Bitter Water

Prospects for Gaza

By Clemens Messerschmid

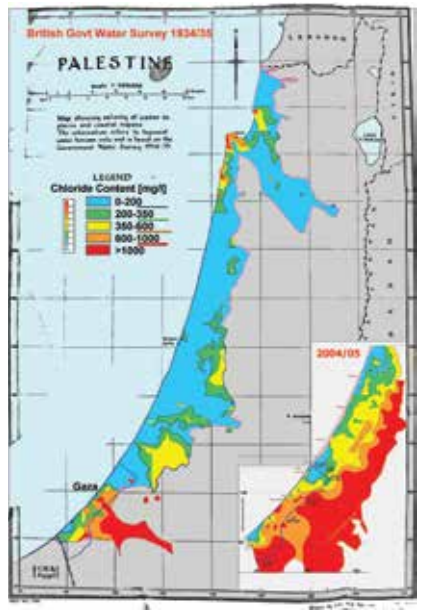
The water malaise in Gaza long ago became chronic and legendary, but if we want to understand the deeper causes of this disaster that is unfolding before our eyes, we must go back deeper into the past and look at factors seemingly unrelated to water.

It is hard to believe, but in the ancient days of Alexander the "Great," Gaza was an oasis, renowned for its sweet and fresh water sources. Technically speaking, Gaza has a layer of fresh groundwater skimming over the deeper, more brackish groundwater strata. Contrary to contemporary common narrative, however, this brackish (slightly saline) condition is a natural hydro-geological state that has been both present and well known for a long time: very large amounts of such groundwater – an estimated 37 million cubic meters annually (mcm/a) – flow in naturally, coming from southeastern directions, i.e., from

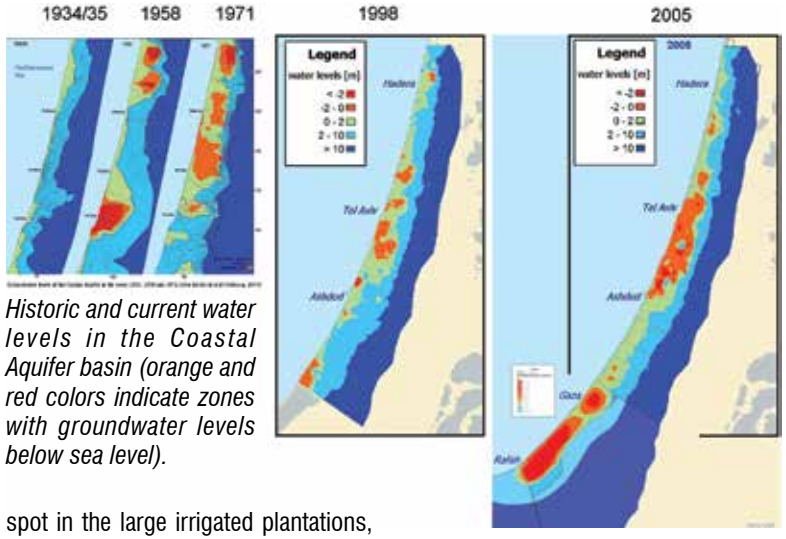
Photo by Shareef Sarhan.

below the northern Negev, which today is part of Israel. These high-chloride contents were mapped by the British Mandate Government of Palestine.[1]

The aquifer in Gaza is an inseparable part of the much larger Coastal Aquifer Basin (CAB) that surrounds the tiny Strip. The Coastal Aquifer extends along the Mediterranean coast, reaching from as far north as Mount Carmel (south of Haifa) to Gaza and farther into the Sinai Peninsula, almost as far as the Suez Canal. During the British Mandate, Palestinians and immigrant Zionist settlers competed in the drilling of wells in this basin; in fact, the large majority of all wells drilled during this era were drilled here. This aquifer is shallow and lies in the plains since wells do not have to be drilled deep to reach the water that was readily used on the



Salinity in the Coastal Aquifer during the British Mandate and in 2004–2005. Maps: UK National Archive and C. Messerschmid.



Historic and current water levels in the Coastal Aquifer basin (orange and red colors indicate zones with groundwater levels below sea level).

spot in the large irrigated plantations, such as the famous Palestinian citrus orchards.[2] Already by the late 1930s, parts of the Coastal Aquifer were over-pumped to such an extent that seawater was intruding into the fresh groundwater body along the coast. Such saline intrusions take place when the groundwater level is lowered by well pumping beneath sea level.

In other words, even the second famous feature of today's water problems in Gaza is much older than usually narrated. Here, however, we can already see one of Gaza's unique problems: Shortly after the *Nakba*, Israel had to address the dramatic lowering of groundwater tables in some parts of

the CAB (especially south of Tel Aviv). But at the time, Israel could simply diversify and distribute the drilling and pumping areas more evenly over the entire aquifer (then already ethnically cleansed of almost all Palestinian agriculture in Israel). This was not possible in Gaza. The *Nakba* is the primary and basic reason for all water qualms of Gaza today – for three reasons.

a) The Gaza district before the *Nakba* was larger than today's Strip (1,113 km2) and, until 1947, under a full process of development. Seventy-three wells existed at the end of the Mandate, with a combined pumping potential of over 26 mcm/a. As a result of the mass-scale expulsions and land robbery, the Strip found itself with only 62 wells (2 mcm/a) in 1949. After the *Nakba*, Gaza had access to only 2 percent of former developed groundwater resources (both Jewish and Palestinian use). This alone constitutes an incredible degree of expropriation and de-development.

b) In addition, however, within one year (by 1949) the population had tripled to 240,000. The *Nakba* laid the foundations for the over-crowdedness of the Strip as it brought a large number of refugees. The increase in population combined with the low well production brought Gaza to catastrophic water supply levels of less than 20 liters/capita/day. [The WHO suggests a minimum *domestic* supply level of 100 l/c/d. Today's West Bank lies far below this level with only 73 l/c/d, whereas Israel enjoys far more than 250 l/c/d of domestic supplies.] And this incredible figure does not even refer to domestic use but contains the water used in agriculture by the original Gazan farmers [who tried as best they could to continue their irrigation methods as before the *Nakba*].

c) The third significant condition that stoked Gaza even back then was the isolation of the Strip from its hinterland – the rest of Palestine.

Despite this catastrophic starting point, during the 19 years under Egyptian rule, Gaza developed at an extremely rapid pace. Over 1,099 new wells were drilled, which is equal to an average of more than one new well drilled every week! It is interesting to note that after 1967 in Gaza, unlike in the West Bank, the Israeli occupation did not impose a total cap on all groundwater development.[3] Nevertheless, the speed dropped dramatically, and only 630 new wells were drilled over the next 25 years even though the population kept growing and had reached over 750,000 by the time of the Oslo Accords (1993/1995). During the 1970s and 1980s, the pressure for expanded farming was kept at bay, however, as much of the Gazan labor force was absorbed inside Israel. Already years before Oslo, Israel had started to implement heavy movement restrictions and closure regimes on Gaza, which depended much more on work in Israel than the West Bank. For most ordinary Gazan workers, the closures that preceded and continued under the Oslo Accords exacted a heavy economic toll. Regarding water supplies, Gaza was experiencing emergency situations that were widely recognized even in the 1990s. More wells were drilled and the total pumpage – over 100mcm/yr – long outstripped sustainable recharge from all sources.[4]

A last catastrophic turn of events followed the Israeli redeployment in 2005. In the summer of 2006, the first of many Israeli aggressions against Gaza came as a shock for the population. When electricity plants were targeted, millions went without power and thus water supply. As a result, a real frenzy of new uncoordinated shallow well drilling followed in the years after (more than an estimated 5,000 wells!), which only deepened the water deficit. Each consequent incursion and bombing campaign of course resulted in a further dilapidation of the water infrastructure that, due to its old age, was already frail, ailing, and overstretched. The permanent status of Gaza as a hermetically sealed open-air prison camp acts more silently but even more devastatingly. It is here that we have to speak about one of the most basic and at the same time misleading misconceptions about Gaza: It is often stated and alleged that Gaza is the most populated land on earth. This is wrong, not only with regard to quantitative figures, but more importantly, on a conceptual level. Gaza is not a country! By all means, and especially from a technical point of view, Gaza – the whole of the Gaza Strip – is simply a large city (2 million), and not even a particularly crowded one at that.

Table 1 Recharge and Abstractions in Gaza (in mcm/a)

RECHARGE	mcm	**OUTFLOWS**	mcm
Rainfall	35	Municipal wells	94.2
Brackish inflow from Negev	36.4	Agricultural wells	80.4
Returns from agriculture, leakage	54.2	To the Sea	2
Seawater intrusion	20		
TOTAL	**145.6**	**TOTAL**	**176.6**
Over-abstractions: 31 mcm/a = 21%			

Gaza is Manhattan – urban supply from outside. Map courtesy of NYC Department of Environmental Protection, 2009, superimposition of borders and bodies of water in Israel Palestine by Messerschmid.

Both maps are to scale; Palestine is superimposed over New York. The Gaza Strip and Manhattan are both shown in red. The population of these two entities is comparable with around 1.6 to 1.7 million. In pink are the other parts of NYC (Staten Island, Brooklyn, Queens, and Bronx). The Hudson River flowing south into New York Bay, the Atlantic Ocean and Long Island Sound are superimposed onto Israel and the West Bank with the National Water Carrier, Lake Tiberias, and the Dead Sea. In two shades of green are shown

the water sources for NYC (the Croton and Catskill/Delaware Watersheds), located as far away from NYC as Lake Tiberias from Gaza.

On the contrary, what sets Gaza apart from other cities on the globe is its total isolation, its unnatural separation from the hinterland. No other city in the world is hermetically sealed off from all sides; there is no city located along the seashore that lacks a functioning harbor, etc. The very essence of an urban space is its connection to the adjacent rural areas, its hinterland. No city on earth could survive without daily intensive exchange of resources, which, in water terms, means that there is no city on earth that supplies itself from within its perimeter. But we constantly try to apply this false paradigm in a hopeless attempt to square the circle by suggesting measures (practical projects) that aim to secure a "sustainable supply" of water from Gaza on its own and from within its own overcrowded "urban" realm. Try to seal off Manhattan from its hinterland and then tell the mayor to supply its population by drilling wells in Central Park or by digging under the Empire State Building to install rainwater-harvesting cisterns. This is truly an odd and bizarre idea, yet we constantly prescribe exactly this for Gaza.

The poor remainder of the Jordan River at the Dead Sea.

The latest donor-driven suggestion, which is now accepted by the PA, is the idea of large-scale desalination! This suggestion is the oddest of all and condemned to fail utterly and inevitably. Desalinated seawater is the most expensive of all "resources" – so the poorest should engage in the most costly luxury alternatives of water supply. Desalination of course is simply a large and entirely un-ecological endeavor that basically turns precious fossil fuels (oil or gas) into the most mobile element on earth, water – so Gaza would simply substitute its dire lack of water with an even worse lack of fuel and electricity. And the chronic electricity and fuel shortage is already more painful and dire than the water shortcomings.

Would anyone suggest that crowded Tel Aviv should supply itself purely from within its own city limits? Or even Beer Sheva, with its much larger hinterland; could it ever be supplied from its own local resources? Even more important and dangerous is the political consequence of the approach that suggests that Gaza should be independent from its surrounding hinterland.

Under international water law, Gaza has a right to a fair share of the Coastal Aquifer Basin. Gaza cannot be separated from the rest of Palestine.

Gaza must be supplied from outside, just like New York, London, Paris, or Munich. The water-rich West Bank purchases ever-increasing amounts of water from Mekorot Company (Israel), while Gaza should look after itself? This is pure and 100-percent Israeli long-standing logic and hydro-political rationale. The historical Palestinian struggle for water rights, for an "equitable and reasonable share of trans-boundary water resources," which is enshrined in international water law, is abandoned under this new paradigm. The Israeli Negev has a surplus of water because the entire upper Jordan River is transferred at Lake Tiberias into the National Water Carrier, which passes Gaza at its doorstep. Huge amounts of surplus water are literally flowing past Gaza, while the Strip keeps drying up.

The National Water Carrier – the new Jordan River

In 1964, Israel opened its century project, illegally transferring the entire Jordan River out of its basin. Every year, 350 million m3 are pumped from Lake Tiberias into a canal that nearly reaches Nazareth and then into a large central pipeline backbone that crosses the entire coastal plain and reaches to the Negev in the south. These quantities are missing in the lower Jordan River.

In other words, Israel transfers (steals) the Jordan River out of its natural basin to accommodate its new settlers and its *kibbutzim* and *moshavim* in the Coastal Plain and Negev. One could say that the Jordan River today flows towards Gaza – or rather passes Gaza without sharing a drop.

The National Water Carrier that replaces the Jordan River and transfers it to the Negev (northeast of Nazareth).

There is no other practical, cheap, readily available, and lasting solution than providing large-scale water supply for Gaza from outside, from Israel. Nevertheless, two arguments are typically brought up against this suggestion:

"But Gaza should be independent from Israel!"

"But we cannot bank on a perpetual supply from Israel!"

As stated above, shining, newly built, highly expensive desalination plants on the coast are worth nothing if a cheap and constant flow of fuel or electricity is not available. Even under a best-case scenario, Gaza would have to buy electric power for its water rather than directly buying natural freshwater at much lower costs. This is a technical, financial argument. But even more importantly, from a principle point of view: It is not only extremely dangerous and damaging for Gaza to join the Zionist discourse of "Gaza should supply itself," it is simply and technically impossible. A sustainable city without hinterland is inconceivable; it is a contradiction in itself. Large-scale water purchase from Israel is as imperative as it is pragmatic.

But this suggestion is far from subduing to the Zionist rationale of Yitzhak Rabin, "May Gaza sink into the sea." On the contrary, it is the only path that combines a practical solution with a long-term perspective of sufficient and sustainable supplies for Gaza, the only option that combines a readily available supply of freshwater with the historical Palestinian struggle for water rights, against continued deprivation, dispossession, and discrimination – not only, but certainly also in water terms.

This historical struggle in the dry terms of international water law can be expressed as the right to a "reasonable and equitable share" of the resources in "trans-boundary water courses."[5] Make no mistake: Palestinians would still – in the short term – have to struggle for an acceptable price of such water supplies from Israel.[6] But instead of sinking billions into desalination plants without fuel, international donors could easily subsidize the price difference for the time being – that is, until a final-status agreement over water can be achieved.[7]

Once a long-term arrangement of water purchase by Palestinians is in place, the struggle could switch to a new paradigm in line with the historical struggle: Palestinians should openly announce and consider this supply as part of their *fair share* of natural trans-boundary allocations of natural blue water. This is because much of this water comes from the Jordan River at Lake Tiberias. Under this new paradigm, Palestinian demands – in harmony with long-term interests and hydro-political traditions in the struggle over water rights – would switch to a new approach: turning these costly external purchases into a continuous supply guaranteed under international water law – as part of the Gazan (Palestinian) right to "equitable and reasonable allocations" from shared water resources.[8]

A solution that proposes large-scale and continued supply from outside – as for any other city on earth –is at the same time highly pragmatic and readily implementable, as it is in line with the historical struggle and water interests of the Palestinian people in Gaza and beyond.

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[1] In the northeast Negev, salt rocks underlie the Pleistocene gravel and sandstones that form the Coastal Aquifer. When this salt is dissolved, a so-called leachate is mobilized and flows into the fresh groundwater body of the Coastal (and Gaza) Aquifer.

[2] Most agriculture before the *Nakba* was in Palestinian hands, but even in irrigated agriculture, a majority of land was Palestinian, thus outweighing the rapidly growing Jewish irrigated agriculture.

[3] This is because Gaza lies downstream in the shared aquifer basin. Whatever Gaza can pump will hardly affect Israeli abstractions at all. Conversely, the West Bank lies upstream and any groundwater pumped from wells there will not cross into Israel. Israel's differential hydro-political regime is a direct consequence of its harsh resource egoism with respect to the oPt.

[4] Illegal settler pumpage was comparatively low – only 8 mcm/yr inside Gaza – but indicated an incredibly high per-capita consumption, along a purely racist differentiation between privileged Israeli colonists and a discriminated against, ever-more-dispossessed population.

[5] The term trans-boundary watercourse refers to water in international basins – here shared between Israel and "Palestine."

[6] This is because Israel currently tries to impose very high prices at the equivalent of desalination costs for the water sold at high rates to the West Bank (>60mcm/a). At least in the short term, Palestinians will have a hard time acquiring this water at the true and much lower costs of natural blue water – taken from groundwater wells or, indeed, stolen from the Jordan River at Lake Tiberias.

[7] And such a temporary subsidy mechanism would, for the first time ever, change the formula of foreign donor aid: Donors would have a vested financial interest in actually terminating the endless spiral of Oslo "interim periods" and pressure for a fair, lasting solution to end the intolerable status quo. By contrast, it is exactly those desalination plants that carry the false promise that technical solutions were available to render the occupation tenable and sustainable, and thus to continue forever…

[8] For example, this water could be declared the Palestinian share over the Jordan River, now channeled to Gaza, not to the West Bank. Or, alternatively, these quantities could be considered Gaza's fair share on the CAB – which, in any case, is larger than the quantities inside the Strip, according to international water law. But many other options are possible and should be considered thoroughly.