



The impacts of electronic waste disposal on the environment and public health in the occupied Palestinian territory: a case study from Idhna, Hebron Governorate



Applied Research Institute – Jerusalem (ARIJ)

“Water and Environment Research Department”

In Cooperation with

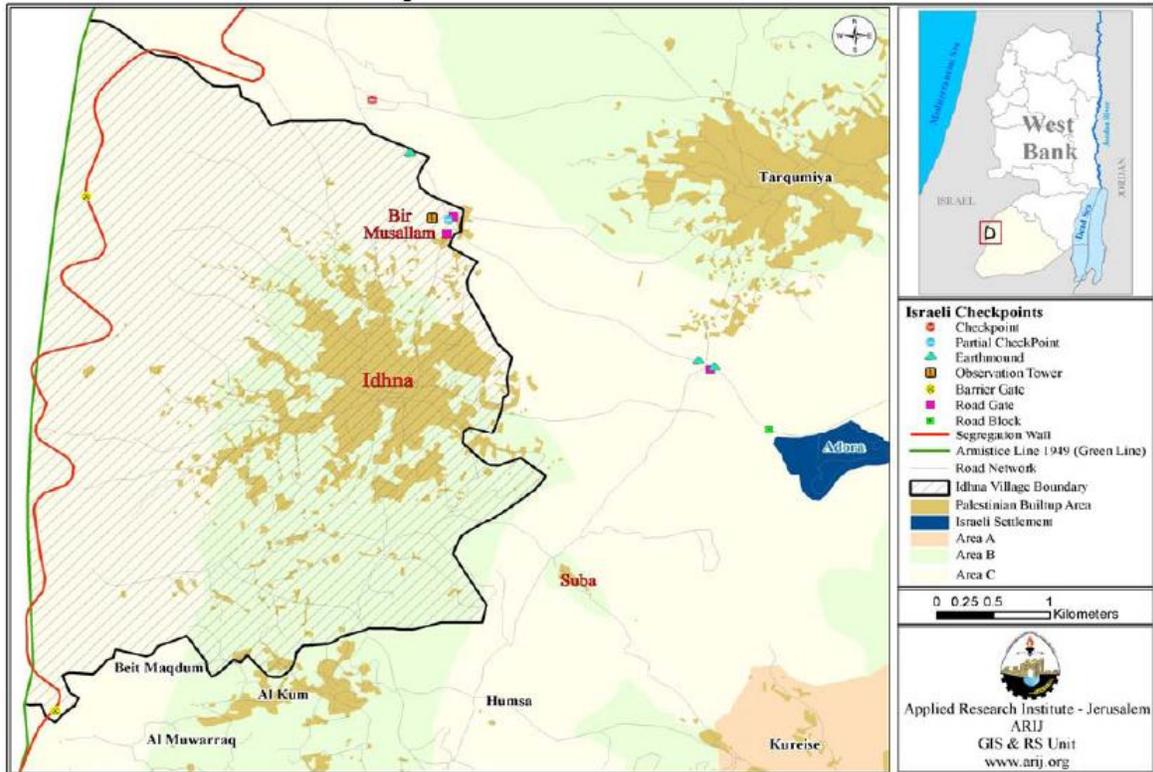
Sunflower Association for Human & Environment Protection

1. Introduction

Electronic waste (e-waste) is a term used to cover almost all types of electrical and electronic equipment that has or could enter the waste stream. E-waste includes televisions, computers, mobile phones, refrigerators, and washing machines – almost any household or business item with circuitry or electrical components with power or battery supply (StEP, 2012). The UN estimates that globally there is around 40 million tons of e-waste that accumulates per year (UNEP, 2009). E-waste differs from general waste as it contains various hazardous substances and toxic chemicals which have potential to pollute the environment and risk human health when processed, recycled or disposed of. The rapid accumulation of electronic waste across the occupied Palestinian territory (oPt) has prompted an investigation concerning its implications on the environment and public health. This report will highlight the situation in Idhna, a town in the Hebron Governorate which receives vast quantities of e-waste, most of which is transferred from Israel. This report reveals the extent of destruction inflicted on the landscape and environment by e-waste processing and disposal along with the associated contamination of agricultural produce and water resources. Health concerns for the local Palestinian population in Idhna are also expressed. This report proposes actions to address the lack of regulation and enforcement within hazardous waste management policy and environmental legislation in the oPt. This report further proposes the initiation of public awareness campaigns regarding the hazards of e-waste disposal, and promotes channeled investment into sustainable recycling hubs and projects across the oPt.

2. Idhna - electronic graveyard

Idhna is a town in Hebron Governorate located 15 km southwest of Hebron City in the southern part of the West Bank. Idhna is bordered by Tarqumiya town to the north, Taffuh town and Hebron city to the east, Al Kum village to the south, and the 1949 Armistice Line (the Green Line) to the west (See map 1). Idhna is located at an altitude ranging from 400m to 480m above sea level with a mean annual temperature of 19°C, and mean annual rainfall ranging between 410mm and 440mm (ARIJ, 2009). According to the Palestinian Central Bureau of Statistics (PCBS), the total estimated population of Idhna for 2012 is 22,077 (PCBS, 2012). A census conducted by PCBS in 2007 estimates 3,118 households with an average size of 6.1 people per household (PCBS, 2012). The population of Idhna village constituted 3.44 percent of the total population of Hebron Governorate (ARIJ, 2009).



Map 1: location of Idhna in the Hebron governorate (ARIJ, 2009)

Idhna was traditionally an area of high agricultural productivity and many local Palestinians maintained a livelihood from the land. This method of livelihood, and the environment which aided it, was rapidly transformed following construction of the Israeli Separation Wall. Approximately 9 km of the Segregation wall has been constructed on Idhna land since 2004. While completed sections consist of austere grey 8m concrete slabs, unfinished sections incorporate vast lengths of razor wire. Two historical sites have been isolated behind the wall, and twenty water sources (two springs and artesian wells) have been isolated from farmers or entirely blocked (ARIJ, 2009). Forty houses have had demolition orders placed on them, and ten have been destroyed to make room for the wall. Additionally, approximately 12 km of roads have been obstructed and/or destroyed by the wall and 20 families isolated by the wall. In terms of land and vegetation, municipal officials attest that 800 dunums of land has been confiscated for the construction of the wall itself, and an additional 3,200 dunums has been isolated by the wall. Furthermore, construction of the wall resulted in the destruction of 2,500 trees (ARIJ, 2009). The economic potential lost from Idhna's once fertile land has been replaced by e-waste collection and disposal. E-waste flows into Idhna on trucks loaded with old appliances including refrigerators, computer monitors, and cell phones. Idhna has essentially turned into an electronic

graveyard receiving 200-500 tons of e-waste everyday (TCCR, 2012). Idhna is not unique; the same methods of disposal have spilled over into the adjacent communities of Al Kum and Beit Maqdam.

In order to process the vast quantities of e-waste, Palestinians have established 55 workshops that are scattered within the town of Idhna. Each workshop employs between 12-38 people (over 1000 in total), many of which are under the age of 16 (TCCR, 2012). Workers process the e-waste to extract valuable materials such as nickel, copper and lead which is then sold and re-used. This process involves dismantling and/or burning components of electronic items in order to separate the useful materials. Furthermore 38 small-scale workshops are established next to households in Idhna and 18 women also operate workshops inside their homes (ARIJ, 2012). In addition to workshops inside Idhna town, there are also burning sites on sporadic areas of land surrounding Idhna. Palestinians, who are not connected to established workshops in the village, dispose of e-waste in an open field owned by other Palestinians. E-waste is burnt, minerals are extracted, and the remaining non-valuable waste is left to contaminate the land. These incidents have grown in number due to the increasing expense of owning a workshop and the ability to obtain larger profit margins from simply burning the waste. Burning sites are a quicker and cheaper way to process e-waste but are extremely detrimental to the environment.

3. E-waste from Israel

The rapid accumulation of e-waste in Idhna is partly a result of the unregulated transfer of waste from Israel and illegal Israeli settlements. Under international law, Israel is prohibited from using occupied land for the sole benefit of its own civilian population. In Resolution 63/201 of 28 January 2009, the UN General Assembly explicitly addressed the issue. It called: *"upon Israel, the occupying Power, to cease the dumping of all kinds of waste materials in the occupied Palestinian territory, including East Jerusalem, and in the occupied Syrian Golan, which gravely threaten their natural resources, namely water and land resources, and pose an environmental hazard and health threat to the civilian populations"* (UNISPAL, 2009). Idhna is a prime location for Israel to facilitate the transfer of e-waste due to its proximity to Targumiya checkpoint. Targumiya checkpoint was built in 2006 for the purpose to monitor and facilitate the passage of commercial goods (POICA, 2008). E-waste can easily flow from Israel across the checkpoint and into Idhna. Furthermore the adjacent settlement of Adora facilitates the transfer of e-waste by further processing e-waste from settlements in the area. Idhna is surrounded by the Israeli settlements of Adora and Telem to the east-northeast, a bypass road that runs through the

northern parts of the town, and the Separation Wall that borders Idhna to the north and the west (ARIJ, 2009). E-waste from Israel also includes old military equipment such as tanks and jeeps which are concealed upon entry into the West Bank and while contained in the workshops.

4. Impact on urban living and the rural landscape

E-waste workshops are distributed across Idhna, many of which are located next to households (figure 1) and schools (figure 2). This is a hazard for residents, children in particular who may be exposed to harmful materials or risk injury in the workshop itself. When burning sites are used the air is choked with thick black smog which lasts for several hours. The harmful emissions contained within the smog are spread across Idhna and leave an intoxicating smell. The rural landscape surrounding Idhna is fragmented with scarred areas of land that have turned black due to workshop burning sites. These areas are littered with the charcoaled remains of e-waste. One burning site lies directly next to the Separation Wall and is now home to the carcasses of refrigerators, televisions, cell phones, and computers which are left to contaminate the remaining olive groves and corn fields (see front cover). The continued transformation of arable lands into burning sites will further encourage desertification.



Figure 1: urban living in Idhna has been transformed with the establishment of e-waste workshops



Figure 2: e-waste workshop adjacent to a school in Idhna

5. Impact on water resources

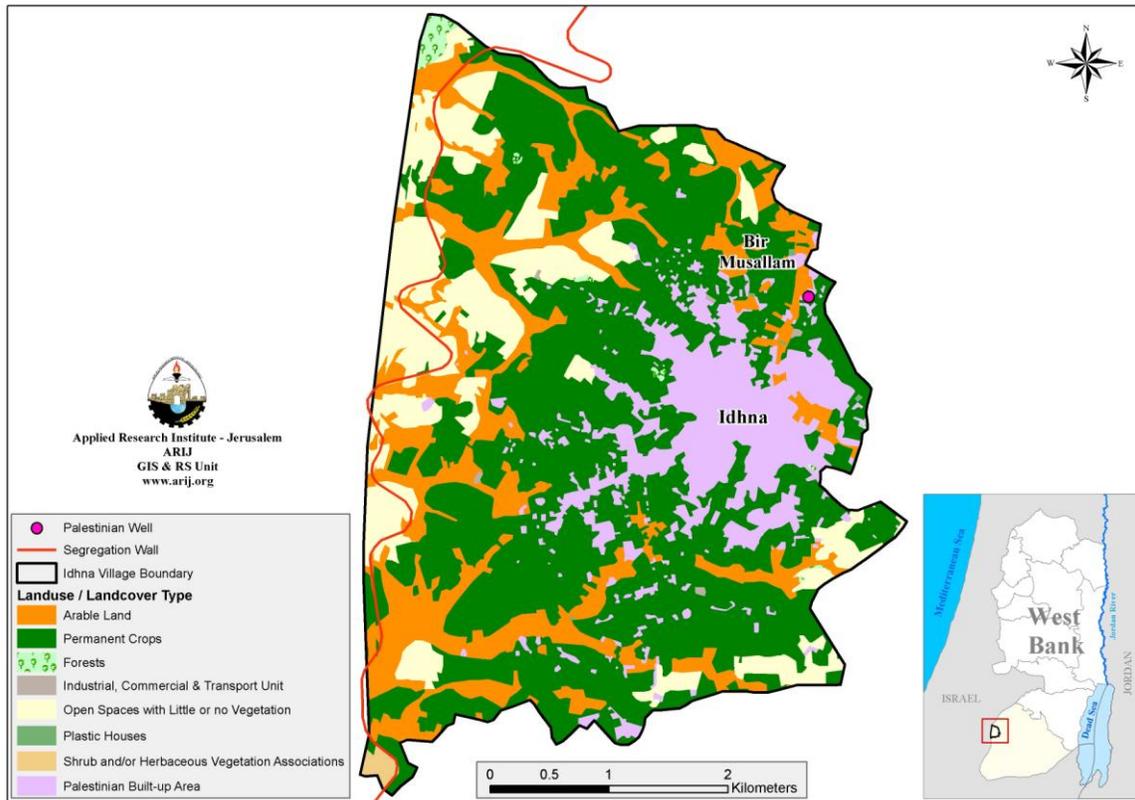
Many workshop burning sites are located next to water wells. The toxic chemicals and toxins that are released during the burning process, such as mercury and lead, leach into the ground and contaminate water supply. This process is further accelerated during the winter months when rainfall raises the water table. Figure 3 highlights one burning site which is located next to a well traditionally used for livestock. As a result of e-waste processing the water has become heavily contaminated and is no longer used. There is one groundwater well in Idhna (map 2) and 3 public wells utilised for agriculture, irrigation, livestock and domestic purposes. All public 3 wells are contaminated due to e-waste processing and disposal. The e-waste burning sites also contaminate the soil which renders the land infertile and barren for many years following e-waste processing.



Figure 3: e-waste burning site adjacent to a groundwater well (right)

6. Impact on agricultural lands

The productive land that remains part of Idhna is used to grow agricultural products to serve local markets. An estimated 11,500 dunums of land is reserved for agriculture, 10,040 dunums of which is cultivated (see map 2) (ARIJ, 2009). The most common fruit vegetables cultivated in this area are squash, snake cucumber, cauliflower and tomato. There is a total area of 7,435 dunums planted with olive trees. Other trees planted in the area are mostly almond trees, fig trees and grape vines. Cultivated crops, in particular, wheat and barley, represent an area of about 1,910 dunums (ARIJ, 2009). Map 2 highlights land use and land cover in Idhna and the surrounding area. An estimated 100 dunums of arable land has been converted into e-waste burning sites. Over 1,500 olive trees have been burnt on land now used for e-waste disposal which equates to loss of 3 tons of olive oil per year (TCCR, 2012). E-waste burning sites that are established next to agricultural lands are threatening agro-biodiversity and the quality of agricultural produce. This impact is physically evident on agricultural crops as revealed in figure 4 which shows tomatoes lined with black soot. This soot is transported by the wind following e-waste burning and can spread across vast areas of land.



Map 2: Land use, land cover, groundwater well and the Israeli Separation Wall in Idhna (ARIJ, 2009)



Figure 4: Tomatoes covered in spots of black soot, a by-product from e-waste burning sites

7. Impact on public health

Exposure to toxic substances released through e-waste disposal can have a severe and detrimental impact on human health. The toxicity of these substances has the potential to damage or disable nervous, immune, respiratory, reproductive, and renal systems. Carcinogenic compounds contained within these substances may further trigger tissue or cell damage leading to cancer. These toxins and chemicals enter the body through absorption, inhalation or ingestion of contaminated water, agricultural produce, soil, smoke, or dust. The hazardous toxic substances contained within electronic products, along with their associated impacts on human health, are summarized below;

- **Cadmium** is used in rechargeable computer batteries, contacts and switches in older cathode ray tube (CRT) monitors. Cadmium is extremely toxic to humans, in particular adversely affecting kidneys and bones (Greenpeace, 2008).
- **Polyvinyl chloride (PVC)** is used for printed circuit boards, connectors, plastic covers and cables. When burnt or land-filled, PVCs release dioxins that have harmful effects on human reproductive and immune systems (CHEJ, 2004). **Ethylene dichloride** is the chemical compound from which PVC is derived and if inhaled, as a result of burning, can cause severe damage to the lungs.
- **Mercury** is used in fluorescent lighting devices and in flat screen displays. Mercury can cause sensory impairment, damage to the nervous system, kidneys and brain, and can be passed on to infants through breast milk (StEP, 2012).
- **Lead** is used in CRT monitor glass, acid batteries, and is as solder for electronic circuits. Exposure to high levels of lead can severely damage the brain and kidneys in adults or children and ultimately cause death. In pregnant women, high levels of exposure to lead may cause a miscarriage.
- Electrical goods contain a range of other toxic substances such as **beryllium, brominated flame retardants and polychlorinated biphenyls**, all of which are highly toxic.

ARIJ interviewed Dr. Saadi Al-Rajoub at the Palestinian Medical Relief Society Idhna medical centre to obtain a deeper understanding on the extent to which e-waste disposal in Idhna is affecting human health. Dr. Al-Rajoub explained that cases of cancer are high in Idhna and its rate of occurrence is increasing among young adults. He reported that 18 people in Idhna under the age of 35 have suffered

from different forms of cancer within the last year. Dr. Al-Rajoub also noted an increasing number of women who suffer from miscarriages, which may relate to lead poisoning. He also noted other symptoms caused by exposure to e-waste such as skin ailments, headaches and memory problems. He also revealed that on average, out of those patients who visited the medical centre everyday, 30 people complain about symptoms that can be related to the existence of e-waste processing in Idhna (al-Rajoub, personal communication, 2012).

8. Required actions

The ongoing transfer and disposal of e-waste in the oPt is an environmental disaster. This practice must be immediately addressed in order to stop and rejuvenate the health of the environment and Palestinians living in affected areas. This has the potential to be achieved through active engagement of international and civil society organizations along with the Palestinian Authority (PA). This section will highlight three major points of action to address the e-waste problem in the oPt.

8.1. Environmental legislation enforcement

Environmental legislation, policies and planning in the oPt are the responsibilities of the Ministry of Environment Affairs (MEaA), in close cooperation with other competent authorities such as the Ministry of Planning and Administrative Development (MoPAD) and Ministry of Local Government (MoLG). MEaA drafted the Palestinian Environmental Law No. 7 in 1999, and revised it in 2003. The Law establishes the general legal framework for environmental protection in the oPt. The Law's objectives involve: protecting the environment by preventing pollution; promoting public health and welfare; preserving biodiversity; and rehabilitating areas that have suffered from environmental degradation. A number of policy instruments are proposed within the Law to achieve these objectives such as environmental impact assessments (EIA), environmental monitoring, licensing, inspection, and issuing penalties for violations. However, as revealed in this report, the Law fails to protect the environment from the impacts of e-waste disposal in the oPt despite the fact that this practice violates the Law in a number of instances. For example, Article 12 states that; *"no person shall be authorized to manufacture, store, distribute, use, treat, or dispose any hazardous substance or waste, unless such a process is in compliance with the regulations, instructions and norms specified by The Ministry, in coordination with*

the specialized agencies". Furthermore, Article 18 states that; "it is forbidden to drift arable lands or transport its soil in order to use it for purposes other than farming".

ARIJ finds it necessary to remind the environmental authorities on how to interpret policy instruments of the Environmental Law. As stated in Article 45, MEnA should set and adhere to strict norms in order to determine which projects and activities are subject to EIA. If a project or activity satisfies the conditions following the EIA then a license should be issued which is subject to be renewed, temporarily suspended, or revoked as stated in Articles 48 and 55. The MEnA should follow up this process with routine inspections of projects, facilities and activities to ensure their compliance with the standards prescribed for protecting the environment in compliance with the provisions of the Law (Article 50). If a project or activity fails to meet environmental regulations stipulated within the Law, the owner of a project or facility will be subject to strict penalties. For example, as stated in Articles 62 and 64; *"any person who violates the provisions of Article 12 (and 18) of this law shall be punished by a fine of not less than 1000 and not more than 3000 Jordanian Dinars, and the imprisonment of a period not less than one month and not more than six months, or one of them"*. In addition to penalties, the cost to remove the environmental damage caused should be the responsibility of the offender.

The failure of authorities to effectively adopt and enforce policy instruments stipulated within the Environmental Law has allowed e-waste disposal to scar the Palestinian environment. Israel has taken advantage of this situation by transferring vast quantities of e-waste into Idhna across the Targumiya checkpoint. Article 13 of the Law specifically states that; *"it is forbidden to import any hazardous waste into Palestine"*. Israel must immediately respect Resolution 63/201 of 28 January 2009 which forbids dumping of all kinds of waste materials into the oPt. Israel must further adopt the 'polluter-pays-principle' by compensating Palestinians for the damage caused to their land. The onus does not only fall on Israel, MeNA and other stakeholders concerned with environmental protection should seriously commit to their responsibilities. For example, taskforces should be established in collaboration with the police to enforce the Law by issuing penalties to those who violate it. The authorities should further establish a working group to monitor and regulate the flows of e-waste into the Palestinian territory with the aim to eradicate this practice.

8.2. Public awareness campaigns

There is a widespread lack of awareness regarding the impacts of e-waste disposal in the oPt. Learning from Idhna, it is clear that the ambition to earn a living within a stagnated economic community is pushing people to continue the practice of e-waste disposal with little regard towards the environment or public health. Public-awareness campaigns should firstly target those who openly burn e-waste. This campaign would promote the discontinuation of the practice by highlighting the extreme damages inflicted on human health and the environment. Secondly awareness campaigns should target workshop owners and workers in order for them to realise the damages caused by workshop operations. Workshop owners should also be informed about the necessity to provide workers with health insurance and protective clothing such as gloves, eye masks and boots. Workers should also understand the importance to adhere to workshop rules regarding individual and environmental safety. Thirdly awareness campaigns should target the local population who should be informed about the dangers of e-waste and the health symptoms arising from exposure. The provision of public awareness campaigns provides a suitable entry point for international and civil society organizations working within the environment and health sectors that have the financial and technical capacity to coordinate trainings.

8.3. Investment in recycling projects and creation of green jobs

In the oPt there is a significant lack of resource recovery as recycling in these instances usually focuses on a few valuable elements like lead, aluminum and copper (with often poor recycling yields), while most other materials are discarded, burnt and inevitably lost. In this sense it can be demonstrated that resource efficiency is another important dimension in the e-waste discussion in addition to the ecological, human, economical and societal aspects. Recycling projects have the potential to transform Palestinian towns such as Idhna, into recycling hubs for the West Bank. These projects would create hundreds of green jobs and clean up the environment in the process. The creation of green jobs would remove the practice of hazardous e-waste disposal and instead confine it to specialized recycling projects that effectively manage waste. Recycling projects would be established away from schools and households and would ensure minimal contamination to the environment. In order to secure greater benefits for the environment, recycling projects should focus partly on refurbishment and reuse of materials rather than the conventional down-cycling process in which equipment is reverted to a raw material form. This would also encourage greater resource recovery as most materials that remain from e-waste can be safely processed and re-used in the future. The environmental and social benefits of reuse include; preservation of natural resources and air quality; diminished demand for new products

and raw materials; reduced greenhouse gas emissions through less energy intensive manufacturing; less packaging per unit; increased availability and accessibility to technology due to greater affordability of products; and diminished use of landfills. Donor funding and a PA budget should be earmarked for sustainable recycling schemes and projects within the oPt. The PA should insure this issue remains high on the environmental agenda.

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