The Water Crisis in Gaza

Gaza, a region with a rich and powerful history, is currently facing one of the world's worst water crises to be seen in recent times. A number of issues are facing the region in this age that contribute to the lack of, and deterioration in quality of, water resources in the local area. The crisis can be tied to many factors, primarily: population increase, global warming, Palestinian-Israeli relations and general lack of adequate control over aquifers in the Gaza strip.

Gaza's primary source of fresh water is the Gaza coastal aquifer which has a water volume estimated to be around 360-420MCM (Million Cubic Meters) regenerating yearly. Of this, only 5-10% meets the standards set out by the WHO (World Health Organisation) for direct human consumption (The World Bank 2009). Judging by these figures, this only leaves between 18MCM to 42MCM to share among the city population of 450,000 people. The total population of Gaza is approximately 1,500,000. According to figures released by Amnesty, the average Palestinian citizen uses only 70L of water per day compared to the average of 300L consumed by someone living in Europe (Amnesty International). The WHO states that the minimum amount of water that should be available to someone is 100L. This vast difference can be accounted for if we examine the climate of the region, human influence upon the environment and the relationship between Israel and Palestine.

Water issues due to climate and human influence

Palestine is situated between 34.15 and 35.40 east longitude and 29.30 and 33.15 north latitude (Google maps). Regions between these longitudes and latitudes are subject to a Mediterranean climate. Mediterranean climates are characterised by their warm summers with low rainfall and their mild to cool winters with mid to partly high rainfall. These winter rain dependent regions are often starved of adequate water resources during much of the rest of the year and this is primarily the case with Gaza. Gaza has an arid climate. It receives no average rainfall between the months of June to September, and thereafter receives a maximum of only around 1.38inches in January. Total rainfall in the region for a typical year averages at only 4.57inches (Wikipedia). This low level of precipitation means that surface water levels are low and that the soil is primarily sandy and permeable, allowing rain to be absorbed by the ground quickly when it falls making it only temporarily available to the population. Because of this, Gaza heavily relies on supplies from the coastal aquifer. Permeable soil also means that the soil absorbs organic and inorganic matter rapidly. Much of the rainfall that falls in the region tends to flow into aquifers, but becomes saline as it flows over and through this soil, making it unsuitable for direct usage without treatment.

Research has shown that water in the region contains over 100mg/L of nitrate salts and around 4-600mg/L Chloride ions (Palestinian National Authority). According to the guidelines set out by the WHO, the levels of Chloride should not exceed 250mg/L and Nitrate levels should not be excessive of 50mg/L in order to prevent illness occurring. Based on these figures, it is clear that the water in the region is primarily not fit for human consumption without major treatment, which is hugely costly to an already impoverished city. Causes for the high salinity and mineral content of the soil and, thus, water have been linked to sea water entering the coastal aquifer, sewerage draining into the coastal aquifer, over extraction of water sources and Israeli missile strikes in or around the region (World Health Organisation). Due to the large scale pollution, around 90% of Gaza's water supply is contaminated and water bourne illnesses such as e.coli and typhoid are rife throughout the city. Kidney failure in children is also not uncommon. These illnesses are putting intense pressure on hospitals and other medical centres in the city which already suffer because of the lack of clean water, which is vital to successful opperation for such basic medical functions as steam sterilisation and cleaning wards (Amnesty International).

Inadequate piping and water sanitation plants are a major drawback to the health of the population.
Raw entry of human faeces, animal faeces and other waste into the local water supply is the primary source of the high mineral nutrient content which is necessary for the growth of bacteria such as e.coli (Schmalenberger 2010). Due to Israeli blockade of the coastal territories, occupants of Gaza are forced to pump over 60 tonnes of untreated or partially treated waste water out to sea. Due to its close proximity to the sea, the Gazan coastal aquifer is polluted by this water re-entering through improvised wells or poorly constructed or war-damaged water piping lines, leading to a water cycle which is becoming more and more polluted. Improvised wells are a major drawback to the quality of water in the region. Without correct engineering, they often allow seawater to seep into the supply. Of the 4200 wells reported in Gaza, over 2400 are illegal. Due to the naturally high salinity of the sea water, severely contaminated wells in the Gaza Strip have been seen to see water salinity levels as high as 6206mg/L (al-Khatib 2010). The average salinity level of drinking water is 100mg/L = 100ppm. From these figures one can conclude that someone drinking from a severely contaminated well is consuming up to 62.6 times more diluted salt than the average person drinking from a non contaminated source.

With tensions ever increasing with Israel, Gaza has seen increased restrictions on water along with Palestine as a whole. Not only are Israeli missile strikes increasing ground magnesium ion levels, thus, contributing to deterioration of water quality but they are also damaging the water transport infrastructure severely, leading to huge loss of water. It has been reported that repair personnel have been shot at, arrested and even killed while trying to carry out repairs on pipelines by Israeli occupants, deterring people from making an attempt to mend the supply. Israel closely monitors Palestine in order to see if the government is importing resources necessary for water management or infrastructural development, restricting their development even further (Amnesty International 2009). Israel also has a major power over the entirety of water in Gaza as a whole, as Israel supplies Palestine with over 77% of its water. To keep such stringent control over the water that it supplies to Palestine, Israel has engineered the surrounding mountains along the Palestine-Israel border in such a way that when rainfall occurs, the vast majority of the water is directed towards an aquifer which lays just over the Israeli border, thus allowing Israel to control approx 80% of this water. On top of this, Israel denies Palestinians access to the waters of the river Jordan, a major water source in the region. This has been the case since 1967. In June 2006, Israel invaded Palestine under a mission known, ironically, as “Operation Summer Rain”. This caused an enormous amount of damage to the water system infrastructure in Gaza as the primary Gaza electrical station was destroyed, forcing pumps to shut down and cause an untold amount of damage to wells and other systems in the region. (Gray 2006).

What has caused such tensions to arise?
Between world war one and world war two, Britain ruled over Palestine as a whole, which was then an entire country which included Israel. In November 1947 this rule ended due to a UN decession and the country was split into two states: Israel which had 53% of the terretory and Palestine which had 47% of the terretory respectively. Not long after this division, protests broke out between the Arab and Israeli forces during which the state of Isreal was formally recognised. Subsequently, war broke out, Israel coming out victorious and forcing over 800,000 Palestinians to relocate to the Gaza strip or flee to neighbouring countries. The war continued until 1949, Israel having enlarged its borders to control 78% of the original land that was divided. The remaining 22%, the West Bank and the Gaza strip, remained under Egyptian and Jordanian control. Due to tensions between Egypt and Israel, Jordan and Syria, In 1967 Israel conquered the West bank, increasing its borders even further. The territories in this region are now known as the occupied Palestinian territories (OPT). Over 4,000,000 palestinians, approximately 1,500,000 of them refugees, currently live in the OPT under Israeli military overwatch (Amnesty International 2009).

In 1994, after negotiations between Isreal and the Palestine Liberation Organisation, the Palestinian Authority was formed allowing certain jurisdiction in some parts of the Gaza strip and The West
Bank. Negotiations upon matters such as a status agreement on Jerusalem (whether it would be under Israeli jurisdiction or Palestinian due to discrepancies with Israel forming settlements in the OPT), delineation of borders, Palestinian refugee status and allocation of water resources were meant to be agreed upon by 1999. By 2000 no progress had been made on these matters and Israel was continuing to build unlawfully within the OPT and construct “bypass roads” to reduce trade in Palestinian settlements. In September 2005, Israel withdrew forces and settlers from the OPT but kept control over the borders, air space and water resources in the region, essentially creating a blockade situation which allowed control over the entire region. This blockade continues to this day, forcing many in the OPT to rely on international aid. The Israeli army has also issued a series of military orders, seizing control over water supplies in the region, that are still in power today. (Isseroff 2009)

Military order 92, issued August 15th 1967, granted complete authority over all water related issues in the OPT to the Israeli army.

Military order 158, issued November 19th 1967, stated that Palestinians could not construct any new water installation without first obtaining a permit from the Israeli army and that any water installation or resource built without a permit would be confiscated.

Military order 291, issued December 19th 1968, annulled all land and water-related arrangements which existed prior to Israel's occupation of the West Bank (Wikipedia).

Coupled with the stringent blockade, these orders essentially deny all Palestinians living within the OPT any rights to water, not only violating international law but also breaching human rights and drastically reducing Palestinians standards of living. This is the cause of so many wells falling into disrepair in the Gaza region, which is currently still the case. A further order issued by the Israeli defense forces limits agricultural development in the region by prohibiting the growth of fruit or vegetables in order to 'conserve water resources' (Israeli Millitary order 1015). It is clear that whether directly or indirectly related to water, Israeli defense orders aim to control the water system and water resources in the OPT in order to restrict Palestinian development.

Current Israeli actions
A 700km long wall has been under construction since 2002, described by the Israeli forces as a defensive measure in order to prevent acts of terrorism and the passage of illegal drugs over its borders. In reality, this wall is restricting Palestinian access to water rich fields in the West Bank. Although not completed, this has already impacted Palestinians livelihoods severly. To construct the wall, many square kilometers of fertile land, olive tree plantations and forest were tore up and all land to the west of the wall has been declared a closed military zone which Palestinians are not allowed access to without a permit. Coincidentally, the best water resources lay within this zone (Parry 2003). As Gaza is an integrated part of the OPT, any action which restricts water development in the region has an adverse effect on Gaza. By restricting water resources in different areas of the OPT, the possibility of constructing pipes that deliver water to Gaza from these areas is diminishing increasingly, as is the revenue available and industry potential. Coupled with this, Israeli action has seen the confiscation of Palestinian herders water tankers in the Gaza Strip during the Summer months, when temperatures are highest and rainfall is lowest, in order to force Palestinians to move on through the denial of water resources for their livestock and thus, livelihood. (Centre for Economic and Social Rights 2003).

Overall, It is clear that Gaza is suffering direly due to the large scale pollution, arid climate and hostile Israeli tensions over the past 65 years. Coupled with the already impoverished economy of Palestine, it is a very bleak situation that must be carefully studied before an adequate draft for a solution can be made.
Possible Solutions

The pollution of the Gaza coastal aquifer needs to be dealt with. However, no cheap solution can be substituted for this process. Key areas where sea water is entering the aquifer, such as illegal wells, need to be identified and dealt with in order to prevent further infiltration and contamination. This could be dealt with by using controlled explosions to seal off the key infiltration points coupled with concrete lining to limit the amount of seawater intrusion. However, this is only possible in areas where seawater is directly entering the aquifer such as through crevices or through thin layer areas in which water can be exchanged via absorption and adsorption. This is also a highly costly measure. A more immediate solution proposed by many specialists is the construction a series of desalination plants in the region. These would reduce the populations dependence on the aquifer and would supply a controlled hygienic amount of water to the region. Due to the high temperatures and excellent availability of solar power in Palestine, this would seem the most ideal solution as it is cheap to run and would provide a much needed resource to the strip. Gaza's close proximity to the sea would supply desalination plants with millions of cubic meters of water a year, with the majority of energy required by the plants being supplied from photovoltaic and solar thermal panels (Ismail 2003).

More water treatment plants need to be constructed in the region. As current water standards are well below acceptable WHO standards, current treatment plants need to be re-evaluated and if under-performing, need to be brought up to to meet the required levels of treatment per day. At present, Gaza has inadequate treatment measures. Illegal pipelines to untreated water supplies need to be monitored and evaluated. If these connections are being used to supply refugee camps or poor areas with little access to water, they should be legalised and be rerouted to a treated water supply in order to cut down water bourne disease and thus cut down medical expenses and mortality rates in the region.

If more solar powered desalination plants were constructed coupled with improved or new water treatment plants and a series of remapped water pipelines, the crisis would immediately begin to see improvement. Desalination plants would increase water supply, allowing greater access to clean treated water via new or improved treatment plants to a greater population through the new network. It would also see the agricultural sector improve as more water would be available for irrigation. However, this is a highly costly solution and would be difficult for an impoverished region to put into action without aid.

A treaty needs to be signed between Israel and Palestine allowing fair access to water and a ceasefire between the Israeli army and Palestinian activist groups such as Hamas. This would potentially be the single most important step in resolving the current water crisis, as immediately Palestine would be able to draw from a large new water source, improving the quality of life in the region instantaneously. This treaty would not only improve the Palestinian economy but also the Israeli as it would not be necessary to spend so much money to control the water resources if the countries shared the supply. With over 1500MCM available between the two countries per year, it is absurd that Israel controls such a strict amount (Hussein & Wolf 2000). If undertaken seriously, an agreement could be drafted within as little as 3 months.

In an ideal solution, all of the above would occur. If Israel signed an agreement with Palestine to allow equal access to water while Palestine reconstructed its pipe network and treatment systems, the water crisis would be eliminated rapidly. Coupled with desalination plants, the situation could be resolved within years. It is clear that solutions to the water crisis do exist, however they are optimistic.
Conclusions

It is clear there is a severe crisis in Gaza. With a decaying water supply network and an ever increasing contamination level in its sole freshwater supply source, Gaza is a city facing one of the worst humanitarian crisis in modern times.

To avert this crisis, Palestine needs to gain the funds, either through aid or through loan, to reconstruct its entire water network. It is difficult to see how these funds will be raised, and it seems unlikely that Palestine will be able to raise them alone. Already humanitarian organisations such as Amnesty international and Trocaire are set up in the region supplying aid to the water deprived population. But with the current trend in the world economy, major funding for aid is not likely for some time. Without help, Palestine, and the Gazan population, will be left to fend for itself. Without major changes to the water system infrastructure more people will die. This crisis is a relatively unknown issue, unheard of by many people. Perhaps by raising awareness among people in richer countries, by highlighting the unnecessary suffering in the region, a change can be made. Perhaps funds may be raised through donations if a large enough awareness campaign is run. Perhaps Gaza can overcome this crisis. But it is unlikely without help and devotion.

“Water is life's mater and matrix, mother and medium. There is no life without water.”

- Albert Szent-Gyorgyi.
Reference List


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