The environmental impact of Israeli military activities in the occupied Palestinian territory

Z. Brophy and J.Isaac

Applied Research Institute – Jerusalem

(ARIJ)

An often-overlooked factor in the field of sustainable development and resource management is the impact of the military on the environment and unfortunately this is no exception in the occupied Palestinian territory (oPt). Whilst there have been many studies and reports on the economic, social and political repercussions of the continued Israeli occupation, there has been scant attention paid to the detrimental effects on the environment from Israeli Occupation Forces (IOF) activities and the military infrastructure which supports them. This is in no small part because of the lack of information provided by the Israeli authorities and the high level of secrecy surrounding the IOF. For example, whilst conducting research for this paper it was not possible to view any images of the military bases in the oPt post 2004 because all sources have been doctored to erase any evidence of their presence.

Nonetheless, this report will strive to provide a historical background and legal framework to the IOF presence in the oPt and assess some of the consequent environmental implications.

A historical perspective

With the routing of the Arab forces in June 1967 the Israelis began their illegal occupation of the Gaza Strip and the West Bank. During more than 40 years of occupation the Israelis have confiscated a considerable proportion of the territory in the oPt under the auspices of military needs. This is in addition to the extensive settlement developments which currently house around half a million illegal settlers in the oPt.

Israel has confiscated approximately 1000km^2 of land to create closed military zones, which amounts to more than 20% of the West Bank territory. Excluding the areas that fall between the green line and the segregation barrier, Palestinians are barred entry to all of the military zones which are mainly on the eastern slopes of the Bethlehem and Hebron Governates in the Jordan Valley. In 2004 the Israeli authorities declared a buffer zone of 150-200 meters around the segregation zone resulting in an additional 252km^2 of territory becoming inaccessible to Palestinians. Map 1 on the following page illustrates how the closed military zones compromise large chunks of the eastern west bank and strategic areas along the green line.

In these lands reside some of the most vulnerable Palestinian communities including large numbers of small scale herding farming communities. As well as severely impacting upon the livelihoods of these communities it is also forcing them to overgraze on their diminished territories leading to desertification of the

terrain. According to recent research by OCHA the expansion of existing military zones or the creation of new ones continues. In May 2009 over 300 people, including 170 children, were issued with evacuation and demolition orders because of the expansion of the Israeli military zones in the West Bank[i].

Map 1. Closed military zones, military bases and mined areas in the occupied West Bank

In addition to the closed military zones Israel has established more than 210 military bases occupying around 38km² of Palestinian territory. These are also illustrated in map 1. Their uses are varied including training grounds, firing ranges, observation posts, barracks, telecommunications facilities and vehicle and fuel depots. All of which have associated environmental concerns. Maps 2a-2c on the following page are aerial photographs of some of these bases.

Figure 2a. IOF Barracks and training ground in the OPT

Figure 2b. IOF storage facilities in the OPT

Figure 2c. IOF facilities in an illegal settlement in the OPT

The dozens of military bases scattered across the West Bank and the 1000km^2 of closed military zones are maintained and supported by an extensive infrastructure of roads, watchtowers, checkpoints and security fences, all of which contribute to the environmental impact on the oPt.

In more recent years Israel has been following a policy of unilateral border creation and enforced separation/containment by constructing the barrier around the Gaza Strip and the segregation wall in the West Bank. Both projects have seen the confiscation and destruction of vast tracts of Palestinian territory and the employment of large scale, heavily polluting machinery. Much of the destroyed land was fertile agricultural terrain and its ruin has therefore had a considerable impact on the local environment and the productive capacities of the affected Palestinian communities. Both of these structures are integral parts of the IOF infrastructure and as such fall within the scope of this paper.

Whilst Israel has had a permanent military presence in the oPt since 1967 there have been particular periods of intensive military activity, most notably during the first intifada (1987-1993), second intifada (2000-ongoing) and the most recent Gaza offensive (Dec 2008-Jan 2009). All of these periods witnessed considerable destruction to the environment, agriculture and economies of the oPt. The Gaza offensive was a large scale and intensive military operation with catastrophic affects on the environment in the Gaza Strip and the surrounding environs. The repercussions are still being felt and they provide us with an informative case study into how Israeli aggressions impact upon the land and resources in the region.

Legal framework

The main statutes in international humanitarian law applicable to the Israeli occupation of the West Bank and Gaza are the Hague Regulations annexed to the Conventions (IV) Respecting the Laws and Customs of War on Land (Hague Regulations) and the fourth Geneva Convention concerning the protection of Civilian Persons in Time of War. Whilst Israel acknowledges its obligations

under the Hague Regulations it contests the applicability of the Fourth Geneva Convention to the oPt. This is in contradiction to a number of rulings and resolutions from the UN, the International Court of Justice (ICJ) and other intra-national legal bodies that reiterate Israel's status as an occupying power and therefore its obligations as a High Contracting Party to the Geneva Conventions. Although the Israeli High Court of Justice has previously acknowledged that Israel is holding the Palestinian territories in belligerent occupation its rulings still repeatedly choose "deference to the discretion of the military authorities whenever it invokes military considerations".

Articles 47 and 53 of the fourth Geneva Convention are of particular importance to this study, and they state respectively, "protected persons who are in occupied territory shall not be deprived, in any case or in any manner whatsoever, of the benefits of the present Convention by any change introduced, as the result of the occupation of a territory, into the institutions or government of the said territory, nor by any agreement concluded between the authorities of the occupied territories and the Occupying Power, nor by any annexation by the latter of the whole or part of the occupied territory" and "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".

Although Israel initially acknowledged the applicability of the Geneva Convention to the oPt, military order 144, October 1967, essentially rendered the convention redundant in the oPt. Since then the Israeli authorities have considered themselves as an administrator (a novel term in international law) of the oPt and therefore exempt from their obligations as a signatory of the 4th Geneva Convention. This stance stands in contradiction to all the major intra-national legal bodies.

After the 1967 occupation of the Palestinian Territories the planning system within the West Bank was still subject to Jordanian legislation. In breach of international law the Israeli authorities made a number of alterations to land planning laws, most notably military order no 418, 1971. One of the principal consequences of the Israeli amendments to Jordanian law was the transfer of all authority formerly conferred to the Jordanian Ministry of the Interior to the commander of the Israeli military. The commander of the armed forces of the region was empowered to issue orders appointing "special planning committees" for defined areas, possessing the powers of local and regional planning committees. This needs to be read in view of the aforementioned choice of the Israeli High Court of Justice to "defer to the discretion of the military authorities" with regards to planning and development in the oPt.

Although the Israel's current "realities on the ground" are effectively rendering the Oslo Accords obsolete the documents are still important references to

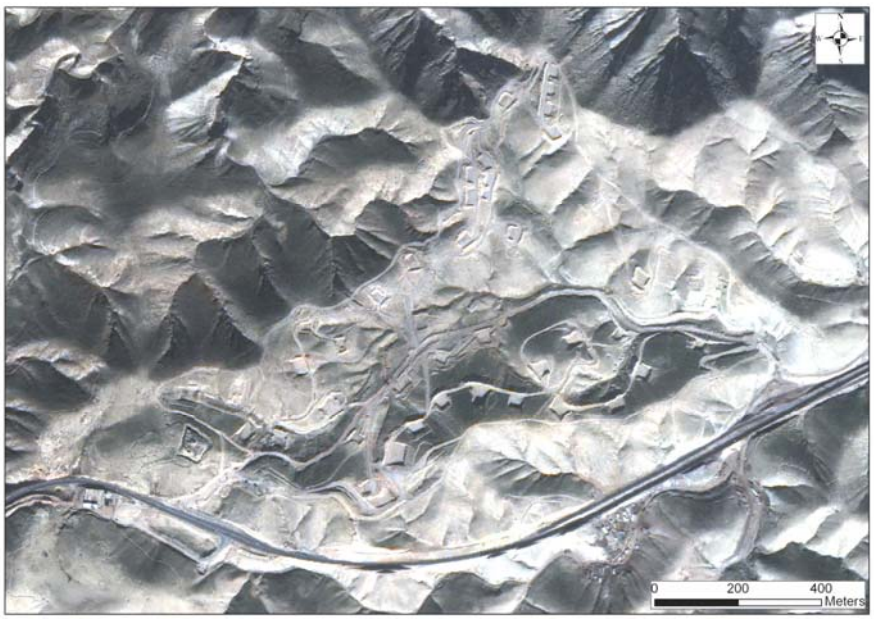
agreements made between the Israeli and Palestinian parties. There are several stipulations regarding the preservation of the status and territorial integrity of the West Bank and Gaza. The 1995 Interim Agreement states that neither party will "change the status of the West Bank and the Gaza Strip pending the outcome of the permanent status negotiations" (Chapter 5, Article XXXI, paragraph 7) and that "the integrity and status" of the West Bank and Gaza Strip territory "will be preserved during the interim period" (Chapter 2, Article XI, paragraph 1 and Chapter 5, Article XXXI, paragraph 8). There were also agreements made with regards to cooperating on the preservation of the environment in the oPt. Israelis and Palestinians agreed to cooperate, on the basis of mutual understanding and shared responsibility, in virtually all areas of environmental protection. Examples of which include:

- To prevent uncontrolled discharge of wastewater and effluents to water bodies and promote proper treatment of wastewater, solid and hazardous wastes.
- To develop jointly a mechanism for mutual notification and coordination to respond to events or accidents likely to generate environmental pollution, damage or hazards.
- To cooperate in the implementation of internationally accepted principles and standards of global environmental concern, such as protection of the ozone layer, endangered species of fauna and flora, conservation of migratory species, and preservation of existing forests and natural resources.

Unexploded ordinances (UXO) and land mines

Having been the staging ground for a series of battles, confrontations and invasions over the past sixty years there are now an unknown quantity of UXOs and landmines littering the landscape in the oPt. However this problem is not merely the throwback from decades of war. A significant amount of these forgotten explosives are the remains from Israeli military training activities. A 2002 Unicef report concluded that “Israeli military training zones are not properly fenced or marked at all and UXO are not collected at the end of training. Many of the training zones are situated near to populated areas; as a result civilians come into contact with the UXO easily"[ii]. Some 2,500 people are believed to have been injured or killed in the oPt by UXO or land mines since 1967. Due to the nature of UXOs and land mines the majority of these casualties and deaths have been children. A study by Defence for Children International-Palestinian Section (DCI/PS) found that in 1997 37 Palestinians were killed or injured by UXO or landmines. Of these 30 were children with 7 killed and 23 injured[iii]. To date Israel has not signed the Ottawa (anti-land mine) treaty.

Map 14. IOF firing ranges and training ground the OPT



In the wake of the Gaza invasion (Dec 08-Jan09) UXOs claimed many lives and a large-scale clearance operation was required in the territory. By August 2009 the toll was 17 dead and 25 injured Palestinians from Israeli UXOs. The British based NGO, Mines Advisory Group (MAG), located 120 pieces of UXO and 31 unexploded white phosphorus shells inside Gaza as of 31st July 2009. UXOs exact a toll on the environment in addition to the more obvious human and social costs. The United Nations Mine Action Team Gaza Office (UNMAT-GO) have been working to clear over 12,000ha of agricultural lands[iv] which have effectively been turned into mine fields since the bombardment. Having fields littered with UXO has made rejuvenating severely damaged agricultural lands a dangerous and costly process (17% of the overall cultivated area of the Gaza strip was totally destroyed in the offensive).

Radiation within the occupied Palestinian territory

Although Israel chooses to follow a policy of 'purposeful ambiguity' with regards to its nuclear arsenal and weapon producing facilities it is widely acknowledged that Israel is a nuclear power possessing somewhere within the region of 200-250 nuclear warheads. Israel's nuclear producing facilities are at the Negev Nuclear Research Center less than 40km south of the West Bank green line border.

Whether the nuclear plant poses a health threat and releases dangerous levels of radiation into the environment is a contentious point of debate. Although the evidence isn't completely conclusive it is at least a cause for serious concern. According to Doctor Mahmoud Sa'ada, former head of the Middle East Division at International Physicians for the Prevention of Nuclear War, the radiation from the facilities and its waste burial sites is causing increased rates of cancer and birth deformalities in the Palestinian communities of the West Bank. "The waste from Dimona is buried west of Dahriyya and the radiation reaches people and causes cancer". He bases his assertations on his experiences and studies as a General Practitioner in communities around Hebron, Southern West Bank.

Research conducted at the Ben Gurion University in collaboration with the Nuclear Research in Wadi Surik and the Israeli Water Authorities potentially supports his claims. The paper confirms the "incidence of radiation leakages into the subterranean water systems in both Wadi Araba and the aquifers of the Naqab Desert", and warns of the dangers that this contaminated water poses to human health. The reactor is now over 40 years old and recent reports of a fissure in the ageing structure have raised fears of increased radiation leaks.

In addition to radiation risks from Israel's nuclear facilities in the Negev the land in the occupied territories has been contaminated with radiation from discarded IOF machinery and weapons components. One such example would be radioactive, beta ray emitting, military component parts found in the oPt by a field work team from the Environmental Quality Authority. The agency sent their findings to UNEP who confirmed with the components manufacturers, General Nucleonics, that the parts were installed as part of the in-flight rotor blade inspection system on Israeli air-force CH-53 helicopters. Like the case of UXO's left at training grounds this is another example of how the Israeli military uses the oPt as a dumping ground for unwanted, polluting or difficult to dispose of waste.

The infrastructure of a military occupation and its disregard for the native environment

The military infrastructure in the West Bank is in many places contiguous and synonymous with the infrastructure that supports the Israeli settlements. Indeed many of the settlements themselves are part of this military infrastructure and consequently it is often not possible to differentiate between military and settler projects. In the end it is important to recognize that an intricate and extensive infrastructure is being developed to serve both the IOF and the settlers in the West Bank and this is having considerable impact on the local environment and its natural resources.

Since the beginning of the occupation in 1967 the Israeli civil administration has been confiscating land by force of the aforementioned military orders and constructing a multi road network. Although the confiscation of privately owned Palestinian lands for such projects is often done under the authority of the so called 'civil administration' it is important to note that this body is headed by a colonel under the strict authority of the Ministry of Defense. In the post Oslo era this road network has continued to develop and has come to be known as the Bypass Road Network (BRN). The roads can be categorised as completely prohibited (referred to by the Israeli army as "sterile roads"), partially prohibited and restricted use. Regardless of the permissibility for Palestinians to use some of these roads the whole network remains under Israeli control and is subject to Israeli planning and military directives. Map 3 is a high-resolution image of a short stretch of route 60 which runs for 223km through some of the most fertile lands of the west Bank.

Map 3. High resolution image of Route 60 in the occupied West Bank

In this case the road has not only been built along a new route but it has been widened to almost three times its original width. The BRN is approximately 800km long with an average width of 20 meters and to feed this web of roads approximately 110km^2 of land has been confiscated and paved over. This constitutes another 2% of the West Bank territory swallowed up by the Israeli occupation. Like the settlements, the military bases and the segregation wall, the roads are flanked by buffer zones and the average width of the buffer zone around these roads is 120 meters. Although this land is not destroyed by being covered in tarmac it is made unavailable for agricultural or development initiatives and therefore is rendered obsolete.

The policy of dual planning for Palestinian and Israeli road networks is incredibly wasteful and flies in the face of responsible and sustainable development practices. In the West Bank there is 5.2km of road per 1000 people as opposed to 2.6km in Israel. This elaborate network of roads contributes to the disruption of natural ecosystems, further fragmenting the environment and habitats of the west bank. Furthermore the increased noise and air pollution from the settler and military vehicles on these roads impacts upon the local communities and their environment.

Map 4. Map illustrating the main Israeli and Palestinian road networks in the occupied West Bank.

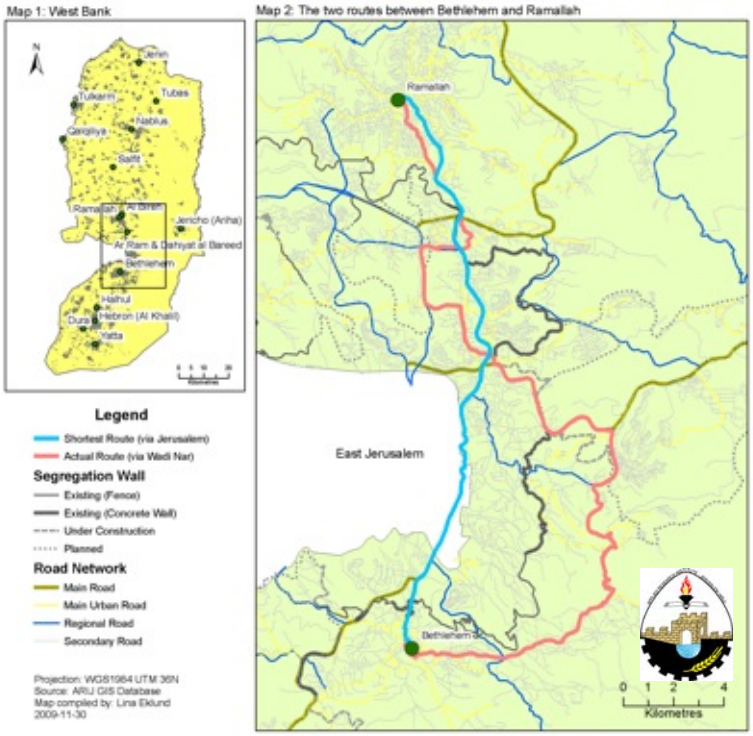
The road network of the occupied territories is punctuated with hundreds of Israeli checkpoints. This flagrantly illegal infringement on the Palestinians freedom of movement also furthers the impact of the IOF upon the environment. Map 5 provides an example of how the presence of an Israeli checkpoint results in increased land clearances in addition to providing a station for polluting Israeli vehicles and machinery.

Map 5. High resolution image of a container checkpoint in the Jerusalem district 2006.

The system of road closures and checkpoints in the West Bank has considerably increased the amount of traffic on Palestinian roads and increased the average journey time.

Ramallah and Bethelehem are two major West Bank cities and there is a considerable amount of traffic between the two and travel between these two urban centers provides an interesting case study. Without any obstacles in the forms of the segregation wall or military checkpoints the journey between the two towns is 25.5km and should take around 23 minutes. Since the outbreak of the 2nd intifada the Palestinians have been forced to take a circuitous route which is 45 km long and takes around 1 hour (although this can be much longer due to the delays at the two checkpoints en route). Assuming that a car emits 225g CO_2/km then a one-way journey between Ramallah and Bethlehem on the old route would result in the emission of 5.740kg of CO_2. By being forced to take the long route the emissions almost double to 10kg. There are currently 742 Israeli checkpoints in the West Bank. See map 7.

Map 6. The old and new routes between Bethlehem and Ramallah



.

Map 7. The segregation wall and checkpoints within the West Bank

A significant environmental consequence of the IOF military bases and the supporting infrastructure is the high consumption and contamination of already

scarce water resources. A recent letter from the Deputy Director at the Israeli Ministry of the Environment, Issaac Ben David, to the commander in chief of the Central Command in Israel, Maj-Gen Gadi Shamni, provides an insight into this problem. In the letter he states "in a recent inspection conducted by the ministry inspectors of IDF bases in Judea and Samaria [oPt] we discovered a bleak picture of neglect and severe damage to the environment due to leakage of fuel and oil. This severely damages the soil and ground water."[v] The report focused on five bases in the West Bank as cases where the damage was particularly severe and they were Gush Etzion, south of Jerusalem; Ramallah (West Bank); another is near Hebron (West Bank); and two are IDF fuel stations near Macabim and Halamish.

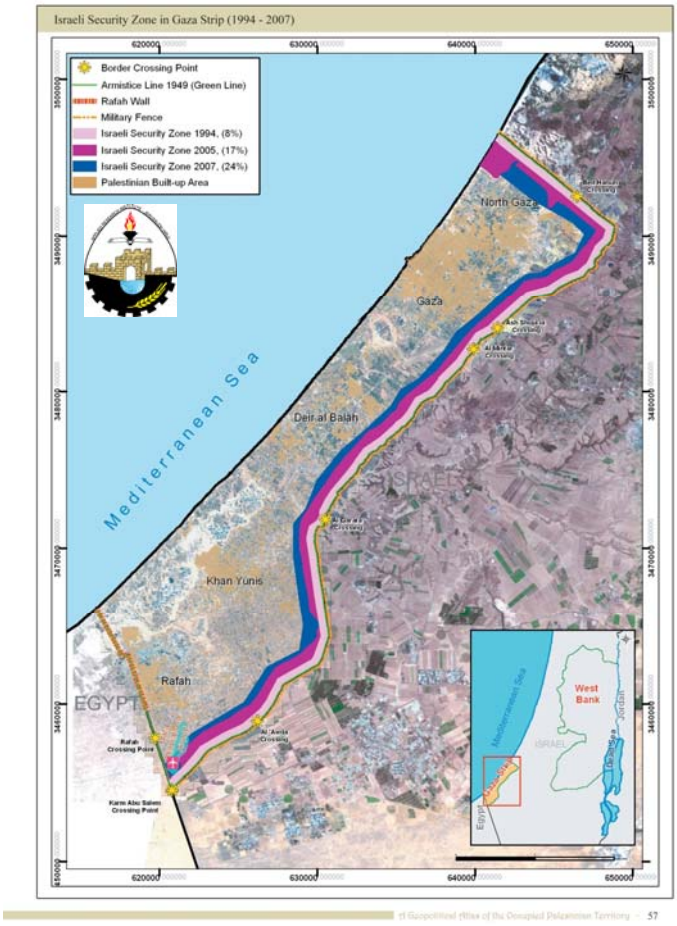
Map 8. Refueling station in Halamish responsible for "reckless" pollution of local water Resources

The environmental cost of enforced segregation

Built on the foundations of a favoured proverb for former Israeli Prime Minister Ehud Barrack, "good fences make good neighbours", the Israeli Authorities have been erecting a series of walls, fences and barriers throughout the oPt in recent years.

The first such construction was the fence which runs along the complete length of the Gaza Strip's land borders; Israel to the North and East and Egypt to the South. The construction is made up of fencing, posts, sensors and buffer zones and from an environmental perspective it is the buffer zones that are of the greatest concern. When the fence was first erected in 1994 the buffer zone was only 500m wide as agreed in the Oslo Accords. This constituted a total area of 29km^2 which amounts to 8% of the Gaza strip land mass. In 2005 and 2007 Israel made the unilateral decision to widen the strip cutting further into the already under-resourced and over-populated Palestinian territory. By June 2007 the buffer zone had been deepened in many parts to 1500 meters and consequently 24% of the Gaza Strip land was confiscated and cleared by the Israeli military for the buffer zone.

Map 9. Gaza buffer zone 1994, 2005 and 2007



Much of this land was some of the prime agricultural land in the Gaza Strip, which until it's confiscation had been managed, maintained and farmed by Palestinians. According to the Gaza based Palestinian Agricultural Relief Committees (PARC) the buffer zone contained rain fed crops including wheat, barley, beans and various vegetables, as well as olive, almond and citrus trees. The fence's buffer zone has swallowed up nearly one third of Gaza's arable land and what was once fruitful productive land is regularly turned over by bulldozers so it remains a sterile and desolate security zone. In view of this it is worth noting that roughly two thirds of Gaza's population is deemed food insecure[vi].

Citing the Gaza Barrier as a successful security measure, the Israelis began the construction of the segregation wall in the West Bank in 2002. The wall is a combination of towering concrete walls, electric fences, ditches and barbed wire. Far from following the Green Line of 1967 it snakes its way through the West Bank with close to 90% built on Palestinian lands. If completed on its current projections the wall will isolate almost 10% of the West Bank territory.

Map 10. Map of the Israeli segregation wall and the armistice line of 1967.

The walls construction is a massive feat of engineering employing heavy machinery and millions of tons of concrete with all of the associated environmental concerns regarding carbon emissions and water consumption/contamination. However, like Gaza, it is the extensive destruction of natural habitats and agricultural land that is most worrying. Map 11 is an aerial photograph where we can see both a concrete section and fence section of the wall on the outskirts of Occupied Bethlehem. Although the concrete sections of the wall are more physically imposing the fence sections actually consume more land. Along its complete length a security road flanks the wall but in the fence section this is supplemented with sand tracks and secondary fences. As is the case with the BRN, the military bases and the closed military zones, a series of buffer zones border the wall. The average width of these buffer zones is approximately 75 meteres on each side of the wall but they can be up to 300 meter. Within these IOF enforced zones Palestinians are denied access and building/development is forbidden.

Map 11. High resolution image of the segregation wall on occupied Palestinian territory; concrete and fence sections.

At a UN meeting in 2004 on the impact of the wall's construction George Khoury of the UNDP stated that more than 100,000 trees had been uprooted and 36,000 metres of irrigation works had been destroyed. "There is a close correlation to the destruction of natural resources and the walls construction" Mr Khoury said at the meeting. Supporting this analysis a recent World Bank report states that some 170km^2 of fertile agricultural land have been affected by the wall amounting to over 10% of the total cultivated land of the West Bank with an average economic value of $38 million. That totals around 8% of annual Palestinian agricultural product[vii]. This is compounded by the fact that the walls construction has isolated many wells and springs. In table 1 below we can see how 58 different water sources have been isolated by the wall robbing the Palestinian communities and farmers of 67.3MCM of water per year. Consequently many farming families and communities can no longer continue to manage and maintain their lands.

Table 1. **Water resources isolated by the segregation wall**

Water source	**Number**	**Average annual withdrawal (MCM)**
Palestinian wells isolated by segregation wall	29	4.3
Palestinian Springs isolated by segregation wall	29	63
	58	**67.3**

Photo 1. Fertile agricultural lands which have been laid to waste by the construction of the segregation wall

The Israelis have established a system of terminals along the length of the segregation barriers as a means to control the movement of people and produce between the oPt and Israel. To date there are 24 such terminals, 17 in the west bank and 7 in Gaza and in most cases these terminals have been constructed on occupied territory where the barrier deviates from the Green line. Map 13 shows two photos the Gilo 300 checkpoint, which is located on occupied territory on the outskirts of Occupied Bethlehem. The first is during the early stages of its development in 2004 and the second is after its completion in 2007. We can see how over 50,000m^2 of land has been confiscated and used to build the terminal. This fertile land was previously olive groves as is still evidenced on the western side of the road. The checkpoints and terminals create severe bottlenecks in the transport system resulting in increased noise and air pollution, not to mention the catastrophic social and economic consequences.

Map 13. High resolution image of Gilo 300 checkpoint in 2004 and 2007

As well as the aforementioned destruction to irrigation systems in the west bank, the wall has also had a negative impact on some of the natural drainage systems. In times of high rainfall this has caused flooding and substantial environmental and agricultural damage. In February of this year (2009) there was a prolonged period of heavy rainfall, which would normally be a positive occurrence from an agricultural and environmental point of view. However, due to the obstruction the wall creates in the natural drainage systems around Qaliqilya (one of the most important food producing regions in the west bank), 150 dunums planted with vegetables and 15 dunums of citrus tree orchard were flooded and the crops destroyed. What's more the flooding also ruined several greenhouses and chicken coups. This is one of several examples where the walls construction has impacted upon natural drainage systems resulting in adverse affects on the local environment and agriculture.

Photos 2a, b and c. Flooding in Qaliqilya next to the wall after heavy rains.

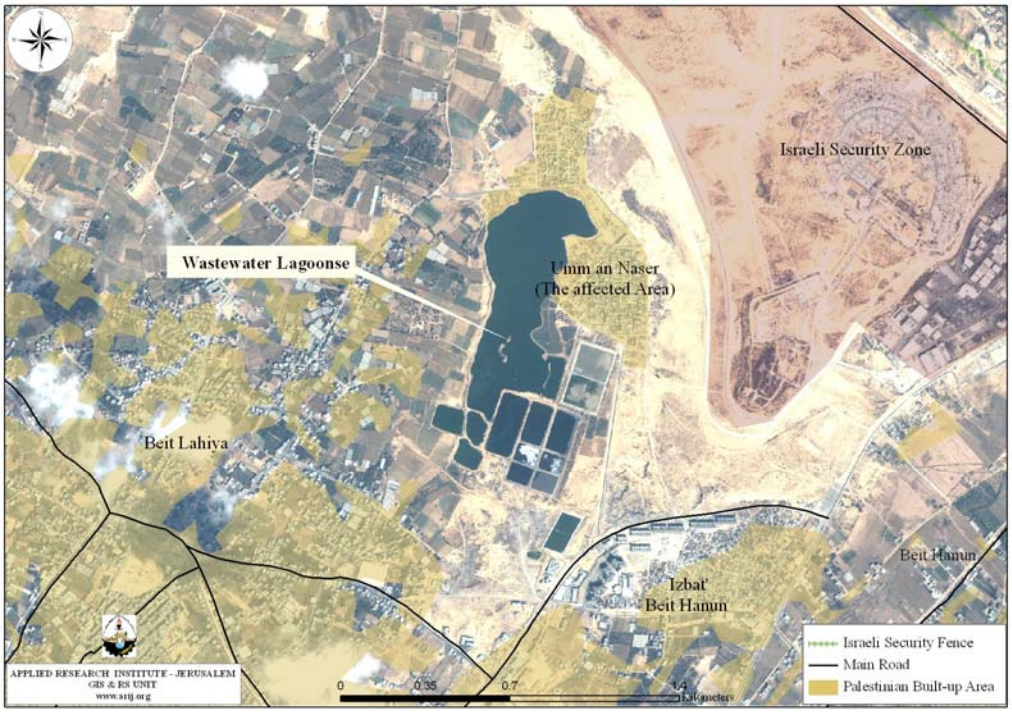
The environmental aftermath from the Gaza offensive

Even prior to the Israeli offensive on Gaza (December 2008-January 2009) the state of the environment, infrastructure and agriculture in the territory was already reaching crisis point after 2 years of the Israeli imposed siege and many more years of chronic underinvestment. The already struggling environmental facilities and institutions were practically crippled by the bombardment they had to endure from which the costs and repercussions are still being felt. A post conflict UN damage assessment gives us some idea of the scale of destruction meted out over just 23 days. 2,692 buildings and 180 greenhouses were destroyed or severely damaged during the hostilities and 167 kilometers of road were damaged. The assessment revealed 220 impact craters on roads and bridges and more than 700 craters on open or agricultural land. Utilities infrastructure in energy (fuel and electricity), transportation and telecommunications also sustained severe damage during the crisis. Water supplies were affected by damage to water wells and drinking water pipes, as were wastewater systems[viii].

The sound management of the agricultural lands of the Gaza strip is not only essential for the Palestinian economy and society but it is vital for the protection of a very fragile bionetwork. The majority of the Gazan agricultural lands are located near to sand dunes in a vulnerable and sensitive ecosystem and the local knowledge from generations of experience amongst the farming community is pivotal in maintaining the sustainability of this system. During the Israeli offensive the damage to local agricultural lands was extensive and pervasive. A report by UNDP/PAPP revealed that 17% of the total cultivated land of the Gaza Strip, including orchards, greenhouses and open fields, was completely destroyed and the viability for rejuvenating the land has been considerably impeded by the damage caused to the soil by large military vehicles.

During the aerial bombardment of Gaza the embankment of anaerobic pond no.3 at the al-Zaytoun wastewater treatment plant was directly hit. The breach of the banks had a devastating affect both on local agricultural lands and also on the water aquifer on which Gaza lies (which is the sole source of natural drinking water in the Gaza Strip). More than 100,000m^2 spilled into the surrounding agricultural areas contaminating the soil and laying waste to that season's produce in around 55,000m^2 of land.

Map 14. Waste water spillage onto agricultural lands from the al-Zaytoun plant after a direct hit from an Israeli missile.



The degradation on water purity and the scarcity of safe drinking water in Gaza was a problem reaching endemic levels even before the offensive. In 2008 around 90% of drinking water in the Gaza Strip exceeded WHO salt and nitrate levels; a 2008 WHO report found nitrate levels in Khan Younis to be three times above the WHO guidelines[ix]. The toxic load released from the az-Zaytoun plant (untreated sewage is rich in pathogens and contains dangerously high levels of heavy metals) further impacted upon the contamination of the water aquifer underlying the Gaza Strip. In fact the whole sewage system was hindered to such an extent that all of the effluent leaving sewage treatment plants into the sea or by infiltration into groundwater was entirely untreated. Fish stocks, drinking water and agricultural lands were all contaminated in the process.

Increased air pollution was another serious consequence of the heavy bombardment Gaza suffered. As previously mentioned 2,692 buildings were destroyed and this created an estimated 600,000 tons of debris (the disposal of which is also an ongoing environmental backlash from the offensive). In addition to the release of toxic materials from these buildings (especially industrial and agricultural structures) many of the buildings were hit by armaments that ignited fires in the structures. When buildings burn the structure and/or the resulting rubble are contaminated with polynuclear aromatic hydrocarbons (PAHs) and, if chlorinated compounds are present, with dioxins and furans, all of which are extremely hazardous[x].

Photo 3. AFP image from Gaza during the Israeli offensive

As this overview illustrates, the immediate and long-term impact of the Israeli offensive on the environment was both comprehensive and far reaching. A UNEP financial calculation of $44,000,000 for the associated environmental cost resulting from the escalation of hostilities[xi] gives us some idea of the scale of environmental destruction caused in less than one month.

Opportunity costs

In addition to the direct impact on the environment from the IOF presence in the oPt there are the indirect costs which we can call the 'opportunity costs'. Opportunity cost is a fundamental economic principle technically defined as "the highest value alternative foregone in the pursuit of an activity". In essence it explains whenever limited resources are used in the pursuit of one activity an unlimited number of other activities remain unfulfilled. In short, doing one thing prevents you doing another. So how does that apply to the IOF in the oPt?

Let's take that UNEP figure of $44,000,000, calculated as the associated environmental cost from the Gaza Offensive, as a case in point. An opportunity cost of this $44,000,000 is the development projects that could have been funded with these resources. Based on figures from the Palestinian Water Authorities figures from 2006, $44,000,000 would have been enough to finance both the $19,600,000 for the rehabilitation of water systems in the West Bank and the $17, 600,000 for the Gaza Strip seawater desalination program. Even after the funding of these two major, and well needed, development investments there would be an additional $7,200,000 left for over development expenditures. The Gaza economy and environment were already in a terrible condition and in need of considerable investment. Based on the costs of these past programs we can see how far $44,000 dollars would have gone to address many of these problems.

Another opportunity cost to be considered relates to the use of land. The 38km of land used for military bases, the 1000km^2 of closed military zones, the 120km^2

of land destroyed for the segregation walls and fences and the 120 km^2 paved over as Israeli roads could have alternative uses which benefit the environment, agriculture and economy. These military confiscations of land at best render the territory redundant and at worst lay it to waste. What's more the water resources that are consumed or contaminated by the IOF within and around these zones could otherwise be employed for development purposes or at least conserved to support the depleting water stocks in the territory. If we simply consider the water resources that the Palestinian communities are isolated from (that is not even counting the water used by the IOF) it makes for revealing reading.

Table 2. **Water resources isolated by the segregation wall and the closed military zones**

Water source	**Number**	**Average annual withdrawal (MCM)**
Palestinian wells isolated by segregation wall	29	4.3
Palestinian Springs isolated by segregation wall	29	63
Palestinian wells in closed Israeli military zones	105	40.5
Palestinian springs in closed Israeli military zones	39	22.9
Total	**202**	**73.8**

The potential for agricultural and environmental development within the oPt which could be realized if the Palestinians had access to the land confiscated for the military bases, Israeli controlled roads, closed military zones, checkpoints and terminals, segregation walls, and all the associated buffer zones in addition to the 73.8 million cubic meters of water per annum is an indirect yet substantial opportunity cost of the IOF presence in the oPt.

Photo 4. The opportunity cost!

Conclusions

Since the 1967 occupation of the West Bank and Gaza Strip the toll exacted on the environment from the IOF and the Israeli military infrastructure has been far-reaching and multifaceted. In contravention of international law a system of military orders has been used to confiscate vast tracts of land within the oPt for use as closed military zones, military bases, Israeli controlled roads and segregation walls. The closed military zones and military bases are supported and connected by an advanced infrastructure, which also serves the half a million or so illegal Israeli settlers in the oPt. Beyond the profound social and economic impact these confiscations have on the domestic communities, long lasting environmental damage is also taking place. Water contamination, disrupted habitats and ecosystem, abandoned UXO's and toxic waste, and air and noise pollution are just some examples of this environmental degradation.

The containment barrier around Gaza and the segregation wall in the West Bank are large-scale constructions within the Israeli military infrastructure that are leaving a devastating impression on the natural environment and the agricultural lands upon which they are built. These projects should be viewed as a part of the whole 'matrix of control' of the occupation, which includes the BRN, watchtowers, house demolitions, discriminatory planning policies and road checkpoints.

Clearly in times of 'peace' there is considerable environmental harm being caused by the Israeli military in the oPt but in times of intense conflict this damage can reach critical levels. The recent Gaza offensive provides a tragic insight into just how destructive and debilitating Israeli aggressions can be for the environment and the already scarce natural resources in the region.

In conclusion, it is evident that the adoption of responsible and sustainable environmental policies isn't possible as long as there is an IOF presence in the oPt and Palestinian land and resource use is subject to Israeli military prerogatives.

---

[i] Union Aid Abroad, 17th June 2009. Retrieved from http://www.unionaidabroad.org.au/projects/mideast/news/1246958000_13866.html

[ii] Landmine Monitor Report 2003, Page 759

[iii] Defence for children international-Palestinian section. Retrieved from http://www.dci-pal.org/english/display.cfm?DocId=114&CategoryId=2

[iv] Farming under fire. Retrieved from http://farmingunderfire.blogspot.com/2009/08/gaza-cleaning-up-explosives-mines-and.html

[v] UNHCR online. Retrieved from http://www.unhcr.org/refworld/country,,IRIN,,PSE,4562d8cf2,4a1b97ae95,0.html

[vi] Architects and Planners for justice in Palestine. Retrieved from http://apjp.org/idf-deny-access-to-gaza-agricu/

[vii] A review of the Palestinian agricultural sector by the Spanish Consulate in Jerusalem, Page 47

[viii] UNEP. Environmental assessment of the Gaza Strip. Retrieved from http://www.unep.org/PDF/dmb/UNEP_Gaza_EA.pdf

[ix] United Nations Information System on the Question of Palestine report retrieved from http://unispal.un.org/UNISPAL.NSF/0/BBB5C84A39DEBDF785257632004F336E

[x] UNEP environmental assessment of the Gaza Strip. Retrieved from http://www.unep.org/PDF/dmb/UNEP_Gaza_EA.pdf

[xi]UNEP environmental assessment of the Gaza Strip, Pg 83 retrieved from http://www.unep.org/PDF/dmb/UNEP_Gaza_EA.pdf