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WATER CRISIS IN GAZA STRIP, PALESTINE

ABSTRACT:
Water crisis is a major environmental problem and day by day, this problem is increasing with the rapid growth of industrialization and urbanization in all parts of the world. This paper is an attempt to investigate the water crisis in Gaza strip in Palestine because the water crisis in Gaza continues to worsen as the groundwater becomes increasingly polluted and the political situation delays hope of ''resting'' the Gaza aquifer and finding solutions for proper disposal of sewage and solid waste. The current situation results in diseases and violates the basic human rights of the people of Gaza. However, this study is proposed few strategies to minimize the risk, one of these strategies are secure Palestinian water rights and to strengthen water institutions to be able to govern water effectively and efficiently.

KEYWORDS:
Water crisis, environmental problem, Gaza strip, Palestine

INTRODUCTION

Even if, access to safe water resources is a global concern, as human rights, stating that all citizens have a right to water of good quality for personal consumption at costs they can afford. In Palestine, people are struggling for access to water, and against contamination of the only sole and precious resource that they have. Geography, politics, and war combine to make the Gaza Strip a worst-case scenario for water resource planners (Bohannon 2006). Long-term overexploitation in the Gaza Strip has resulted in a decreasing water table, accompanied by the degradation of its water quality. Due to high levels of salinity and nitrate pollution, most of the ground water is inadequate for both domestic and agricultural consumption. The water is unfit for human consumption, and the risk of contracting an infectious disease is high. The rapid rate of population growth in the Gaza Strip and dependence upon ground water as a single water source present and failure of the existing infrastructure to cope, considered as a serious challenge for future political stability and economic development. This comes as the Israeli Occupation Forces continue impose block and siege, to prevent access of needed material to maintain and improve water system in Gaza strip, in addition to reduce fuel and electrical supplies to Gaza, which disrupts the operation of many water wells, thus affecting the authorities' ability to pump water to the population. Thus, although the water quality is bad, it is not always available, because the current electric is needed to pump water to consumers and the electricity is not consistently available. The environmental situation in the Gaza Strip was already serious prior to these events, due to underinvestment in environmental systems, lack of progress on priority environmental projects, and the collapse of governance mechanisms. The recent escalation of Israel hostilities caused additional damage and increased the pressure on environmental facilities and institutions. Water supplies were affected by damage to water wells and drinking water pipes, as were wastewater systems. The water crisis in Gaza continues to worsen as the groundwater becomes increasingly polluted and the political situation delays hope of ''resting'' the Gaza aquifer and finding solutions for proper disposal of sewage and solid waste. The current situation results in diseases and violates the basic human rights of the people of Gaza. WHO established international standards for salt levels of chemical compounds in water, such as nitrate and chloride. For safe and healthy human consumption of drinking water these salt compounds cannot exceed the WHO guidelines. For nitrate, the WHO standard is 50 mg/l and for chloride it is 250 mg/l. The Gaza aquifer has nitrate levels over 100 mg/l and chloride levels averaging 1000 mg/l. accordingly, how can adversely these unsafe and unacceptable levels affecting the health of Palestinians citizen in Gaza Strip? Today, only 5-10 percent of the water of Gaza's portion of the Coastal Aquifer is safe to drink. Poor water quality in Gaza leads to serious health concerns, with vulnerable groups such as children suffering most.

THE EXPECTED RIGHTS FOR PALESTINIAN TO ACCESS HEALTH AND SAFETY WATER

The Gaza Strip has narrow surface area, about 365 km^2, and rapid population growth (which is about 3.8% based on estimates of the Palestinian Center for Census Statistics) has led to an increase in census, up to the approximately 1,416,543 people, in 2007,

increased to about 1, 5 in 2010, and the high population density of up to about 6,708 people / km^2, population growth is still continuing. Gaza is located on the southeastern coast of the Mediterranean sea between latitudes 31° 16[11] and 31° 45[11] and longitudes 34° 20[11] and 34° 25[11] East. It is about 1.33% of the total area of mandate Palestine. On the east, it is bordered by Israel, on the south with Egypt, on the north is Israel and on the west is the Mediterranean Sea. The Gaza Strip is one of the most densely populated areas on the earth. Because of their isolation, the inhabitants of this area between the Mediterranean, Egypt and Israel are reliant on being self-sufficient. Beneath the ongoing conflict in the Gaza Strip is a groundwater crisis that's rapidly depriving Palestinians of drinkable water. The Gaza Strip is underlain by the sole source of fresh water from the Shallow Coastal Aquifer, which is contiguous with the Israeli Coastal Aquifer to the north. Gaza is the 'downstream user' of the portion of the Coastal Aquifer system that lies beneath Israel, due to the natural flow regime in the aquifer which is from southeast to northwest toward the Mediterranean Sea. Thus, the ground water flows coming from Israel into the Gaza portion of the aquifer, and hence water abstraction in Gaza does not affect Israeli water supplies. Amnesty International Report, Troubled Waters: Palestinians denied fair access to water (2009), which states that:

"The inequality in access to water between Israelis and Palestinians is striking. Palestinian consumption in the Occupied Palestinian Territories (OPT) is about 70 liters a day per person – well below the 100 liters per capita daily recommended by the World Health Organization (WHO) – whereas Israeli daily per capita consumption, at about 300 liters, is about four times as much. In some rural communities Palestinians survive on far less than even the average 70 liters, in some cases barely 20 liters per day, the minimum amount recommended by the WHO for emergency situations response" (AMNESTY, 2009).

According to the Costal Municipalities Water Utility in Gaza Strip (CMWU): "The groundwater underneath Gaza is becoming limited due to Israel's construction of trap wells [about 27 wells] inside Israel, along Gaza's eastern political border, siphoning water supplies from the aquifer before they reach Gaza." It is estimated that the annual recharge of the Coastal Aquifer from rainfall in the Gaza Strip is in the range of 40-45 million cubic meters (UNEP, 2009). Approximately 90% of the population of the Gaza Strip drinks water from municipal groundwater wells and 15%, mostly in agricultural areas, use private wells (Shomar, 2006).

WATER SITUATION IN GAZA STRIP

Only 5% - 10% of the aquifer is suitable for human consumption and that this supply could run out over the next 5 to 10 years without improved controls (UNISEF, 2010). The Coastal Aquifer being the only water resource in Gaza Strip suffers from deficit in the water amount which has been leading to deterioration in the quality and quantity of groundwater. Different field studies found that the ground water has poor quality, and it is quickly becoming contaminated not just with nitrates only, but with salts as well. The poor quality of groundwater is due to over-extraction from the aquifer and this has allowed seawater intrusion, hence the high salinity of Gaza's groundwater as a result of over pumping of groundwater by about 1.5 million of the Gaza Strip's people, which caused depression in the level of groundwater. This has created a slope in the groundwater table, allowing the naturally saline groundwater to flow steadily westward and spoil the aquifer under the Gaza Strip. Referring to CMWU in Gaza Strip, About 160 million cubic meters of water was taken from the underground aquifers last year to supply about 1.5 million people with drinking water and for agriculture, but that natural replenishment amounted to only 80-90 million cubic meters. Consequently, the ground water deficit is arisen to more than 80 million cubic meters last year, and if this situation continues reserves, then it will be collapsed in the next few years. Accordingly, most of ground water in Gaza strip is unfit for human use, and tap water in Gaza is known to be very salty and undrinkable. The decrease in usable water reserves has also been linked to climatic changes, such as lower rainfall, which have slowed the recharge rate of the aquifer. Other factors are a rapid population growth and increasing urban sprawl, leaving little space for rainwater catchment areas, in addition to continuous Israeli invasions to Gaza strip and destroying wide range of green areas and cutting trees which also affect negatively on the ability to catch water. Poor groundwater quality can also be attributed to pollution from wastewater seepage and the infiltration of agricultural fertilizers.

"With no other source of water available to them, Palestinians in Gaza have long resorted to over-extraction from the Coastal Aquifer, by as much as 80-100 MCM/Y – a rate equivalent to twice the aquifer's yearly sustainable yield. The result has been a marked, progressive deterioration in the quality of the water supply, already contaminated by decades of sewage infiltration into the aquifer. Today some 90-95 per cent of Gaza's water is polluted and unfit for human consumption" (AMNESTY, 2009). Inadequate sewage treatment infrastructure and damage to wastewater and drinking water pipelines has allowed sewage water to contaminate drinking water supplies, leading to sharp increases in water borne diseases in many areas. In addition to that, failure to control over-pumping has led to sea-water intrusion into the aquifer to the extent that, in 2003, only 10 % of the wells produced water of World Health Organization (WHO) drinking water standards (UNEP, 2003). The results of a 10-year monitoring program revealed that more than 90% of the available water is not suitable for drinking purposes as a result of elevated chemical contaminants as well as microbiological organisms (Shomar, 2010).

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WATER QUALITY IN THE GAZA STRIP (WHO STANDARDS)

According to the CMWU (the water service provider in Gaza):

- 65% of water wells are contaminated with nitrates
- 57% of water wells are contaminated with chloride
- Water tests have shown some wells with high values of fluoride (EWASH, 2010).

In most parts of the Gaza Strip, the nitrate concentration in groundwater is far above the WHO accepted guidelines of 50 mg/liter as nitrates (up to 331 mg NO3/liter) (EWASH, 2010). The situation is deteriorating more because; the groundwater aquifer of Gaza is extremely susceptible to surface-derived contamination because of the high permeability of sands and gravels that compose the soil profile of Gaza (Zeitoun et al., 2009). This means that sewage, irrigation water, and 'leachate' from overwhelmed and unsealed landfills can easily percolate down into the aquifer (Shomer, 2010). The lack of proper sanitation and certain agricultural practices are polluting Gaza's aquifer. Only about 60% of the territory's 1.5 million inhabitants are connected to a sewage collection system. Raw sewage discharged into the river Wadi Gaza in the middle area of Gaza Strip and this sewage flow directly to the sea, which snakes through urban areas, jeopardizes the health of the communities living on its banks, or swimming in the sea. In a recent report, the UNEP (2009) stated that groundwater supplies, upon which 1.5 million Palestinians depend, are in danger of collapse as a result of years of over-use and contamination that have been exacerbated by the recent conflict. The report on the environmental condition of the Gaza Strip following the hostilities, calls for the aquifer to be ''rested'' and alternative water sources found. Unless the trend is reversed now, damage could take centuries to reverse.

HOW THE POLITICAL SITUATION AFFECTS GAZA'S PEOPLE ACCESS TO WATER

There are environmental and geographic concerns, but there also political problems (UNEP, 2009). The whole of Gaza's civilian population are being punished for acts for which they bear no responsibility. The closure therefore constitutes a collective punishment imposed in clear violation of Israel's obligations under international humanitarian law. Resulting in many environmental problems has accelerated and exacerbated which prevent effective management, due to siege and closure boarders. Among all these problems, there are attempts to in particular access to safety and healthy water resource. Gaza is one of the good examples where politics, environment, and human activities combine to escalate water problems. The influence of each component and the interaction among the components varies with events of the day, as well as the relationship of new environmental insults to longer term of environmental degradation (Shomer, 2010). Since 2005, Gaza's water supply has been affected by restricted access to power, fuel and spare parts. Several major sewage-treatment projects funded by foreign donors including one in the northern area (SIDA 1999), were frozen after Hamas won elections in 2006. Their project aimed to treat sewage in north Gaza and it was worked on for 2 years and a pressure pipeline and a pumping station were constructed. These projects were stopped after Hamas won the elections. Desalination plants planned by donor countries have also all but fizzled due to security concerns and sanctions against the new Hamas-led Palestinian government (Bohannon 2006). Also, Israeli invasion of Gaza (Operation Summer Rain, June 2006) has caused untold damage to water infrastructure, with destruction of the Gaza Electric Station affecting the operation of the majority of wells, pumping stations and sewage treatment facilities (CMWU, 2006). The tightened siege and blockade of the enclave and boarders that Israel has imposed on the Gaza Strip since Hamas sized power, and took over control of the security apparatus there in June 2007 has greatly harmed Gaza's environmental health system, which had not functioned well beforehand. Equipment and supplies needed for the construction, maintenance and operation of water and sanitation facilities have been denied entry to Gaza, this directly affects Gaza's ability to maintain its sanitation and water treatment facilities, which hampered many services such as providing good quality and quantity water to Palestinians citizen in Gaza Strip, and since the siege began, ability to access to water are not available After almost 2 years of strangling closure that left residents in a very fragile and vulnerable state, Gaza Strip was imposed by the Israeli military offensive operations on the morning of December 27, 2008, and the Strip was under continuous attack for 23 consecutive days further multiplying the pressure on the Strip.

"Water resources in the Gaza Strip were already in the throes of an environmental crisis prior to the latest escalation of hostilities. However, the recent events aggravated the situation in several ways. First, the collapse of sewage treatment during the period accelerated the pollution load into the underlying aquifer. Second, the lack of reliable and sufficient drinking water supply during the fighting meant that the population used whatever waters it had access to, irrespective of its supply source. Third, even water supplied through municipal systems and private tankers was both untreated and untested, leaving the population exposed to contamination" (UNEP, 2009).

Water and sanitation conditions worsened further during and after the attack, that the water and sanitation infrastructure sustained damage, depriving many of running water and threatening many others from the risk of being infected with water borne diseases as a result of water contamination by leaking wastewater. During the attack the Coastal Municipalities Water Utility "CMWU" which is responsible about providing water and wastewater services in Gaza Strip announced its inability to maintain its services in both the water sector in terms of production and distribution and wastewater sector in terms of collection and discharging in Gaza Strip

governorates. Despite several appeals to all international aid agencies and organizations to help out and support the technical teams in keeping all water and wastewater facilities operational and repairing the infrastructure damages and destructions caused by the Israeli bombarding, but all these requests were declined which lead to serious crisis in Gaza Strip during this period. About 10,000 Gaza residents do not have taps in or near their homes and an additional 60 percent of the population (about one million people) does not have continuous access to water. Amnesty International, Troubled Waters - Palestinian's denied fair access to water (2009) states: "Israel's recent military offensive in Gaza, operation "Cast Lead", lasted from 27 December 2008 to 18 January 2009. During these 22 days, Israeli attacks caused some US$6 million worth of damage to Gaza's water supply and sewage and wastewater facilities and infrastructure. In northern Gaza, three water facilities were destroyed and the emergency sewage treatment plant was damaged, as well as water distribution networks. In central Gaza, Israeli attacks damaged the Sheikh 'Ajlin sewage treatment plant, causing the raw sewage to inundate more than a square kilometer of agricultural and residential land ruining the crops. In both northern and eastern Gaza, Israeli tanks and bulldozers dug up or damaged water mains. At the height of the hostilities, more than 800,000 people, over half Gaza's population, were without running water. Months later, the WHO reported that samples taken from the public water supply, water storage tanks, and water wells in areas that sustained serious damage during operation "Cast Lead" were still contaminated, and that this was reflected in higher rates of acute watery diarrhea, especially in young children, and viral hepatitis.

The impact of the damage has been particularly acute and long-standing because of Israel's continuing blockade of Gaza, and the impact this has in preventing the import of the spare parts, equipment and other materials needed to repair and improve the water supply and sanitation systems and other infrastructure" (AMNESTY, 2009). As a result of this war, and referring to CMWU fast track report, 11 wells and four reservoirs were damaged, as well as 19,920 m of water pipes and 2,445 m of sewage pipe network. Damage occurred in four locations of the sewage network and pumping stations, the North Gaza sewage treatment plant, water utility premises, and many household water-storage systems. The damage to the electricity network and the power shortages also affected the normal water supply and wastewater pumping and treatment in the Gaza Strip. As a result, it is reported that nearly 840 households (with an average family size of around 7.25 persons) suffered damage to their water supply. A further 5,200 households lost their roof water tanks, and another 2,355 tanks suffered damage. Also, the destruction caused by Israeli shelling, tanks and bulldozers damaged Gaza's sanitation network, causing 150,000 cubic meters of untreated and partially treated sewage waste water to flow over agricultural and residential land and into the sea during the attacks. The daily average of wastewater being pumped into the sea is still a staggering 80,000 cubic meters. Nearly, 10% of the population of the Gaza Strip did not receive proper water supplies immediately after the cessation of hostilities, and a population of 32,000 did not have access to proper water supply even 3 months after the ceasefire was concluded (WHO, 2009).

The escalation of violence caused aggregate of contamination, such as hydrocarbon contamination at industrial sites, sewage contamination around broken storage tanks, continuing sewage contamination around sewage treatment plants, storm water infiltration areas, and contaminated sewage drains and coastline. Furthermore, because both the weapons used and the materials present within the buildings had chemical constituents, it had to be assumed that every damaged site, including impacted agricultural areas, was also potentially contaminated. In addition to the continuation of the above many obstacles during the, Gaza Strip faced acute shortage in necessary spare parts, equipments, and machines for affording the required infrastructural services had to deal with electricity insufficiency and fuel (diesel) shortage as power supply alternative for restoring these services, which lead to serious water crisis in the last three years. Accordingly, the water crisis exacerbated, that since January 2010, there has been a serious deterioration in the supply of electricity in the Gaza Strip, which disrupts the operation of many water wells, thus affecting the authorities' ability to pump water to the population. The immediate reason is that Gaza's sole power plant, the Gaza Power Plant (GPP), is able to produce only half the electricity that it did prior to January 2010, due to a lack of funds needed to purchase the industrial fuel required to operate the plant. As a result, almost all of about 1.5 million Palestinians residing in the Gaza Strip, with the exception of those who live in the Rafah area (The Rafah area has scheduled cuts of 6-8 hours a day), must cope with scheduled electricity cuts of 8-12 hours daily, compared to 6-8 hours prior to January 2010. These power cuts exacerbate the already difficult living conditions in Gaza and disrupt almost all aspects of daily life, including household chores, health services, education and water and sanitation services. People living in tall apartment buildings particularly lack water supplies since they depend heavily on energy to pump it to their homes. Certain areas in Gaza have not had any water for days (OCHA, 2010). The above mentioned electricity crisis strongly affected negatively on sewage treatment, as the proper operation of Gaza City's sewage treatment plant requires 14 days of uninterrupted power supply for the full duration of the treatment cycle. Daily power cuts disrupt sewage treatment and hinder the completion of the treatment cycle, with the result that partially treated and untreated sewage is discharged into the environment; Gaza's water authorities release 60-80 million liters a day of raw

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and partially treated sewage into the Mediterranean Sea, in order to avoid sewage flooding residential areas. Electricity is also needed for pumping water for domestic use and irrigation. Because the pumps cannot be operated continuously, water supply for domestic use is insufficient, raising hygiene and health concerns. In order to pump water to households, the water wells must receive electricity in synchronization with electricity supply to the same households. Almost all the households receive water for only 5-7 hours a day (OCHA, May 2010).

How Gaza Residents Are Coping The Situation

Meanwhile service providers are obliged to supply water intermittently trying to keep the minimum level of service, Gaza resident straggling to cope the situation with different strategies, to overcome the situation in order to obtain enough water for their daily life's needs. These attempts differ according to the level of status or needs. Most of them tend to secure their water for drinking purposes from the purchasing water from largely private small-scale brackish desalination plants, which are prevalent throughout the Gaza Strip, by paying a considerable fee in addition to the expenses of the bad quality water from municipal service, which in total can afford good quality water from the municipal service. These desalination plants purify brackish water from wells and sell to residents either wholesale by tankers or retail by jerry can. There are at least 40 private desalination plants producing more than 2,000 m3 a day. There are also estimated to be more than 20,000 home desalination plants. As this sector is unregulated, there are concerns as to water quality (EWASH, 2010). High concentrations of salts and nitrates are difficult and costly to remove from drinking water supplies. Prices for purchased desalinated water are high: NIS 50/m3 (US $ 13 per cubic meter) and place additional financial strain on many households; those who cannot afford it are may be unsafe.

The operation of desalination plants has at times been hindered due to the blockade and lack of entry for spare parts, electricity and water purification chemicals such as chlorine necessary to run them (EWASH, 2010). Desperate to secure safe water resources, the population has responded by drilling private wells - many of them unlicensed - which have further contributed to the degradation of the aquifer. According to AMNESTY report, 2009, Palestinian families who do not have enough water to meet their basic needs often have no choice but to resort to coping strategies which carry risks for their own health, negatively affect their food security, and damage the groundwater resources. These include:

- *Buying water from unsafe sources (agricultural wells, which are not monitored for quality or adequately chlorinated) and boiling before consumption by young children, as most families cannot afford to buy sufficient fuel to boil all their drinking water.*
- *Reusing the same water for several tasks: water used to boiled vegetables is reused to wash dishes, then reused again to wash floors and then finally reused to flush toilets.*
- *Flushing toilets less frequently.*
- *Washing less regularly and fully, using a bucket or jug to limit the water used instead of showering.*
- *Washing clothes and floors as infrequently as possible and using a small quantity of water to hand-wash clothes in a bucket rather than using a washing machine.*
- *Only growing rain-fed crops in their home gardens or not keeping a home garden at all in dryer areas.*
- *Keeping fewer animals or none at all.*
- *Drilling unlicensed shallow wells (AMNESTY, 2009).*

Health Impact Of Water Crisis In Gaza Strip

The water required for each personal or domestic use must be safe, therefore free from micro-organisms, chemical substances and radiological hazards that constitute a threat to a person's health. Furthermore, water should be of an acceptable color, odor and taste for each personal or domestic use (EWASH (2010). According to EWASH (2010), the water situation in Gaza strip, and referring to different reports, researches and experts, the tragic situation there indicates a high probability associated with many water born diseased among the Palestinian citizen in Gaza strip, that without access to safe water, adequate sanitation and proper hygiene, children are particularly vulnerable to sickness caused by water borne disease. UNEP report assert that a number of environmental and health impacts may be related to this environmental crisis, due to lack of good quality water may which lead to an increase in disease; water and sewage water may mix, exacerbating health problems; sewage from damaged treatment plants may be released onto agricultural and other land and; untreated or undertreated sewage may be drained out to sea, causing problems to the marine environment, and for people using the sea.

The effect of people consuming contaminated water at levels over safety standards for many years, leads to an accumulation of chemicals in the body that can cause chronic diseases such as cancer, liver problems, renal failure, kidney problems and reproductive difficulties. Referring to different health effects reports, the health problems are: 50 % of Gaza's children have a parasitic infection; children and adults suffer from diarrhoea; that in Gaza, diarrhoea, an easily preventable disease, is behind 12 percent of young deaths. Furthermore lack of safe water is an immediate cause of under nutrition for millions more children, which can have lasting impact on a child's cognitive and physical development. high chloride levels causes kidney disease; consumption of saline water leads to salt levels in humans that causes kidney dysfunction, heart failure, neurological symptoms, lethargy, and high blood pressure; excessive levels of fluoride are toxic, causing gastritis, ulcers, kidney failure, bone fluorisis (bone fractures and crippling), and teeth fluorsis (black lines around gums and tooth

decay); and Nitrate levels in the Gaza Strip have continued to rise and currently present a health risk throughout the territory. High quantities of nitrates in drinking water can have significant health repercussions, particularly for infants. A recent UNEP report recommended that a comprehensive study should be conducted on the prevalence of "blue baby" syndrome, also known as methaemoglobinaemia, in addition to prevalence of and gastric cancer. Consequently, safe water should immediately be provided in the Gaza Strip to all children less than one year old, in order to ensure their health is protected from disease caused by nitrate contamination. Since people do not have other water alternatives they consume the brackish water for daily survival. Palestinians have no other options currently and the current numerical figures show the demand for water exceeds the water supply more than 90 per cent of the water extracted from the aquifer in Gaza is contaminated and unfit for human consumption. Waterborne diseases are common. The Department of Health of the UN Relief and Works Agency (UNRWA) reported in its February 2009 Epidemiological Bulletin for Gaza Strip that: "Watery diarrhea as well as acute bloody diarrhea remain the major causes of morbidity among reportable infectious diseases in the refugee population of the Gaza Strip." (EWASH, 2010; AMNESTY 2009; UNEP, 2009).

Is There Any Potential To Resolve The Crisis?

As the ICRC has stressed repeatedly:

"The dire situation in Gaza cannot be resolved by providing humanitarian aid. The closure imposed on the Gaza Strip is about to enter its fourth year, choking off any real possibility of economic development. Gazans continue to suffer from unemployment, poverty and warfare, while the quality of Gaza's health care system has reached an all-time low" (ICRC, 2010).

Assembling enough suitable materials to carry out sanitation projects is a slow and haphazard process. Materials obtained through the tunnel trade can be of questionable quality, while some items, such as certain electro-mechanical pumps, cannot be found at all, which hobbles construction efforts. The options for improving the water situation in Gaza remain effectively unchanged since 2000. Namely, additional supplies must be made available: through desalination, wastewater treatment and reuse, import from Israel, or import from the West Bank. Currently, the unstable conditions in the Gaza Strip make large scale engineering projects impossible to implement. The less technically difficult options of water import from Israel or the West Bank are loaded with political implications and complexities. Both require the cooperation of Israel to ensure their implementation as additional pipelines would need to be constructed, and in the first case, the Israeli water company, Mekorot, would have to supply the water; whereas in the second, a pipeline would have to be constructed across Israeli territory and furthermore, an agreement would have to be reached on Palestinian water rights in the West Bank. Unfortunately, the socio-political developments in Gaza place insurmountable hurdles in the way of all attempts to reform, upgrade, or even maintain that infrastructure in proper working condition. To redress this situation, aid is needed to develop alternative water supplies, such as desalination, and infrastructure for sewage disposal must also be restored and expanded to meet the needs of a growing population. All of this can be achieved by devote the unacceptable and inhumane collective punishment for more that 1.5 million Palestinian people for more than 3 years, and open the boarders to facilitate entrance of all needed materials, and equipments to rehabilitate and improve the water situation in Gaza strip.

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