## Contents

<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>2</td>
</tr>
<tr>
<td>Restrictions</td>
<td>4</td>
</tr>
<tr>
<td>Water Restrictions</td>
<td>4</td>
</tr>
<tr>
<td>Building Restrictions</td>
<td>12</td>
</tr>
<tr>
<td>Movement and Access Restrictions</td>
<td>16</td>
</tr>
<tr>
<td>Consequences</td>
<td>20</td>
</tr>
<tr>
<td>Agricultural Consequences</td>
<td>20</td>
</tr>
<tr>
<td>Environmental Consequences</td>
<td>24</td>
</tr>
<tr>
<td>Recommendations</td>
<td>36</td>
</tr>
<tr>
<td>Bibliography</td>
<td>38</td>
</tr>
</tbody>
</table>
Restricted Access and its Consequences:

Israeli Control of Vital Resources in the Jordan Valley and its Impact on the Environment
1967, there was no real
divide between the Jordan Valley and the rest
of the West Bank. The Israeli occupation of the
West Bank began in 1967 when Israeli forces
took control of the Palestinian land from the
Jordanian government. Immediately at the
beginning of the Israeli occupation, regulations
were imposed on the Palestinian people that
drastically limited their rights and made them
dependent on Israel. Decades later, Israel has
effectively separated the Jordan Valley from
the rest of the West Bank and vastly decreased
the Palestinian population in this highly strate-
gic area. In addition to the extremely adverse
effects on Palestinian population levels in the
Jordan Valley, decreasing from over 320,000 in
1967 to 52,000 today, the Israeli policies have
had grave consequences for the Palestinian
agricultural sector and have produced a num-ber of continuing and residual environmental
concerns. Nowhere are these policies more
detrimental to Palestinian farmers and more
evident in the Palestinian environment than in
the Jordan Valley.
As one of the most fertile areas in the region, the Jordan Valley is ideal for agricultural production. Consequently, this area is one of the first that felt the negative effects of both the Israeli occupation and the growing Israeli settler community. Immediately after Israel took control of the West Bank, it monopolized the water resources – the most vital resource in the area – and began to push Palestinians out of the Jordan Valley. Beyond simply being geographically isolated, towns within the Jordan Valley are separated from each other by a sophisticated network of checkpoints and by other restrictions on movement that have caused the World Bank to term the Jordan Valley as “Israel’s Eastern Separation Zone” (see: Movement and Access Restrictions, below.)

Inside the Jordan Valley, Palestinian residents and farmers are forced to live in a world that is defined by the restriction of freedoms. Farmers and families alike are forced to cope with an unreasonably and unjustifiably low level of water allocated by the Israeli government. The lack of water available to Palestinians in the Jordan Valley is compounded by the strict enforcement of building restrictions, the prevalence of military zones, and movement restrictions that present significant challenges to the Palestinians who reside in the Jordan Valley.

Importantly, the effects of the Israeli occupation on the Jordan Valley will continue to be felt for years. The infiltration of chemicals into the water supply and into the soil will damage future agricultural yields and continue to endanger the health of Palestinian families. The damage to the Palestinian environment is already observable today, and will only become more evident in the future. This destruction is directly linked to the very Israeli policies that are driving Palestinians from their land.

This fact sheet intends to explore the various policies that Israel has implemented in the Jordan Valley since the beginning of the occupation in 1967, and how the Israeli occupation has affected the Palestinian agricultural community and the Palestinian environment. This study has been divided into two main sections.

In the first section, the various Israeli policies of the occupation will be described. This report will discuss the restrictions on water, construction, movement as well as the demolition and confiscation of personal Palestinian property. The second section will look at the agricultural and environmental consequences of each of these policies.

It is the authors’ hope that this report brings the dire situation in the Jordan Valley to the attention of the international community and the Palestinian public. For any future Palestinian state, the Jordan Valley will be a crucial region. The ripe agricultural conditions and the beauty of the Valley hold significant economic potential for a future Palestinian state through the expansion of the agricultural sector and the development of a tourism sector. In addition, the border crossing points connecting Palestine to neighboring countries make the Jordan Valley one of the most strategically important areas in Palestine, providing a future Palestinian state with the ability to interact with the Arab world without dependence on Israel. Moreover, Palestinian sovereignty over the Jordan Valley is necessary for Palestinians to harness their natural resources, which will ultimately ensure the sustainability of the agricultural sector and the lasting health of the environment in this critically important region. As such, control over the strategically important Jordan Valley will be vital to the sovereignty of a future Palestinian state.
Restrictions

The allocation of water to Palestinians and Israelis has been discriminatory and unequal since the beginning of the Israeli occupation of the West Bank in 1967. Immediately after the 1967 war, Israel denied Palestinian access to the Jordan River, via military orders such as 92, 158, and 291, which granted complete authority over all water issues to the Israeli Occupation Forces (IOF) and abrogated all preexisting agreements on water usage. This immediately relegated to the mercy of the occupation the Palestinians’ ability to access this most basic and necessary resource. Since 1967, Israel has destroyed 140 Palestinian water pumps and has confiscated another 162 agricultural water projects that had been developed under Jordanian rule. In 1967, there were 774 operational wells, a number that was reduced to 328 by 2005.

By destroying Palestinian wells and limiting water availability to Palestinians, and thus limiting the ability of Palestinians to fully realize the potential of the agricultural sector, Israel is in violation of International Covenant on Economic, Social and Cultural Rights (ICESCR), which guarantees the right of an adequate standard of living and ensures the right to most efficiently utilize national resources. Likewise, the unequal allocation of water to Palestinians and Israeli settlers living within the West Bank, which will be discussed below, violates a number of international agreements prohibiting the promotion of institutionalized racism, including the International Convention on the Elimination of All Forms of Racial Discrimination, the International Covenant on Civil and Political Rights (ICCPR) and the...
Fourth Geneva Convention relative to the Protection of Civilian Persons in Time of War. Indeed, Israel’s discriminatory water policies of confiscation, destruction, and reallocation throughout occupied Palestine are unquestionably illegal under several international laws and agreements.

Ironically, despite the regional concern over water scarcity, there is enough water in historic Palestine to meet the minimum demands of both the Palestinian and Israeli populations. In historic Palestine, water is pumped from the Coastal Aquifer (located along the coast of the Mediterranean Sea), the Mountain Aquifer (located primarily under the West Bank), the Jordan River (along the eastern border of the West Bank), and Lake Tiberias (in the Galilee region to the north of the West Bank). The Jordan River and the Dead Sea are unavailable for Palestinian use because the banks of the river have been categorized by Israel as restricted military zones since 1967, while the Coastal Aquifer and Lake Tiberias are geographically unavailable to the West Bank. Thus, the only accessible water source for the Jordan Valley is the Mountain Aquifer, which consists of three main basins: the Western Basin, the Northeastern Basin, and the Eastern Basin. While these three basins have a combined yearly production potential of 725.3 million cubic meters (MCM) of water, Palestinian usage is extremely limited.

It is the restrictive and discriminatory policies of the occupation that are reducing Palestinian water consumption to dangerously low levels. While the Mountain Aquifer has an an-
Annual potential of 725.3 MCM, Palestinians are allotted merely 72.3 MCM per year. Although Article 40 of the 1995 Oslo II agreement stipulated that Palestine has the right to 20% of the water located under the West Bank, currently Palestinians are able to abstract only 17%. Despite the Palestinian population growing by 50% in the 15 years since the Oslo Accords were signed, no adjustment has been made on the quantity of water allotted to Palestinians. In fact, Palestinians receive less water today than in 1995, resulting in a continuously decreasing per capita consumption rate. The lack of water is particularly obvious in the Jordan Valley; in a 2009 survey conducted by Save the Children, only 37% of respondents from the Jordan Valley said that water was available, compared to 86% among the general Palestinian population in the West Bank as a whole.

The contrast between Palestinian and Israeli consumption is vast. Each year, Palestinians consume a total of approximately 120 MCM of water originating in the West Bank, while Israelis consume 483 MCM per year, which is over four times more than Palestinians. The World Health Organization recommends that each individual has access to 100 liters of water per day, but the 120 MCM consumed by the Palestinian population equates to a per capita statistic of between 50 and 70 liters per day. While this reflects average daily consumption for Palestinians, one-quarter of Palestinians receive less than 50 liters per day, while some Palestinians, including many in the Jordan Valley, receive as little as 10-20 liters per day per person. Such a dangerously low amount of water per day is astonishingly lower than both the recommended daily intake and the absolute minimum daily consumption needed to avoid ‘mass health epidemics.’

The lack of Palestinian accessibility to an appropriate amount of water is compounded by Israeli restrictions that limit the ability of Palestinians to connect to suitable water
networks or to construct reliable alternatives. Nearly half (49%) of all Palestinians – primarily in the Jordan Valley – are not connected to any water network and are forced to rely on wells, cisterns, or water tanks for their water needs. As Israel routinely denies permits to build or rehabilitate water structures in the Jordan Valley, many Palestinians are forced to rely on water tanks in order to meet basic household needs.

As most Palestinians in the Jordan Valley are not connected to piped water networks, they are forced to purchase water from the Israeli water company Mekerot or to purchase tanks to refill at local springs. Water purchased from Mekerot is typically abstracted from the Mountain Aquifer in the West Bank and costs nearly 10 times as much as piped water. The average price for piped water is around 2.6 NIS per cubic meter while the average cost of water for tanks is 14.23 NIS per cubic meter, and in some places in the Jordan Valley this cost can reach 37.5 NIS per cubic meter. The cost increase is due in large part to the Israeli restrictions on movement, thus increasing the price of transport. Since the beginning of the second Intifada, the price of water tanks has increased by 101-153%. Such steep costs have resulted in some households spending as much as 40% of their income on water, a number that increases to 50% for families who are completely dependent on water tanks. In addition to the burden of extra expenditures on water, the lack of adequate water for irrigation has cost the Palestinian agricultural sector 60,000 dunums of uncultivated farmland and 12,500 jobs in the Jordan Valley, according to the World Bank.
“We have been living in this area for many years and have been using the spring that connects the two parts of our village. What started happening was the settlers from Maskiot started walking down the hills and stopping us from reaching the spring. The settlers, especially the younger ones, would steal our animals and bring them to the settlement, especially our camels, which are very profitable. We would eventually get them back but the settlers have taken our land and then had the army come and declare the land as a closed military zone or a natural reserve. Since the animals have much less access to varying water sources, the water in the spring is almost gone and is getting contaminated by overuse. All these factors have caused us to bring water tankers which now takes up 33% of my income and is only getting worse and worse. We rarely had water problems until three years ago, now I don’t know how much more we can pay for water at these prices."

Ahmad, Ein al-Hilwe
As you see on the hill, there is a big Israeli water cistern surrounded with a barbed wire fence on the hill that slowly confiscated all the water in the area. Israel also made our wells obsolete by digging deeper wells, which brought the water level down below our ability. This wadi used to have abundant water resources for all the Bedouin around Jericho but now, we have to have water tankers come bring us water which costs 50 shekels a day [each holds 4m³], every day, and this not enough for the animals and my family. We use the water for everything from cleaning to cooking to drinking. My sheep were sick this year and I think it is because of the complete shift in water usage, but now I am worse in debt because my sheep are not sellable. I was in debt because of water before, but it has only gotten worse.”

Aiham, resident of Ras-Al Auja
The extreme water crisis afflicting Palestinians in the Jordan Valley is contrasted by the obvious overuse of water in nearby Israeli settlements. Whereas the average Israeli consumes up to 350 liters of water each day, Israeli settlers typically consume even more, despite living among a majority-Palestinian population denied proper access to water. With 56,000 Palestinians in the Jordan Valley and 9,400 settlers, there are over 45,000 more Palestinians than settlers; however, settlers use six times more water than Palestinians. In the north of the Jordan Valley, for example, the Palestinian town of Tubas is located only 12 kilometers from the illegal Israeli settlement of Beka’ot. On average, Palestinians in Tubas use 30 liters of water per person per day. In Beka’ot, average water usage jumps to 401 liters per person per day.

In order to enter an Israeli settlement, Palestinians are required to apply for and receive special (typically labor-related) permits. Palestinians are prohibited from driving their personal vehicles in settlements even with the permit. Israeli settlements are comprised of lush foliage and open areas, a stark contrast to the surrounding Palestinian poverty and population density. The Massu’a settlement, for example, has fewer than 150 Israeli settlers and covers over 800 dunums. In comparison the Palestinian village of Zubeidat, which has more than 1500 residents living/harvesting on 360 dunums. The houses in Massu’a are generously spaced like those in most of Israel and most have personal lawns and gardens. In the middle of Massu’a is a large swimming pool for use by the settlers only, free of charge. Throughout the day, fresh water is pumped into the settlement pool from Israeli-only pumps, further depriving the Palestinian neighbors of the most precious natural resource and forcing many to purchase expensive tanked water from Israel.
**The story of Jiftlik**

“For more than two weeks, I have not purchased water. I depend on the scarce and remaining salty water available in our wells. I am currently unemployed. Where can I get the needed money to feed my children and buy water for our household consumption? How can I plant my trees in a land that is near desertification and suffering from thirst due to the lack of water resources? Even our water collection tanks, distributed by donors, have been entirely destroyed by the Israeli Occupation with the aim of deporting us. And unfortunately, we haven’t seen any tangible support from our leaders, except often hearing words of conviction and denunciation, whereas our dire situation remains unchanged.” - Jiftlik resident Haj Mohammad Abed Nabi Odeh

Lying between the yellow hills of the Jordanian borders, and in the Jordan Rift valley, the village of Jiftilk was historically considered a key parcel of the green food basket of Palestine. It was famous for its renowned history. Since the Ottoman Empire it was well known by the name “the Land of the Emirate” and “the Oasis of the Green Valley.” However, today the Oasis is witnessing a crisis caused by the Israeli Occupation. Although it is located on a significant natural water aquifer, the village is suffering from extreme water shortages. Moreover, located in Area C, Jiftlik has no electricity network and lacks the bare minimum of infrastructure and essential services. The village of more than 5,000 inhabitants in the north of Jericho Governorate, is suffering from various environmental hazards, water theft and deportation of its inhabitants.

Jiftlik, despite its size, has not been immune from the Israeli policies against its citizens, especially since it is located above the Western Basin of the Mountain Aquifer. Its natural springs and artisan wells have long benefited from the flow from the Jordan River. Since the first implementation of Israeli military law in 1967, Jiftlik’s natural water sources have felt the effects of Israel’s water policies concerning the Mountain Aquifer and the Jordan River. The water springs have gradually dried out with no other water resources available in the village. Instead of being one of the main sources for cold water for its agricultural area, the water networks in Jiftlik are currently dry, filled with garbage and dirt. The green agricultural areas are becoming scarce and are on the verge of disappearing.

On the hills looking over the eastern lands of Jiftlik, the Massu’a settlement, which is built on the rubbles of the “Abu Ojaj” Palestinian refugee camp, continues to expand. On the northern hills, the Hamra settlement joins the Massu’a settlement, surrounding the Palestinian village below. While Jiftlik is slowly watching its natural water sources and artisan wells dry up, two large water tanks located on the hills above provide an uninterrupted flow of water to the Israeli settlements. Israeli water pipes pass through the village, sometimes through Palestinian houses, feeding the large water tanks that only service the settlers. Jiftlik’s inhabitants confirm that “they hear the voice of running water in the pipes passing through their houses, while they suffer from the lack of water.” To replace the once bountiful springs and wells, Palestinian villagers are forced to “purchase some [drinking water] from the Froush Beit Dajan village at the price of 25 NIS per cubic meter, or 75 NIS per tank.”
The modern restrictions on Palestinians in the Jordan Valley were created by the Oslo Accords in the mid-1990’s that designated almost 95% of the Jordan Valley as “Area C.” While Palestinians have control over only 5.62% of the Jordan Valley, 50% is controlled by Israeli Settlement Regional Councils, and 44.37% is designated by Israel as closed military zones. The Area C classification means, among other things, that Palestinians need permits from the Israeli Civil Administration to undertake any type of construction. These restrictions on construction were compounded by the creation of the Joint Water Committee (JWC) through the Oslo Accords. The JWC is a committee comprised of Israeli and Palestinian officials that oversees and authorizes all Palestinian water development in the West Bank. Despite often being championed as an example of cooperation, the committee further impedes Palestinian construction in Area C by institutionalizing Israeli dominance and control. The JWC has no control over water projects in Israel proper or in Israeli settlements, but full control over Palestinian projects. In order for Palestinian water projects to receive authorization, Israel must consent through its participation in the JWC.

As the JWC institutionalizes Israeli control over Palestinian resources, it “disempower[s] the Palestinians from being able to take responsibility for water management,” according to the environmental nonprofit Friends of the Earth Middle East in a report from 2009.

Amnesty International released a report in 2009 that noted that the decisions of the JWC were dominated by the Israeli side:
"Restricted Access and its Consequences"

"An international water expert who attended several JWC meetings on behalf of a major international donor told Amnesty International that decision-making, in practice, was almost entirely in the hands of the Israeli representatives: ‘The interaction between the two sides during the meetings can best be described as an exercise in subjugation and humiliation.’"\(^{24}\)

In effect, the JWC has become a significant barrier to Palestinian water and sanitation projects across Palestine.\(^{25}\) Additionally, as nearly 95% of the Jordan Valley is categorized as Area C, all projects that are proposed in this area must also be approved by the Israeli Civil Administration. It is nearly impossible for Palestinians to receive the proper permits from the Civil Administration to construct in the Jordan Valley; between 2000 and 2007, only 6% of Palestinian construction permit requests were approved for the Jordan Valley.\(^{26}\)

"Our village of Ein al-Beida is at maximum capacity and soon we are going to have to build illegally just to be able to absorb our growing population. Our neighbor Bardala has exactly the same problem. We both have had families try and build in Area C on the outskirts of the village, but the Israelis have demolished their structures just as soon as they built it. If we do not solve this problem soon, we are going to face a similar situation as Zubeidat where we will be imprisoned on an area of land too small for us."

Sameer, Ein al-Beida

"The Israelis do not keep their demolitions just in Area C, which is wrong in the first place. I built a structure in Area B of the village of Tamoun not that long ago. Israeli authorities and soldiers came by and gave me a demolition order. This was my eighth notification in the past three years for structures that I’ve built. Israeli soldiers have come by with officials to threaten me not to rebuild any of these structures again. There is nothing that can make me stop building on my land, especially not illegal demolitions and threats."

Abdullah, Al-Biqa’ah

The JWC has effectively barred many Palestinian communities in the Jordan Valley from constructing new or connecting to existing water networks. Consequently, Palestinians must find other means of obtaining water. Unfortunately, because the Mekerot Company charges Palestinians unreasonably high prices for water, many Palestinians are subsequently unable to afford to stay on their land or they must adapt their lifestyles to survive with so little water in such a dry climate. Many of the herders’ communities, both Bedouin and semi-nomadic, are forced to sell their livestock, and farmers are unable to properly or efficiently irrigate their crops.\(^{27}\) Others are unable to receive the proper Israeli permits to connect to existing water networks and are consequently facing the prohibitively high cost of tanked water. As a result, many Palestinians are often forced to build wells and other water collection mechanisms that are technically illegal and routinely demolished by the Israeli authorities.

"I have around 400 sheep right now in the current situation, with having to pay farmers with tractors to bring in water tankers all the time for them and my family. I used to have more sheep but I am forced to sell more sheep to pay off my water debt I have incurred since I am not able to utilize the water resources in the area due to Israeli soldiers and settlers stealing the water and closing off the area. If I did not have to purchase water, I would be able to have more sheep, and be able to sell them at their most profitable level and not prematurely. This makes the cycle so much worse, I need to sell my sheep early for less money to afford water when I am surrounded by it."

Abdullah, Al-Biqa’ah

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Abdullah, Al-Biqa’ah
Demolition of Homes and Structures and Subsequent Land Confiscation

As it is nearly impossible to receive building permits from the Israeli authorities and JWC, many Palestinians build without them. The structures that are built illegally are inadequate, structurally unsound, and under constant threat of demolition. A survey by Save the Children in 2009 found that 31% of households had been temporarily or permanently displaced since the outbreak of the second Intifada (September 2000) due to Israeli house demolitions, military orders, and other restrictions. This situation was further accelerated from January of 2010 until June 2011, when 350 demolition, evacuation, and removal notifications were given out to 11 different communities in the Jordan Valley. These violations led to significant losses in houses, shelters, barns, and religious places. The majority of notifications were for demolition, and 272 Palestinian-owned structures that received demolition orders were subsequently destroyed. Of these 272 demolitions, 178 took place in eight communities in the Jericho and Tubas governorates, of which 121 were in the Yarza and Al-Farrisiya communities. This is part of an overall increase in demolition of structures in Area C. As the United Nations Office for the Coordination of Humanitarian Affairs (OCHA) notes, in just the first six months of 2011, there were five times as many structures demolished and people displaced as during the first six months of 2010. As part of the increase in the demolition of structures in Area C, Israel has targeted water structures. In June 2011 alone, three Palestinian wells in the Jordan Valley were destroyed by Israel.

This increase in demolitions, and the practice of demolitions in general, is unquestionably illegal under the 4th Geneva Convention (Article 53), which states that “any destruction by the Occupying power of real or personal property belonging individually or collectively to private persons, or to the State, or to other public authorities, or to social or cooperative organizations, is prohibited, except where such destruction is rendered absolutely necessary by military operations.” While Israel often cites a lack of permit as justification for demolitions, there is little evidence that such demolitions are required by military operations.

This further violates Article 147 of the same convention, which considers “extensive destruction and appropriation of property, not justified by military necessity and carried out unlawfully and wantonly” as a grave breach of said convention.
In addition to the demolition of structures, Israel routinely confiscates public and private Palestinian land. Since the occupation began in 1967, Israel has confiscated 200,000 dunums of West Bank land. One striking example of land confiscation is in Ein El-Hilwe and Al-Farisiya where 200 and 35 dunums, respectively, were confiscated in the past year. The confiscated land was utilized by Israel for the expansion of the settlements of Maskiot and Rotem, which are adjacent to these villages and have fewer than 175 settlers combined. This further violates the 49th article of the 4th Geneva Convention that states, “the occupying Power shall not deport or transfer part of its own civilian population into the territory it occupies.” This is just a part of the systematic expansion of illegal Israeli settlements in the Jordan Valley which is exasperated by the fact that a new plan, formulated by the settler department of the Zionist Federation, has been developed and is awaiting approval from the Israeli Ministry of Agriculture. The plan includes an increase in the amount of dunums given to settlers in the Jordan Valley by 130%, and increases the amount of water allocated to settlers from 30 to 51 cubic meters per person per year.

**Confiscation of Property (Non-Land Related)**

Israeli authorities and settlers routinely confiscate Palestinian agricultural property such as tractors, animals, and water tankers in the Jordan Valley. Since the Israeli authorities control so many aspects of the lives of Jordan Valley residents, it is not surprising that confiscation is not just limited to land. Israeli authorities cite various reasons for the confiscations, such as a lack of a license, or as a tactic used for leverage in terms of information, money, or influence, as has been stated in interviews with local Palestinians. For example, in September 2008, the Israeli army confiscated four water tanks in the villages of Hadidiya and Hamra. In February of 2009 a mobile water tank was confiscated from Latoon Abu Jumma by the Israeli authorities as well. In Bardala in May 2011, Israeli authorities confiscated 13 tractors under the pretense of not having the proper license. In 2007, in the village of Humsa the Israeli military confiscated the village’s water tanks and tractors, which were the only way to obtain water. In addition to having a large fine levied on them, the Palestinians were forced to sign a pledge to the Israelis to never return to the area where they had been living.

Confiscation of essential property as a means to pressure residents into relocation is a gross violation of Article 49 of the 4th Geneva Convention, which states that “the Occupying Power may undertake total or partial evacuation of a given area if the security of the population or imperative military reasons so demand,” but “the Occupying Power undertaking such transfers or evacuations shall ensure, to the greatest practicable extent, that proper accommodation is provided to receive the protected persons, that the removals are effected in satisfactory conditions of hygiene, health, safety and nutrition, and that members of the same family are not separated.”

Israel has not adequately justified any military need for such expulsions, and has completely ignored its responsibility, under the Geneva Conventions, to provide for the Palestinians that are driven from their land.
Movement and Access
Restrictions

While all of Palestine struggles with Israeli limitations on the right to freedom of movement, the Jordan Valley is “one of the most restricted areas on earth.”\textsuperscript{43} The restrictions on Palestinian movement within, as well as to and from, the Jordan Valley, are exceptional.\textsuperscript{44} Israel imposes restrictions on the Palestinian right to movement in several ways, including the installation of military zones, the use of checkpoints, and the creation of a strict permit system. Through these tactics, Israel has been able to effectively control and restrict the movement of Palestinians.

Israel drastically restricts the movement of Palestinians between the Jordan Valley and the rest of the West Bank through four permanently-staffed IOF checkpoints: Tayasir, Hamra, Ma’ale Efraim, and Yitav.\textsuperscript{45} Only those Palestinians who hold identification papers proving residency in the Jordan Valley or those who have special permits are allowed to enter the Jordan Valley in their private vehicles. Palestinians are able to enter the Jordan Valley without crossing through a checkpoint by entering via Road 1 in the south; however the distance Palestinians must travel to reach Road 1 makes this an impossible option for most Palestinians. For example, the distance between Tubas, north of the Jordan Valley, and the village of Bardala, in the Jordan Valley, is a mere 24 kilometers through the Tayasir checkpoint. However, to reach Bardala via Road 1, the journey would cover 176 kilometers, a sevenfold increase.\textsuperscript{46}
The separation of the Jordan Valley from the rest of the West Bank is particularly damaging for the Palestinian farmers who own land in the Valley, but who are residents of neighboring villages. While there was no issue with such an arrangement before 1967, Israeli policies make it more difficult and expensive for farmers to tend to their land. The artificial amputation of the Jordan Valley through the establishment of numerous checkpoints has also created unnecessary troubles for farmers who sell their produce outside of the Jordan Valley, as the checkpoints delay the transportation of goods.

Likewise, the checkpoints artificially raise the prices of goods entering the Jordan Valley. As noted above, the price of tanker water has increased exponentially since the beginning of the second Intifada, by as much as 153%.47 This increase in tanker prices is greatly due to the restrictions on movement that make many communities in the Jordan Valley difficult to reach.

Concerning the closures and restrictions that separate the Jordan Valley from the rest of the West Bank, the World Bank has concluded that Israel has created a “de facto Eastern Separation Zone”:

Furthermore, combined with checkpoints and a permit regime imposed on access of Palestinians from other areas to the Jordan Valley, Israel is enforcing a de facto Eastern Separation Zone without walls or fences along the Jordan Valley and the shores of the Dead Sea. This zone includes 43 Israeli settlements and 42 Palestinian localities. In the Jordan Valley, all land outside of the 42 Palestinian localities, regardless of its declared purpose, was declared the jurisdiction of the settler regional council in the area, the Arvot Hayarden Regional Council, effectively putting it beyond reach for future Palestinian use or expansion.48
In addition to the restrictions of movement between the Jordan Valley and the rest of Palestine, Israel has imposed severe restrictions on Palestinian movement within the Valley by the creation and expansion of Area C, as noted above. The military-controlled areas include nature reserves, military bases, and free-fire zones, and are prohibited from Palestinian use of any kind. The closed military zones were unilaterally imposed upon the Palestinians and often encompass areas previously inhabited by Palestinians. Thus, entire Palestinian communities that were established long before the beginning of the Israeli occupation in 1967 are located in what have since been declared military and free-fire zones.

Importantly, the restrictions of Palestinian movement within the Jordan Valley have decreased the land available to Palestinians, most notably affecting both Bedouin and semi-nomadic herders and farmers. While the Palestinian population of the Valley is approximately 56,000, 70% live in the Jericho
area while the rest live in small herding and farming communities that have existed long before 1967.\textsuperscript{52} There are approximately 15,000 semi-nomadic Bedouin living in the Jordan Valley, traditionally earning money through animal husbandry and herding. The restrictions on movement in the Jordan Valley have severely curtailed the ability of the Bedouin communities to survive. As their survival has traditionally depended on the ability to move freely, the classification of nearly 95\% of the Valley as prohibited areas has had dire consequences. The inability to access large swaths of unused grazing land in Area C has forced many Bedouin to abandon their traditional way of life and forced entire communities into uncomfortable sedentary lifestyles.

Farming and grazing on land in Area C is particularly dangerous for Palestinians due to the unilateral Israeli declaration of free-fire and military zones. This danger is greatly compounded by the use of mine fields by the Israeli military throughout the Jordan Valley. Since 1967 Israel has created and maintained around 51 land mine fields in the West Bank and Gaza Strip. Israel has planted land mines on thousands of dunums specifically around or in Bedouin agricultural and grazing areas in the Jordan Valley.\textsuperscript{53} Land mines cover over 200,000 dunums in Area C throughout the West Bank. Since most of the Jordan Valley is Area C, the region has several land mine fields. In addition to the obvious danger of land mine explosions, the size of these fields tend to grow every year as rain and floods cause the land mine fields to expand “naturally.”\textsuperscript{54}

Moreover, the mine fields are often located in unattended and unfenced areas with no warning signs. As a result, children account for around 30\% of the injuries and deaths caused by land mines. In the Jordan Valley, these tragic accidents occur most often while children are herding family animals around their villages in search of grassed areas, which are the most likely to be mined. Since Israel does not release maps of the exact locations of these land mine fields due to their “security interests,” Palestinians cannot knowingly avoid them.\textsuperscript{55}
The agricultural sector is more than a pillar of the Palestinian economy. It symbolizes the Palestinian identity and emphasizes the connection between the Palestinian people and their land. It stands as a symbol against the Israeli occupation and provides an important safety net against food insecurity and poverty. Despite the importance of agriculture in Palestine, the Israeli occupation has created massive challenges that have greatly damaged the agricultural sector.

The severe restrictions placed on the Jordan Valley have deeply limited the productivity of the Palestinian agricultural sector. By restricting the land and resources available to Palestinian farmers, Israel has kept the Palestinian agricultural yield far below its potential. Consequently, Palestine is forced to import a great quantity of food while struggling to maximize production on its own land. Of all agricultural land in the West Bank, 62.9% is located in Area C, most of which is in the Jordan Valley, where Palestinians are unable to expand their agricultural production and often are required to obtain special permits to simply reach their land. The community of Zubeidat, for example, owns farmland that is located in Area C. Farmers from Zubeidat are issued permits to access their land from 6:00 in the morning until 6:00 in the evening; outside of these hours, the agricultural land becomes a military free-fire zone.

Moreover, the checkpoints and other movement restrictions that govern when and where Palestinians are able to enter or exit the Jordan Valley have a drastic effect on the ability of farmers not only to reach their land, but also to deliver their goods to market. The complex network of checkpoints and Israeli-only roads increases the cost of transportation and often increases the
travel time as well; transportation costs have increased by 35.6% since 2000, and journey times have jumped by nearly 40%. Consequently, produce that is meant for export often spoils as it languishes at checkpoints. The delay caused by checkpoints reduces the quality of Palestinian produce, while the limited number of authorized transporters and the closure of alternative crossings also increase the price of farming, raising prices for consumers and producers. Such restrictions also increase the price of goods brought into the Jordan Valley that are essential for farmers, such as fertilizers and metal pipes. With higher costs for transportation as well as the import and export of produce and farming equipment, Palestinian products are often more expensive than that of their Israeli competitors.

The restrictions on land, and consequently on the ability of Palestinians to cultivate the land, have depressed the Palestinian agricultural sector. The World Bank estimates that, due to Israeli movement and access restrictions, 60,000 dunums of agricultural land is unavailable to Palestinians in the Jordan Valley. Overall, only 247,000 of 708,000 dunums of irrigable lands are used by Palestinians. Economically, the fact that such a vast majority of agricultural land is in Area C results in the loss of US$480 million annually (around 10% of GDP) and around 110,000 jobs. Currently, the agricultural sector in Palestine accounts for 11-20% of the economy, and 15% of the formal workforce. In 1967, however, the agricultural sector accounted for 37.4-53.5% of GDP and 46% of the formal workforce. While 80% of Palestinian agricultural production was exported in 1967, most production is today consumed locally or sent to Israel. It is estimated that the Palestinian agricultural sector, free of the constraints imposed by the Israeli occupation, would produce around US$1 billion in agricultural exports.

“We have had sporadic issues with exporting our produce through the checkpoints. The worst time was between 2009 and 2010 when Israel had stricter procedures on the movement of goods. What this included was the unloading of produce from one truck to another, which was preceded by long lines and slow checks by the soldiers. This whole process could take anywhere from 30 minutes or the whole day, and the drivers would have to stay overnight. The produce would never keep its freshness and high quality while being unloaded in the hot sun.”

Sameer, Ein al-Beida
The growing restrictions of movement have also reduced the production capacity of Palestinian farmers. A 2006 survey of farmers in the Tubas district (the north of the Jordan Valley) revealed that 98.3% of farmers were losing production capacity due to Israeli policies. Of respondents, 70% said they had experienced production losses between 5% and 20%, while 10% of respondents said they had lost over 40% of their production capabilities.\(^67\)

Conversely, Israeli settlement plantations in the Jordan Valley are extremely successful: 95.1% of all agricultural land cultivated by settlers is located in the Jordan Valley. Of all irrigated land, 50% is under settler control, and settler plantations produce nearly 300,000 tons of produce every year.\(^68\)

In addition to the limitations imposed on the more traditional farming communities in the Jordan Valley, the occupation has greatly reduced the potential for animal husbandry and herding. Around 80% of the Palestinian grazing land is located in the Jordan Valley, and nearly 100% of this grazing land is located in Area C. The closure of large swaths of land for military purposes has caused severe over-grazing by Palestinian herders in the small areas of the Jordan Valley that are still available. The accessible rangeland provides around 1,700 tons of animal feed (0.075 tons/hectare over 22,500 hectare), a mere 2% of the required amount of feed for the Palestinian herds. The Palestinian herding community, generally very poor, is forced to purchase expensive commercial feed to make up for the lost potential.\(^69\) Thus, one of the most impoverished demographic groups is punished two-fold by losing important income generated by grazing and being forced to purchase expensive feed.

The loss of grazing land has had two major consequences for the herding communities.
On the one hand, many Palestinian Bedouins have been forced to sell entire flocks of goats, sheep and cows in order to buy exorbitantly-priced water, commercial feed, and shelter, thus depriving entire communities of their only sustainable means of income. On the other hand, for those who have maintained the traditional lifestyle, reduced access to grazing land has forced Bedouins to bring animals to limited and infertile lands to graze. The reduction of available grazing land in the Jordan Valley has directly contributed to an environmentally unstable process of desertification which has progressively devastated the Jordan Valley for years. Over-grazing has resulted in the loss of vegetation cover, a decrease in the natural biodiversity, soil erosion problems, and, in some areas, complete desertification.\textsuperscript{70}

Around 80\% of the Palestinian grazing land is located in the Jordan Valley, and nearly 100\% of this grazing land is located in Area C.
Environmental Consequences

The environmental consequences of the Israeli occupation are visible and dangerous across the West Bank and Gaza, but are particularly worrisome in the Jordan Valley. The restrictive policies imposed on the Palestinian people and lands are causing serious and potentially irreversible environmental damage. High levels of soil and water salination can be traced directly back to the Israeli policies. The deterioration of the Palestinian environment is not simply due to the practices of the Israeli army and the Israeli settlers, but also to the various Israeli policies and practices that prevent the Palestinians from properly attending to the needs of the environment. While the effects of the policies of the occupation on the Palestinian people and environment are evident today, the environmental degradation caused by the occupation will continue to haunt Palestinians for years to come.

“The crops from our area, Wadi Fara’a, have only become worse and worse. There are many reasons for this. Many of the farmers are forced to implement illegal, and environmentally unsafe methods, just so they can yield a minimal level of crops, which they are dependent on. Wadi Fara’a is the village where most of the industrial sewage and untreated water and waste from the Nablus region settle, including from illegal Israel settlements. This has many agricultural and health hazards by using the water. Since farmers are strangulated by Israeli building restrictions, the farmers build illegal water pipes that are exactly in the polluted area. This creates very poor and poisonous produce, which means we cannot export them or even consume them because of the very real risk of health risks which are already obvious.”

Saeed Shtaiyeh, Engineer and President of the Agricultural Middle Rift Valley Association
As discussed above, the water that is available to Palestinians in the West Bank is limited to a mere 72.3 MCM per year, mostly pumped from the Mountain Aquifer under the West Bank. The insufficient amount of water is compounded by the decreasing quality of the aquifer water, resulting in water that is often unsuitable for consumption due to high levels of saline and other more toxic chemicals that infiltrate the aquifer. Unfortunately, the geological composition of this area is predominantly limestone, a particularly permeable rock that allows for a higher rate of pollution penetration into groundwater sources. Therefore, not only are natural organic compounds such as sodium nitrate able to penetrate Palestinian water sources, but inorganic agrochemicals are also able to easily pollute the only water source for the Jordan Valley.71

While there are many factors that influence the salination of Palestinian aquifers, a major cause is the over-withdrawal, or over-abstraction, of water by Israeli wells beyond the rate at which the aquifer naturally replenishes, known as the recharge rate of aquifers. The Western Aquifer, as mentioned above, has an annual abstraction potential of 725.3 MCM, meaning that Israel and Palestine would be able to abstract no more than this potential from the aquifer without permanently lowering aquifer levels. Over-abstraction beyond the recharge rate, then, is the practice of taking more water out of the aquifer than is naturally replaced. Although 90% of the recharge for the Mountain Aquifer takes place in the West Bank, Israel takes far more than its fair share; in addition to receiving 83% of the abstracted water, Israel often over-abstracts from the Palestinian aquifer by as much as 50%, according to the World Bank.72 This amount of over-abstraction reduces the ability of the aquifer to replenish, leading to irreversible damage to the sustainability of the aquifer as well as increased saline levels of this important groundwater source.73 In 2008, the chairman of the Israeli Water Authority stated that over-abstraction, mainly from the Eastern Basin of the Mountain Aquifer, has brought water levels “to the point where irreversible damage is done to the aquifer.”74 The over-abstraction of water by Israel has caused an increase in the salinity of the water in the West Bank, reaching saline levels of 5000 parts per million (ppm), which is 20 times the limit the WHO recommends for drinkable water.75
In the Jordan Valley, the over-abstraction of the Eastern Basin of the Mountain Aquifer has led to a noticeable drop in the groundwater level and quality. Israeli wells reach the lower levels of the aquifer because they are dug deeper than Palestinian wells. Before the beginning of the occupation, Palestinian wells did not need to reach particularly deep depths in order to abstract water, while the very few new Palestinian wells are authorized to reach the lower parts of the aquifer. Consequently, Palestinian wells are only 60-140 meters deep while Israeli wells can reach depths between 300-400 meters. These deep Israeli wells, used nearly exclusively for the benefit of Israeli settlers, lower the shallow water table that provides the water for Palestinian wells. As a consequence, the shallow Palestinian wells are unable to reach the deeper, better-quality water, reducing both the quality and the flow of Palestinian water. Indeed, flow of spring water has gone from 52.7 MCM in 2004 to only 44.8 MCM since 2007, forcing many Palestinians to depend on expensive water sold by Israel. During this same short period, the amount of water bought from Mekerot increased from 42.6 MCM to 49.4 MCM. The decrease in spring water and the corresponding increase in water bought from Mekerot indicates that nearly 50% of domestic water used by Palestinians was purchased from an Israeli company that abstracts water from the West Bank and sells it back to Palestinians at an artificially high rate that is not imposed on settlers.

The continuous abstraction from deep Israeli wells ensures a constant water flow and better water quality for the Israeli settlers, but diminishes water flow from Palestinian sources and often results in Palestinian wells drying up completely. The unsustainable Israeli over-abstraction of Palestinian groundwater is dangerously reducing the sustainable yield of the Mountain Aquifer and increasing the salinity of the entire groundwater source. Even though over-abstraction leads to future consequences that aren’t immediately felt, over 33% of Jordan Valley wells already have higher nitrate levels than the World Health Organization recommends, leading to well water that is unsuitable for drinking because of high salinity and nitrate levels. This means that the damage to the aquifer that is observable today was caused by past environmental abuse, and that over-abstraction today will only cause additional damage to the aquifer that won’t be revealed until a future date.

“...are three main wells around our village that are used for water resources. Mekerot controls them, and if we go over the water quota they set for us, they steal the water from these wells. We have this 250-dunum well that is placed on that hill overlooking our village. Our wells used to supply the village with an adequate level of water. About 15 years ago, Israel, using Mekerot, decided to deepen and expand its well to dig into our main well. This made our well obsolete, but the nearby water reserve is under the exclusive control of Israel and is used in the settlements around us. Then Israel reduced the quota by half over 10 years, told us it was for agricultural use only, and if we go over that limit they steal the water from the other two wells. We are forced to use the water for all purposes including drinking, although it is not made for it.”

Sameer, Ein al-Beida
Agricultural Chemicals

In addition to the high saline levels in Palestinian water caused by the Israeli policy of over-abstraction, the unregulated use of various pesticides and fertilizers creates highly polluted runoff water that eventually finds its way into the groundwater under the West Bank. A chemical imbalance of the Mountain Aquifer, the Jordan River, and the Dead Sea is evident from unnaturally high levels of nitrates as well as the presence of inorganic chemicals. The proliferation of unregulated chemical pesticides and fertilizers in the West Bank is directly related to the inability of the Palestinian Authority (PA) to regulate both the use and distribution of such chemicals in most of the Jordan Valley.

In an effort to reduce the use of harmful agrochemicals, many members of the international community signed the Stockholm Convention in 2004 that banned various chemicals that have extremely negative consequences on the environment, including the notorious “Dirty Dozen” that are banned internationally. Israel is a signatory of the Stockholm Convention, and while Palestine is not, the PA has created the Palestinian Environmental Quality Authority (PEQA) that has banned all internationally-prohibited substances.

Yet, despite the efforts of the PA and the international community, the use of inorganic pesticides and fertilizers is widespread in the Jordan Valley. In 2004, Palestinian farmers applied 464 active substances and over 900 different pesticides – including 14 that are internationally banned – to their crops, and in 2006, it was estimated that 979 tons of pesticides were used. In the West Bank, 30,000 tons of chemical fertilizers and manure and 502.7 tons of pesticides are used annually. Importantly, about 200 tons of methyl bromide (CH$_3$Br, bromomethane) is used every year in the West Bank, accounting for nearly 40.5% of total estimated pesticide use. Methyl bromide, an agrochemical that is known to be ‘ozone depleting,’ is not banned by the Stockholm Convention, but was targeted by the Montreal Protocol of the 1992 Vienna Convention, of which Israel is a signatory. The Montreal Protocol required all signatory states to cease using methyl bromide by 2005. Israel, however, has the largest per capita use of methyl bromide in the world. The Palestinian Environmental Quality Authority, on the other hand, has completely banned the use of methyl bromide in the West Bank.
Other internationally-banned active ingredients used in pesticides and agricultural chemicals include pencozole, methyfenozide, methicarb, kresoxim-methyle, and difenoconazole. Overall, it is estimated that 96.9% of irrigated land and 87% of rain fed land in the West Bank is treated with various harmful and illegal pesticides. The unrestricted use of agrochemicals, though, is not limited to Palestinian farmers. It is estimated that Israeli settlers illegally add another 110 tons of pesticides and 45 tons of the banned methyl bromide every year.

Evidently, under the occupation, PEQA has been unable to prevent the use of banned chemicals or regulate the use of legal chemical pesticides and fertilizers. The unfortunate result is the overuse and abuse of such chemicals, leading to improper and unsafe applications of excessive amounts of chemicals. The piecemeal construction of Palestinian environmental law and the Israeli regulations that prohibit Palestinian government action in Area C greatly contribute to the inability of the PEQA to regulate the agrochemical usage in the West Bank.

PEQA is the successor of the Palestinian Environmental Planning Directorate and the Palestinian Environmental Authority, both of which were based on the Jordanian environmental laws that existed before 1967. As the Palestinian environmental agency evolved, weaknesses and contradictions were identified and eliminated with various new environmental laws, such as The Palestinian Environmental Law and the National Environment Action Plan. The Palestinian Authority also made the environment a central part of the various National Development Plans throughout the last decade.

Despite the advancements in Palestinian environmental law, the fact that the PA is not the ultimate governing authority in much of the West Bank remains a fundamental weakness for PEQA. As the PA does not control the border between Israel and Palestine, it is unable to regulate the goods that enter Palestinian territory from Israel. Likewise, the Area C categorization prevents the PA from exercising full sovereignty over most of the Jordan Valley, preventing PEQA from physically regulating Palestinian farmers and...
the use of agrochemicals. Moreover, a lack of coordination between the PA and the Israeli government has resulted in inefficiencies and contradictions in the environmental law for the West Bank. The contradicting legal statuses of methyl bromide are a perfect example of how the Palestinian and Israeli environmental laws do not correspond. The resulting environmental laws that govern the West Bank are consequently substandard.

According to the United Nations Environment Programme, the governing environmental laws are a “mix of legislation from previous systems, which in terms of environmental protection, is weak, piecemeal and sector-based. In practice, there are fundamental contradictions between inherited laws, new environmental laws promulgated by the Palestinian Authority, and Israeli military law.”

94

“‘The problem with chemicals is already playing itself out. A farmer named Haroun Abu Moughsein from the Kardala village in the north of the Jordan Valley died from inhaling a pesticide during its use as he didn’t abide by the general public safety measures. Ahmad Tawfiq Sebaiee is another case, from the Bardala village in the north of the Jordan Valley, lost six cows as a result of their contamination from an intestinal infection as a result of using concentrated amounts of pesticides on the plants.’”

Jamal Khourshidou, Director of Farmer’s Union in the Jordan Valley

While more developed Palestinian laws and better enforcement are needed from the Palestinian government, the proliferation of chemicals in the West Bank is generally due to the sale of restricted chemicals from Israel and the inability to regulate agrochemical usage in Area C. Reports have shown that the main sources of these agrochemicals are Israeli distributors who sell chemicals to largely uneducated Palestinian farmers and merchants. More often than not, these Palestinian merchants receive directions verbally, as most chemical directions are printed on packaging in Hebrew. The inability to read directions in Hebrew is a major problem for Palestinian farmers; according to a recent study, 86.3% of Palestinian farmers were unable to read directions for the use of agrochemicals due to the Hebrew language barrier, and 95.4% experimented to find appropriate dosages. Agrochemicals imported from Israeli merchants are often sold at lower-than-market prices and lack basic information such as expiry dates or information on storage and disposal, calling into question the quality of the Israeli imports.

One consequence of being unable to read the Hebrew directions on agrochemicals is the inattention or ignorance of Palestinian farmers to the dangers of human contact with various chemicals. For example, many agrochemicals require a strict “security period” after their application, during which time humans must avoid contact with treated crops. Chemicals with this stipulation include confidor, theonex, dicofoil, and lindane, all of which are used by Palestinians on tomatoes, cucumbers, cherries, and grapes. Palestinian farmers are often unaware of the dangers of these compounds and continue to tend to their crops despite recent chemical usage. The pesticides mentioned above are organo-chlorine compounds deemed as carcinogenic and obstruct natural hormone production in the body, as well as the immune and nervous systems. They can cause fetal abnormalities, blood anemia, and have many grave consequences on the lungs, kidneys, liver and blood cells.
“When we need to use chemicals for our farms, we go to the local shop in the village. The merchant gets his chemicals from local Palestinian producers [who purchase the chemicals from Israeli distributors], but most of them come from the settlements. The settlers sell him the chemicals with instructions on usage, and he tells [us] how to use them. The packages never have an expiration date and all the Israeli ones are written just in Hebrew. Although the merchant tells us how to use them, we still have to do trial and error on them to figure out the correct dosage. If we have [a] problem, we bring it to him and we will figure out another chemical or usage.”

The environmental damage caused by the overuse of agrochemicals is only beginning to be observed as the infiltration of agrochemicals into groundwater is not immediately evident. There is a significant lag between the time when agrochemicals are applied and when traces of such chemicals appear in the groundwater, meaning that the effects of today’s agrochemicals will not be felt for years. Moreover, chemicals are very difficult to filter from the soil and water, often taking decades to clear. Groundwater in shallow wells (which, in the West Bank, are always Palestinian wells) is the first to be contaminated and the pollution is incredibly difficult to reverse. Shallow Palestinian wells are twice as likely to experience contamination with pesticide residue in irrigated areas, such as the farming areas of the Jordan Valley.

In the Jordan Valley, groundwater is already showing moderate signs of salinity and sodium imbalance, and extreme signs of bicarbonate and chlorine imbalance. The environmental detriment of these chemicals is also seen in the degradation of the soil in the Jordan Valley. Excessive use of agrochemicals has been proven to increase the level of soluble salts and exchangeable sodium in soil. Saline soil impairs plant growth and can potentially alter soil properties. The combination of chemical residue infiltration into the Palestinian groundwater and the infusion of inorganic chemicals into the soil of the Jordan Valley not only dramatically reduces the productivity of the land, but also has lasting consequences for the future of the Palestinian environment.
A major issue in the West Bank, and particularly the Jordan Valley, is the lack of adequate waste disposal capabilities. The inability of Palestinians in the Jordan Valley to properly treat and dispose of waste poses a dangerous threat to both the health of Palestinians and the environment. The Joint Water Commission (JWC), as mentioned in the building restrictions section above, plays a fundamental role preventing Palestinians in the Jordan Valley from properly disposing of waste. Without permission from the JWC and the Israeli military, Palestinians are barred from constructing proper waste management plants in the Jordan Valley. In this area, only 2% of Palestinians surveyed by Save the Children UK said that sanitation services were available, compared to 61% among the general West Bank population. Overall, 67% of Palestinian communities in the Jordan Valley rely on cesspits and septic tanks that are, at best, poorly lined, although they are often left unlined and unsealed, allowing wastewater to seep into the ground and eventually into the Mountain Aquifer. The use of unsealed cesspits often results in additional forms of environmental damage, such as the contamination of groundwater and soil, as well as subsequent health risks for local communities. The Centre on Housing Rights and Evictions (COHRE) noted that “[a] major problem in the West Bank is the lack of proper disposal of waste from cesspits causing them to overflow leading to environmental pollution (including of water resources) and constituting a health hazard to local residents.”

As Palestinians in the Jordan Valley are forced to rely mainly on cesspits and septic tanks, this area (specifically the Jericho district) is considered to have the worst waste management practices in all of Palestine, despite the absence of industrial activity. In total, 5,373 tons of wastewater is collected in poorly-lined cesspits in the Jordan Valley, greatly increasing the risk of seepage into the ground. All wastewater in the Jordan Valley is released untreated into the environment due to the lack of treatment plants, causing a severe environmental threat in terms of deterioration of biodiversity and contamination of groundwater. Flooding of wastewater collection systems also can cause spillage of raw sewage into residential areas, encouraging the spread of pathogens that are associated with several dangerous diseases, particularly leishmaniasis and diarrhea.
Solid waste collection, management, and disposal in the Jordan Valley are also extremely poor. The lack of solid waste collection services forces many in the Jordan Valley to rely on unmonitored solid waste dump sites. Like cesspits, unmonitored solid waste sites are often unlined and uncovered, allowing for seepage into the ground. The lack of waste collection and management systems is directly related to the extent of open, unmonitored solid waste dump sites.\textsuperscript{112}

Unmonitored solid waste dumps are complemented by the environmentally-unfriendly practice of uncontrolled burning of solid waste in open areas. This practice leads to the unfiltered emission of acidifying and greenhouse gases (namely CH\textsubscript{4} and CO\textsubscript{2}), as well as heavy metals (particularly cadmium and mercury) and dioxins. Indeed, uncontrolled burning of solid waste is a large contributor to the levels of carbon dioxide, nitrogen oxide, and sulfur dioxide.\textsuperscript{113} In addition to potentially irreversible damage to the air quality, human exposure to these gases is directly associated with a number of respiratory problems.\textsuperscript{114}

Proper waste treatment facilities would both reduce the negative environmental effects of waste and provide much-needed benefits. Environmentally-friendly incineration plants for solid waste are able to convert CO\textsubscript{2} into molecular oxygen while using the generated heat to produce electricity.\textsuperscript{115} Likewise, treated wastewater can easily be filtered and used as a replacement fertilizer for much of the agricultural activity in the Jordan Valley.\textsuperscript{116} However, the extreme difficulty in receiving the proper permits in Area C makes the legal construction of waste treatment facilities highly unlikely. There is still no sewage system in Jericho, which is the only major Area A designation in the Jordan Valley; however, encouraging progress has been made on solid waste management by the Palestinian Authority. In the city of Jericho, for example, the PA’s Joint Committee for Services, Planning, and Development has recently transformed a previously unmonitored dumping site into a sanitary landfill. Outside of Area A, though, there have been no efforts by the Israeli administration to either construct waste management facilities for Palestinians, or to authorize the Palestinian Authority to do so.

\textit{Trash brought in by truck}
In addition to Israeli restrictions preventing the construction of adequate waste disposal systems for Palestinian residents of the Jordan Valley, Israeli settlements directly contribute to the waste problem in this region. According to the United Nations Environment Program (UNEP), many Israeli settlements lack any form of treatment for domestic or industrial wastewater. A UNEP report claims that Israeli settlements allow wastewater to flow freely into nearby wadis (valleys), often near Palestinian communities. Israel claims that 66% of its settlements treat wastewater, although UNEP was unable to confirm those claims. Likewise, the report was unable to confirm Israel’s claim that solid waste in settlements is collected, disposed of, and monitored by local environmental councils. Amnesty International and B’Tselem reiterate the concern that Israeli settlements are dumping untreated waste into Palestinian areas; in 2007, only 81 of the 121 Israeli settlements in the West Bank were connected to waste treatment facilities, and no outposts were connected to such plants.

A 2004 study by Friends of the Earth Middle East found that only 6% of settlements adequately treated their sewage before dumping it. Overall, settlers produce an average of 2.21 kg of solid waste per person per day, 80% of which is dumped, untreated or partially-treated, onto Palestinian land. Moreover, wastewater from Jerusalem is also dumped into the environment of the Jordan Valley: nearly 10.5 MCM of sewage is dumped annually from Jerusalem into the Kidron stream, which flows from Jerusalem across the Jordan Valley and terminates in the Dead Sea.

The Israeli settlements in the Jordan Valley produce a higher amount of wastewater than the Palestinian communities in the area. Despite being greatly outnumbered, Israeli settlers produced 38 MCM of wastewater in 2003, compared to 29 MCM of wastewater from Palestinian residents. This disparity is due to the unequal water usage between Palestinians and settlers (see: Water Restrictions, above).

Domestic and agricultural waste is unfortunately not the only environmental concern for the Palestinian territories. A 2006 report by the Palestinian Environmental Quality Authority (PEQA) suggested that Israeli authorities are secretly dumping solid waste and poisonous materials from Israel proper into the West Bank. The Israeli military, meanwhile, has used the West Bank to bury harmful zinc, nickel, and radioactive substances for years, and there are fears that Israel has buried nuclear materials in Palestine.

Importantly, the environmental degradation of the Jordan Valley is both cumulative and delayed, meaning much of the observable damage to the environment was caused by poor practices in the past, and the current abuse will be observed in the future. While it is clear that the Palestinian Authority must do more to prevent environmental degradation from unmonitored use of pesticides and dumping of waste, Israeli policies that have governed the West Bank since the beginning of the occupation have greatly damaged the Palestinian environment. Since the beginning of the occupation of the Jordan Valley in 1967, Israel has used the area as a dumping ground for waste generated both in settlements and Israel proper. While the Israeli government has since closed many of the dumping sites throughout the West Bank, there has been no action taken to prevent further pollution.
Using Wastewater to irrigate crops in Nassariya and Aqrabaniya

Using untreated sewage water to irrigate farm crops has become a serious, widespread environmental hazard, especially in the middle areas of the Jordan Valley. The lack of water in communities such as Aqrabaniya, Nassariya, Beit Hassan, Ein Shiblee, and Jiftlik has forced Palestinian farmers to use untreated sewage as a substitute for clean, agricultural water. The consequences have a negative impact on public health as well as the health of the soil and vegetation.

The Nassariya and Aqrabaniya areas, for example, are characterized by their unique enchanting landscape, along with over 2,000 dunums of agricultural land. Yet, like many other agricultural communities in the Jordan Valley, these villages suffer from a lack of water resources. The twenty four artisan wells in these areas have begun to dry, pumping only around 50 cubic meters per hour, forcing farmers to often purchase water in private tanks at high costs of around 50 NIS per tank.

The cost of agriculture has subsequently increased, leading farmers to depend on untreated household and industrial sewage water to replace clean water. The lack of wastewater and solid waste treatments plants in the area surrounding Nablus has allowed untreated sewage emanating from Nablus to flow towards towards Al-Bathan Valley, to Wadi Faraa. Engineer Saeed Shtaiyeh, the president of the Agricultural Middle Rift Valley Association, has confirmed due to the lack of water, many farmers are forced to extend pipes from the polluted sewage water of Wadi Faraa towards their agricultural lands to be used for irrigation.

The use of untreated wastewater for irrigation has led to many agricultural problems and health hazards. Shtaiyeh observes that its negative impact is more visible in winter than in summer, as rain water facilitates the diffusion of pollution through the pipes of Wadi Faraa. Shtaiyeh also notes that the use of wastewater for irrigation has led to the production of low quality vegetables, damaging the ability of Palestinian farmers to market their produce on Israeli markets.

In order to tackle the water shortage in these areas, many civil society organizations have begun to implement various water collection projects. The Palestinian Hydrology Group, for example, has constructed eight 100 cubic meter water collection pools and two 500 cubic meter metallic tanks (in Nassariya and Beit Hassan.) These water collection projects have benefited 130 farmers by providing clean water to irrigate crops instead of using wastewater.

For many years, the area surrounding Wadi Faraa had been characterized by the abundance of fresh water available through many natural springs and artesian wells. However, the Israeli destruction and confiscation of key water sources have resulted in the reduction of water quantities going through the valley. The valley has now become a stream for untreated sewage water coming from Nablus posing a major health hazard to local Palestinians.
Restricted Access and its Consequences:
Since 1967 continuous and increasing environmentally degrading activity has been permitted and encouraged by the Israeli occupation. The effects have greatly damaged both the environment and the agricultural sector of the Jordan Valley. Among other factors, the restrictions on Palestinian movement and construction, the unequal allocation of water, poor waste management practices, and an unacceptable lack of coordination of environmental laws between Israel and Palestine have had significant environmental consequences, and must be addressed immediately.

Many alarming and environmentally disastrous practices have been described in this fact sheet and must be addressed by the Palestinian Authority, Israel, and the international community. Moreover, weak cooperation between Israel and the Palestinian Authority on environmental issues has compounded a continuously worsening situation. It is imperative that action be taken to ensure that the environmentally-unfriendly practices outlined above are banned, and that the agricultural activities throughout the Jordan Valley are regulated.

Each party has its own obligations to reverse these disastrous trends involving the environment in the Jordan Valley. Israel, the occupying power, has legal obligations to facilitate the well-being of Palestinians living in areas it occupies. The Palestinian Authority, being the authority for the Palestinians in parts of the West Bank and Gaza, has obligations for creating infrastructure in anticipation for assuming sovereignty in these areas. The international community, especially those working in the West Bank, need to pressure the parties involved to adhere to international standards of environmentally sound agriculture. To this end, MA’AN Development Center offers the following recommendations.

**For the Palestinian Authority:**

- The Palestinian Authority must make the construction of wastewater and solid waste treatment plants a priority throughout the West Bank, but particularly in the Jordan Valley, in order to dispose of waste in an environmentally-friendly way.

- The Palestinian Authority must create a program aimed at educating farmers throughout the Jordan Valley on the dangers and consequences of agrochemicals, and must train farmers in appropriate and safe ways for chemical application and disposal.

- The Palestinian Authority must provide the Palestinian Environmental Quality Authority with real regulatory abilities throughout the Palestinian territories in order to stem the sale, distribution, and use of banned agrochemicals.

- The Palestinian Authority must renegotiate the existing Oslo agreements concerning the allocation of water from the Western Aquifer to ensure a more equitable distribution of water.

- The Palestinian Authority must establish an independent building committee charged with promoting Palestinian construction in all areas of the Jordan Valley and the West Bank in general, with no hindrance.

- The Palestinian Authority must encourage Palestinian farmers and Israeli settler farmers to adhere to the environmental laws of the Palestinian Authority, particularly concerning the use of banned agrochemicals, such as methyl bromide, through the creation of a subsidy system based on good agricultural practices.

- The Palestinian Authority must modernize Palestinian environmental law, ensure that said law corresponds with international environmental protocol, and coordinate with the Israeli Environmental Agency to ensure that such laws are effectively upheld throughout the entire territory.
For Israel:

- Israel must immediately remove all obstacles to Palestinian development in the Jordan Valley, specifically through the elimination of the existing permit system and the creation of a Palestinian building commission that encourages development of the Jordan Valley.
- Israel must allow the Palestinian Environmental Quality Agency to enforce environmental laws in all areas in the West Bank, including the entirety of the Jordan Valley and all territory currently classified as Area C.
- Israel must immediately remove all obstacles to Palestinian movement, including checkpoints, military zones, and Israeli-only areas, as well as cease all practices that seek to isolate the Jordan Valley from the rest of the West Bank.
- Israel must regulate the flow of agrochemicals between Israel proper and Palestine, and must coordinate with the Palestinian Authority to disrupt the flow of illegal agrochemicals into Palestine.
- Israel must immediately cease the practice of over-abstraction of water from all water sources, particularly the Mountain Aquifer.
- Israel must immediately remove all land mines in the Jordan Valley and throughout Palestine in general, as they are an unnecessary hazard to Palestinians and greatly limit the agricultural capacity of the Jordan Valley.
- Israel must end the practice of land and property confiscation and destruction.
- Israel must coordinate environmental laws with the Palestinian Environmental Quality Agency to remove all legal inefficiencies and contradictions.

For the international community:

- The international community must pressure the Palestinian Authority and Israel to coordinate environmental laws and to create an effective import/export monitoring system that adheres to the environmental laws in both Israel and Palestine.
- The international community must pressure Israel to remove all obstacles to Palestinian development in the Jordan Valley, including the current construction permit system, movement restrictions, and various military orders limiting Palestinian water usage.
- The international community must take an active interest in the unequal allocation of water and push for a more just reallocation based on existing cross-border legal precedents.
- The international community must push for immediate construction of water networks and waste treatment facilities throughout the Jordan Valley.
- The international community, including national governments and international NGOs (INGOs), in coordination with Palestinian NGOs (PNGOs), should take an active interest in improving all aspects of living conditions for Palestinians living in the Jordan Valley.
- The international community must encourage Israel and Palestine to immediately end illegal agrochemical trade and to adhere to the existing international environmental conventions, including the Stockholm Convention and the Vienna Convention.
- The international community must employ political pressure through international institutions to ensure that Israeli merchants and settlers adhere to international and Palestinian Authority laws and standards especially concerning use of agrochemicals, including methyl bromide.

Afaq al-Beea wa al-Tanmiya. (2010, February 30). In-discriminate use of agricultural pesticides in the Jordan Valley is an impending disaster. *Afaq al-Beea wa al-Tanmiya*.


Anonymous. (2011, August 5). Personal interview. (C. Whitman, Interviewer)


Hussein, F. (2011, August 5). Personal interview. (C. Whitman, Interviewer)


Rashaid, J. (2011, August 5). Personal interview. (C. Whitman, Interviewer)

Sakur. (2011, August 5). Personal interview. (C. Whitman, Interviewer)


Save the Children UK. (2009). *Fact Sheet: Jordan Valley*. Save the Children UK.


Military Order 92, issued in August 1967, authorized the IOF to take complete control of all water related matters; Military Order 158, issued November 1967, required all Palestinian water-related construction required a specific permit from military authorities and that all unauthorized structures would be confiscated; Military Order 291, issued December 1968, abrogated all previous water-related agreements. See Amnesty International, 2009, p. 15 and Centre on Housing Rights and Evictions (COHRE), 2008, p. 11.)

1 MA’AN Development Center, 2009, p. 11.

The discriminatory gap between water allocated to settlers and Palestinians violates the International Convention on the Elimination of All Forms of Racial Discrimination (ICERD), the International Covenant on Civil and Political Rights (ICCPR), the UN Convention on the Rights of the Child (CRC), the UN Convention on the Elimination of All Forms of Discrimination against Women (CEDAW) and the Fourth Geneva Convention relative to the Protection of Civilian Persons in Time of War of 12 August 1949 which explicitly forbid racial discrimination in “all territories” under Israel’s jurisdiction; by destroying Palestinian property, specifically houses, wells, and water tanks, and thus encouraging emigration from the Jordan Valley, and by strictly limiting Palestinian agriculture through water limitations and movement restrictions, Israel is violating the International Covenant on Economic, Social and Cultural Rights (ICESCR) which guarantees the right of an adequate standard of living and ensures the right to most efficiently utilized national resources. While Israel contends that many of these laws are not applicable to Palestinians in the occupied territories, the UN has recognized Israel’s legal and binding obligations in Palestine Amnesty International, 2009, p. 94. For more on the illegality of Israel’s water policy in Palestine, see (Amnesty International, 2009, pp. 93-102), Centre on Housing Rights and Evictions (COHRE), 2008, pp. 2-9) and Canadians for Justice and Peace in the Middle East, 2010, p. 2.

4 Applied Research Institute - Jerusalem, 2008, p. 4. Israel’s total consumption of fresh water is approximately 1,500 MCM/year. In addition to the 400MCM/year abstracted from the West Bank Aquifer, Israel diverts up to 650 MCM/year from the Jordan River and abstracts around 700 MCM/year from Lake Tiberias. Amnesty International, 2009, p. 20.

5 Applied Research Institute - Jerusalem, 2008, p. 4

6 It is important to note that Oslo II was meant to be a temporary agreement to be annulled after the conclusion of a final agreement after a period of five years.

7 Save the Children UK, 2009, p. 4

8 MA’AN Development Center, 2009, p. 4, Israel consumes a total of 2,000 to 2,200 MCM a year, of which 1,500 is fresh water. The 483 MCM is the total Israeli consumption originating in the West Bank and represents about 25% of Israeli consumption, Gray & Hilal, 2007, p. 102. The Palestinians also use surface water from streams and purchase water from the Israeli company Mekerot, which explains the difference between Palestinian water usage and the amount abstracted from the aquifer. See also Centre on Housing Rights and Evictions (COHRE), 2008, p. iii

9 Some studies find the per capita consumption to be 50 liters, (EWASH Advocacy Task Force, p. 3), others have concluded 60 liters, (Applied Research Institute - Jerusalem, 2008, p. 2), while others have found as high as 70 liters per person per day (MA’AN Development Center, 2009, p. 4), and (Amnesty International, 2009, p. 21). It is generally thought that the higher consumption estimates used water distribution statistics in lieu of water consumption statistics. This difference is substantial considering the amount of water lost through leaky pipes in the dilapidated state of the Palestinian water network. Thus, while approximately 76.7 liters per person per day are distributed, 17% is lost in the West Bank Water Distribution (WBWD) systems, 28% in the Palestinian Water Authority (PWA) systems, and between 31% and 52% in municipalities, (Gray & Hilal, 2007, p. 105). The Palestinian Authority and the PWA are unable to rehabilitate many of these systems without permission from the Joint Water Committee (JWC) and the Israeli Civil Administration as mentioned on page 12.

10 Amnesty International, 2009, p. 10

11 EWASH Advocacy Task Force, 2010, p. 3. The WHO recommends at least 15 liters of water per person per day to avoid mass epidemics. See also Amnesty International, 2009, p. 21, and The World Bank, 2009, p. 32.

12 MA’AN Development Center, 2009, p. 4

13 EWASH Advocacy Task Force, 2010, p. 3
14 Centre on Housing Rights and Evictions (COHRE), 2008, p. 27
15 MA’AN Development Center, 2009, p. 21
16 Human Rights Watch, 2010, p. 82
17 Human Rights Watch, 2010, p. 75
18 9,400 Israeli settlers in the Jordan Valley consume 41 MCM of water per year, while 56,000 Palestinians consume only 37 MCM. This equates to roughly 4,361 liters per year for settlers, which is approximately 6.6 times more than the 660 liters consumed per year by Palestinians. MA’AN Development Center, 2009, p. 4
20 3.54% is considered Area A and 2.08% is Area B, MA’AN Development Center, 2010, p. 3.
21 Under the Oslo Accords, the West Bank was divided into Area A, B, and C. Area A is completely under Palestinian administrative and security control; Area B is under Palestinian administrative control and Israeli security control; and Area C is completely under Israeli control.
22 The JWC was created by article 40 of the Oslo Accords.
23 Friends of the Earth Middle East 2009.
24 Amnesty international, p. 33
25 The JWC acts as a barrier to Palestinian development. Between 1996 and 2008: only 57% of the 417 proposed projects were approved, and of the 202 approved wells, only 38 (19%) were constructed. Between 2005 and 2008, all proposed Israeli projects were approved while only 29% (28 of 97) of Palestinian projects were approved, Isaac, 2001, p. 7. For more information on the JWC see: (Centre on Housing Rights and Evictions (COHRE), 2008, pp. 21-22, and Amnesty International, 2009, pp. 21-25.
26 Ninety-one permits were granted out of 1,624 requests made during this period, many due to international pressure on Israel, BBC News, 2008.
27 The effects of the occupation and Israeli policies on the Palestinian herders and farmers in the Jordan Valley also have grave environmental consequences that will be discussed below.
28 Save the Children, UK, 2009, p. 9
29 MA’AN Development Center, 2011, p. 4
30 MA’AN Development Center, 2011, p. 7
31 UN OCHA, 2011, p. 9.
32 Al Haq, EWASH 2011, p. 10.
33 International Committee of the Red Cross, 1949.
34 International Committee of the Red Cross, 1949.
35 Al Haq, EWASH, 2011, p. 9
36 The Marker, 2011.
37 Hussein, 2011.
38 Hussein, 2011.
39 Al Haq, EWASH, 2011, p. 11
40 Hussein, 2011.
41 Al Haq, EWASH, 2011, p. 11.
42 International Committee of the Red Cross, 1949.
43 Palestinian Trade Center, 2010, p. 2
44 There has been speculation that the unjust treatment of Palestinians in the Jordan Valley is part of a strategy to cleanse Palestinians from the area in an effort to facilitate complete annexation of the valuable area by Israel. The Palestinian population of the Jordan Valley has decreased by 82% since 1967, from 350,000 to 56,000 today. Luisa Morgantini, the former Vice President of the European Parliament, has likened Israeli policy in the Jordan Valley to ethnic cleansing: “an area cleansed of its inhabitants today is more easily annexed tomorrow”, Malini, 2010. B’Tselem has said that the movement restrictions are tantamount to a de facto annexation of the Jordan Valley, B’Tselem, Land Expropriation. Indeed, when construction of the Apartheid Wall began, Israel had plans to extend the wall to completely separate the Jordan Valley from the rest of the West Bank, see: Majdal, 2004. Israel considers the Jordan Valley to be a separate entity from the rest of the West Bank. In addition to the restriction of movement to and from the Jordan Valley, the Israeli military differentiates between the Jordan Valley and “the territories of Judea and Samaria” (the West Bank) White, 2010. These policies help create the notion that the Jordan Valley is a separate entity and thus open to annexation.
45 The Ma’ale Efraim checkpoint is accessible to only Israelis and foreign passport holders.
46 UN OCHA, 2010, p. 22.
47 Centre on Housing Rights and Evictions (COHRE), 2008, p. 27
48 The World Bank, 2008, p. 5
Palestinian use of the area controlled by the Settlement Regional Council is also prohibited, though many Palestinians work in settlement plantations, requiring special permits from the Israeli Civil Administration.

It has not been uncommon for Israel to arbitrarily create new military and free-fire zones in Area C over existing communities. The village of Ein al–Hilwe, in the north of the Jordan Valley, is located in a part of Area C that was unilaterally declared a free-fire zone in 2010.

Save the Children UK, 2009, p. 2

Afaq al-Beea wa al-Tanmiya, 2010

Afaq al-Beea wa al-Tanmiya, 2010

Afaq al-Beea wa al-Tanmiya, 2010

Palestinian Ministry of Agriculture, 2011, p. 1

The built-up area of Zubeidat is considered Area B while all the agricultural land belonging to village is located in Area C.

Zubeidat, 2010

Applied Research Institute - Jerusalem, 2007a, p. 43

UN OCHA, 2010, p. 22

The World Bank, 2009, p. 44

The World Bank, 2009, p. 45

The Applied Research Institute - Jerusalem, 2010, p. 34

Butterfield, Isaac, Kubursi, & Spencer, 2000

Butterfield, Isaac, Kubursi, & Spencer, 2000


Applied Research Institute - Jerusalem, 2007a, p. 43


Applied Research Institute - Jerusalem, 2007a, p. 43

Applied Research Institute - Jerusalem, 2007a, p. 43

United Nations Environment Programme, 2003, p. 36

The Stockholm Conference of 2004 set regulations to control 12 of the more damaging pesticides. The seven members of the “Dirty Dozen” commonly used in Palestine are: Aldicarb; Chlorodan; D.D.T.; Lindane; Paraquate; Parathion; and Pentachlorophenol. Saleh, Neiroukh, Ayyash, & Gasteyer, 2006, pp. 3-11

Al-Sa’ed, Ramlawi, & Salah, 2009, p. 2
The 14 internationally banned substances are: 2, 4D Aliette Fosetyl; Paraquat; Pentachlorophenol; Benomyl; Maneb; Captan; Parathion; Lindane; Methidathion; Aldicarb; Endosulfan; D.D.T.; Fenamiphos; and CH3BR (Methyl Bromide) Saleh, Neiroukh, Ayyash, & Gasteyer, 2006.


Afaq al-Beea wa al-Tanmiya, 2011

Abu-Amrieh, Sabbah, & Issac, 1999, p. 11


Al-Sa'ed, Ramlawi, & Salah, 2009, p. 2


Saleh, Neiroukh, Ayyash, & Gasteyer, 2006, p. 17

Al-Sa'ed, Ramlawi, & Salah, 2009, p. 8). Another study found that 65% of Palestinian farmers were unable to read Hebrew directions (Abu-Amrieh, Sabbah, & Issac, 1999, p. 7

Saleh, Neiroukh, Ayyash, & Gasteyer, 2006, p. 17

Afaq al-Beea wa al-Tanmiya 2011

British Columbia Ministry of Agriculture

Gilliam & Hamilton, 2006

Montana Department of Agriculture, 2005

Abu-Amrieh, Sabbah, & Issac, 1999, p. 11

Abu-Amrieh, Sabbah, & Issac, 1999, p. 6

Save the Children UK, 2009, p. 4


Centre on Housing Rights and Evictions (COHRE), 2008, p. 25

United Nations Environment Programme, 2003, p. 55; The Jericho district is the only district in Palestine that does not have a sewage network. In Nablus and Tubas (the other districts in the Jordan Valley) sewage networks exist only around the major cities in Area A, outside of the Jordan Valley, Applied Research Institute - Jerusalem, 2007b, pp. 118-119

Applied Research Institute - Jerusalem, 2007b, p. 119

Applied Research Institute - Jerusalem, 2007b, p. 137


Applied Research Institute - Jerusalem, 2007b, p. 143

Applied Research Institute - Jerusalem, 2007b, p. 137

Applied Research Institute - Jerusalem, 2007b, p. 129

Applied Research Institute - Jerusalem, 2007b, p. 139

Applied Research Institute - Jerusalem, 2007b, p. 139

Applied Research Institute - Jerusalem, 2007b, pp. 57-60

Amnesty International, 2009, p. 78

As cited in Applied Research Institute - Jerusalem, 2007b, p. 133


Cohen, Sever, Tzipori, & Fiman, 2008

Isaac, 2007; see also Applied Research Institute - Jerusalem, 2007b, p. 134

Amnesty International, 2009, p. 79
Publications on Jordan Valley
<table>
<thead>
<tr>
<th>Section</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>Executive Summary</td>
<td>2</td>
</tr>
<tr>
<td>Restrictions</td>
<td>4</td>
</tr>
<tr>
<td>Water Restrictions</td>
<td>4</td>
</tr>
<tr>
<td>Building Restrictions</td>
<td>12</td>
</tr>
<tr>
<td>Movement and Access Restrictions</td>
<td>16</td>
</tr>
<tr>
<td>Consequences</td>
<td>20</td>
</tr>
<tr>
<td>Agricultural Consequences</td>
<td>20</td>
</tr>
<tr>
<td>Environmental Consequences</td>
<td>24</td>
</tr>
<tr>
<td>Recommendations</td>
<td>36</td>
</tr>
<tr>
<td>Bibliography</td>
<td>38</td>
</tr>
</tbody>
</table>