WATER SITUATION IN GAZA DESCRIBED

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[Article: "Water in Gaza Strip; Palestinians Prevented from Exploiting Their Land's Wealth and Resources in Favor of Israeli Settlers; Numerous Causes for Increasing Salinity in Underground Wells; Measures To Tighten Authorities' Grip on Water Resources"]

[Text] The water issue would not receive greater attention than merited by its importance to the life of the Gaza Strip's population or to anybody's life were it not for the serious crisis that has begun to surface in the citizens' lives, whether in connection with drinking water or with water to irrigate the strip's crops.

Out of our belief in the importance and vitality of this issue, we have found it necessary to plunge into the bowels of the land to whose richness and generosity we have become accustomed and which is experiencing the pains of failure for the first time. The consequences of these pains are certainly reflected directly on the citizen's life.

Through this study, we will try to discuss the Strip's water resources, the geological situation, the water's potability, the agencies in charge of water utilization, water uses, the restrictions imposed on water utilization, and the causes of the water drain.

Water Resources in Gaza Strip

The Strip's water resources are confined to rainwater and to underground water whose replenishment relies in turn on the annual rainfall. This ties underground water utilization to the rainfall's capacity to replenish the water drawn from the underground store. Consequently, people mainly rely on underground water. Some people believe that the Strip's water comes from a single source, namely underground water. However, we divide the water sources into two sources and will deal with each source separately.

First, Rainfall:

Rains begin in mid-November, increase in December, and peak in January and February. They then begin to diminish and stop falling by the end of March

and the beginning of April.[1] Some early rain falls and then rain stops altogether in May and June, as demonstrated in Chart 1a.

Chart 1a. Rainfall Volume and Averages Throughout the Year

Month	Year 1967-68 Number of Rainy Days	Year 1967-68 Rainfall in Millimeters	Year 1970-71[2] Number of Rainy Days	Year 1970-71[2] Volume in Millimeters
August and September[3]	-	-	-	2.7
October	2	39	2	7.0
November	8	131	6	53.3
December	12	50	12	89.6
January	14	110	11	123.7
February	6	33	8	71.4
March	2	11	3	13.3
April	3	37	9	75.3
May and June	1	4	-	-
Total	48	415	51	436.3[3]

Chart 1b. Below demonstrates the total monthly rainfall in 1983 (according to Gaza station):

Month	Volume in Millimeters
January	280.6
February	106.4
March	61.6
April	5.8
May and June	0.5
October	2.2
November	46.7
December	16.4

Average rainfall in Gaza Strip varies from area to area, with the rainfall decreasing as we move from the north to the south. This rainfall ranges from more than 400 mm in the north (Bayt Hanun area) to less than 100 mm in the south (near Rafah), as demonstrated in Chart 2a. The rainfall volume also varies from year to year, as demonstrated in Chart 1a. The volume of rain falling in the Strip is estimated at 50 million cubic meters annually.

Chart 2a. Strip's Rainfall Volume in Millimeters

Area	1977-78 Rainfall Volume in Millimeters	Area	1982-83 Rainfall Volume in Millimeters
Bayt Hanun	300.3[5]	Bayt Hanun	717.0[4]
Bayt Lahiya	334.5	Bayt Lahiya	660.0
Mazra'at al-Shati'	303.4	Gaza	600.0
Gaza/al-Mighraqah	287.5	al-Nusayrat	560.0
Al-Nusayrat	291.5	al-Qararah	550.0
Dayr al-Balah	298.0	Dayr al-Balah	520.0
Khan Yunis	231.0	Khan Yunis	479.0
Rafah	183.0	Rafah	370.0
Gaza (Water Branch)	410.2		
Total	2,639.4	Total	4,456.0

Second, Underground Water:

In Gaza Strip, underground water represents the second major source of water. The importance of this source has increased with the constant growth of underground water use since the 1950's. This growth has accompanied the agricultural expansion, especially in the cultivation of citrus fruits, the expansion in processing activities, and the development of living standards.

In Gaza Strip, the depth of underground water from the surface ranges from 20-80 meters. It may reach a depth of 100 meters and decrease to a depth of 8 meters in areas close to the sea.[1] The underground water reservoir in the Strip is nearly 50 km long and 8-12 km wide, meaning that its area is nearly 100 [as published] square km.

The underground water is utilized through deep artesian wells fitted with motor-operated pressure pumps. The need for these wells and their use have increased with the development of the cultivation of citrus fruits and vegetables which require a permanent irrigation system (irrigated farming) and with the development of living standards and processing activities. We should also take into consideration the Strip's growing population, which numbers nearly 650,000 people, whereas it was, according to the official statistics, 412,282 people at the end of 1964.

Chart 3a below shows the development of the number of wells and the acreage cultivated, whether in dryland farming or in irrigated farming:

Year	Total Number of Wells	Total Cultivated Area	Area of Cultivated Dryfarm Land (in dunums)	Area of Cultivated Lands with Constant Irrigation (in dunums)
1948-49	442	97,192	77,470	19,722
1952-53	480	115,800	88,250	27,550
1955-56	526	121,350	93,000	28,350
1958-59	604	141,826	112,283	29,543
1959-60	Not available	145,826	110,293	35,533[6]
1960-61	Not available	Not available	Not available	Not available
1963-64	861	163,353	Not available	Not available

Thus, we find that permanent irrigation covered only 20 percent of the total area cultivated in 1948-49 whereas nearly 25 percent of the acreage cultivated in 1959-60 relied on permanent irrigation, keeping in mind the growth of the area cultivated in 1960 in comparison with the area cultivated in 1948.

After the occupation, the Israeli authorities imposed strict restrictions on water use and on tree cultivation, especially the cultivation of citrus fruit trees, allocating only 1,000 cubic meters of water annually for each dunum of land cultivated with citrus fruits, disregarding the nature of the land and the type of soil involved. The authorities have levied exorbitant fines for water consumption exceeding the permitted limit. This limit is much lower than the rates permitted within the green line and which are actually needed for successful cultivation under the Strip's natural conditions. For the same purpose, the authorities have issued decrees which ban the cultivation of trees and which call for the trial and fining of farmers who violate them. The authorities have also banned the drilling of new wells (see AL-BAYADIR AL-SIYASI, No 176, "Cultivation of Vegetables in Gaza Strip," by Muhammad al-Mashukhi).

The acreage of land relying on permanent irrigation is many times the acreage of land relying on rainfall. This is why the number of wells used for irrigation and for human, home, and industrial consumption has increased. The total number of wells amounted in 1986 to 1,918 wells, of which 103 are inoperable. Chart 4 demonstrates the distribution of wells according to area. This is in addition to 31 wells built by Mekorot, the regional Israeli company, in the southern area on contract with the Agriculture Department and 6 wells built by UNRWA, thus bringing the total number os wells to 1,842, excluding the wells in the Israeli settlements located north of Gaza City. No information is available to us on the number and capacity of these wells. Later in this study, we will discuss the wells that nourish the settlement activity in particular and that are heavily concentrated in the southern part of the Strip.

Chart 4. Number and Distribution of Wells, Both Operable and Inoperable, in Gaza Strip in 1986

Area	Total Number of Wells	Inoperable	Operable
1. Dummarah	25	-	25
2. Bayt Hanun	145	2	143
3. Bayt Lahiya	188	3	185
4. Jabaliya	160	4	156
5. Al-Nuzlah	67	3	64
6. Northwest Gaza	272	35	237
7. Northeast Gaza	73	5	68
8. Southwest Gaza	195	7	188
9. Northern al-Sab'	68	3	65
10. Central al-Sab'	43	1	42
11. Southern al-Sab'	8	1	7
12. Abu Mudyin	49	3	46
13. Al-Nusayrat	94	4	90
14. Al-Sumayri	15	-	15
15. Dayr al-Balah	153	10	143
16. Khaza'ah	5	4	1
17. Bani Suhayla	11	-	11
18. Greater and Smaller 'Absan	24	1	23
19. Khan Yunis	178	11	167
20. Rafah	145	6	139
Grand Total	11,918	103	1,815

Strip Water Is Not for Human Consumption

It is accepted "in terms of health" that water salinity must not exceed 250 ppm [parts per million]. As for irrigated water, salinity or chlorides must not exceed 300 ppm. We notice that salinity in the major part of the Strip water exceeds these rates, with Gaza underground water salinity rising as we move from north to south. The studies conducted on underground water in the 1950's (1953-54) show that salinity ranges from 400-2,500 ppm in the northern and central part of the Strip and from 2,500-4,000 ppm in the southern area.[6]

But the consumption of underground water has increased, especially in the past 10 years, as a result of numerous reasons, the most significant being the construction of agricultural settlements that draw a quantity of water which exceeds the quantity that is supposed to be drawn annually. This hypothetical quantity must not exceed the total volume of the rainfall and drainage water because the difference between the volume drawn and the volume replenished is consumed from the underground water reservoir, thus causing the water level in this reservoir to drop and, consequently, the salinity to increase.

Currently, the Strip's water production exceeds the actual capacity of the underground reservoir. The volume of water seeping into the earth every year is estimated at 60 million cubic meters whereas the volume of the underground water drawn annually is estimated at 100 million cubic meters. The difference, amounting to 40 million cubic meters, is made up from the underground water reservoir.

Chart 5. Salinity Rates in Various Parts of Strip in 1985

Area	Rate of Chlorides Per Liter [ppm]
Dummarah and Northern Bayt Hanun	100-200
Bayt Hanun	100-350
Bayt Lahiya	30-150
Jabaliya	50-350
Al-Nuzlah	50-350
Northeast Gaza	100-500
Northwest Gaza	500-2,000
Southwest Gaza	500-2,000
Abu Mudyin	200-2,200
Al-Nusayrat	400-2,000
Al-Burayj al-Maghazi	350-1,500
East Gaza Valley	[No figures given]
Dayr al-Balah	100-3,000
Al-Sumayri	150-1,000
Bani Suhayla	500-1,500
'Absan	700-2,000
Khaza'ah	1,200-2,000
Southern al-Sab' Area	700-2,000
Khan Yunis	150-2,000
Rafah	200-1,000

Chart 6. Development in Water Salinity in PPM (One Well from Each Area Throughout Period Covered by Chart)[12]

Area	Salinity Rate in May 1975	Salinity Rate in May 1976	Salinity Rate in May 1985	Salinity Rate in May 1986
Dummarah Area	168	168	112	133
Bayt Hanun	182	203	217	210
Bayt Lahiya	266	273	287	294
Al-Nuzlah	42	49	56	49
Jabaliya	84	91	105	105
Northeast Gaza	336	308	294	315
Northwest Gaza	217	224	222	231
Southwest Gaza	476	476	623	693
Northern al-Sab'	294	371	406	511
Abu Mudyin	658	151	1,001	1,043
Al-Nusayrat	511	399	483	490
Dayr al-Balah	322	469	630	553

[Chart 6 (Continued)]

Area	Salinity Rate in May 1975	Salinity Rate in May 1976	Salinity Rate in May 1985	Salinity Rate in May 1986
Al-Sumayri	441	434	420	443
Eastern al-Sab'	602	714	700	679
Southern al-Sab'	560	672	1,120	1,204
Bani Suhayla (village council well)	637	812	1,001	826
'Absan	847	843	910	903
Khaza'ah	1,232	1,239	1,204	1,141
Khan Yunis (municipal well)	735	721	525	553
Rafah (municipal well)	350	329	294	525
Average Salinity Rate Wells in 1975, 1976, 1985 and 1986	448 ppm	447.3 ppm	530.5 ppm	545.05 ppm

It is noticed from Chart 6 that the salinity rate is unstable. It has decreased in five wells in five different areas while increasing in other wells. Between 1975 and 1986, the salinity rate increased from 658 to 1,043 ppm in 56 wells in Northern al-Sab' area--central camps.

The other chart indicates that increased salinity is not affected solely by increased drawing from the underground reservoir. This motivates us to discuss the geological position of the Strip's land.

Strip's Geological Position

There is a single water reservoir extending along the coastal strip to a depth of 10 km eastward. The reservoir is separated by the Gaza Valley, which extends from east to west. The water reservoir is carried by an impervious clay layer that does not permit water to penetrate or seep into the other layers. The reservoir is 20-90 meters below soil surface and the average depth of the water-carrying layer is nearly 30 meters, though varying from area to area. The water direction is from east to west, especially the direction of rainwater, which ranges from 40-50 million cubic meters annually. The depth of the wells ranges from 5-90 meters.

The salinity rate in the underground water reservoir ranges from 50-300 ppm. Water with a slinity rate of more than 300 ppm is considered unfit for agriculture generally and for drinking in particular. Health specialists say that excessive water salinity is harmful to human health if the water is used for a long time.[12]

Salinity Sources

Salinity, which has begun to appear clearly and seriously in the Strip water, comes from several sources:

First, when water runs in the valleys it melts a greater or lesser amount of surface salts, depending on the soil layers through which it passes. During water seepage to the underground reservoir, it also melts some of the salts existing in the various soil layers, with the amount of melted salts depending on the type of soil layers the water passes through.

Second, salinity from seawater when seawater pressure exceeds the pressure of underground water formed by rain. Rainwater moves in a westerly direction toward the coast. If the volume of this water exceeds the reserve (balance), then it squeezes out the seawater and prevents it from infiltrating eastward. But when underground water decreases, it gives seawater the chance to seep eastward and to mix with the underground water. This is what has happened in the coastal wells.

In recent years, with the water pumped out of the underground reservoir exceeding the replenished water, saline water has seeped into the underground reservoir. Some people say that salt water has moved several kilometers eastward in recent years.

Third, the salinity in the eastern wells remote from the coast, especially in the wells of Khaza'ah area, east of Khan Yunis, which is the easternmost point in the Strip and where salinity has reached 1,141 ppm--this salinity comes from the soil layers through which the underground water passes. What has helped this salinity increase is the fact that there is less rainfall in the southern area than in the northern area and that the underground reservoir is much better replenished in the northern area. This is in addition to the difference in the geological layers of the area's soil. Rocks in the southern area contain a high degree of easily soluble salts in contrast to the northern areas.

A study of the geographical distribution of water consumption shows that human consumption is concentrated in the north. Gaza City alone uses more than 50 percent of the water consumed for non-agricultural purposes, not to mention the villages and camps north of the city. Moreover, irrigated agriculture is more heavily concentrated in the north than in the south (see chart on home and industrial use and on the geographic distribution of citrus groves).

However, the concentrated Israeli settlement in the southern part of the Strip and the large number of wells drilled by the Israeli settlements and by Microt, the Israeli water company, in this part are responsible for the Strip's water crisis in general, especially in the south.

Even though the water resources are limited in comparison with the size of the population, the Israeli occupation has created an additional burden on these resources as a result of the settlement policy which drains some of the resources. This is on top of the official measures taken by the

occupation authorities to curtail agricultural growth in the area, measures which prohibit drilling any new wells, limit the quantity of water pumped out, and ban the cultivation of any more citrus trees.[8]

The water problem is not confined just to the scarcity of water but extends to the water quality which is getting gradually poorer as a result of the increased salinity. This is due, according to the experts, to the increased volume of water pumped out of the water reservoir. These experts estimate the volume of rainwater seeping underground at 60 million cubic meters annually whereas the volume pumped out is estimated at 100 million cubic meters annually. The deficit is drawn from the water reservoir whose salinity is rising year after year as a result of the seepage of seawater. According to the official reports, the salinity in wells ranges from 300-1,700 ppm. But according to citrus producers, these estimates on underground water and on other aspects are no more than justifications for the obstacles created by the occupation authorities to prevent the cultivation of new areas with citrus trees and the replacement of old trees by the law they have issued for the purpose. As proof of their point, the people who hold this opinion cite the incentives the authorities pay for cutting citrus trees or drying up citrus groves without putting any curbs on alternative crops which, as we know, need irrigation water.[9]

A study by the Research and Documentation Center of Bi'r Zayt University--"Settlement and Land Confiscation in Gaza Strip," p 11--states the following: "In Gaza Strip, the settlers, amounting to 2,110 people by the end of 1984, consume 30-60 million cubic meters annually compared to the 100 million cubic meters consumed by the Strip population, which numbers 500,600 people. This means that each of the settlers, who altogether form less than 1/2 percent of the Strip's entire population, consumes 14,218-28,436 cubic meters whereas the native inhabitant of the Strip consumes 200 cubic meters of water annually." This expalins the motives behind the Israeli authorities' restrictions on the use of water by Palestinian citizens. It is evident that the purpose of these measures is to withhold the water resources from the Palestinians in the interest of expanded Israeli settlement.

What proves this conclusion is that the Gaza Strip water reservoir is totally separated from the Israeli underground water. While the Israeli presence and its policies represent an additional burden on the available water resources and a restriction on the possibilities of growth and development, this presence resorts to obvious deception and falsehood which are made evident by a preliminary reading of the book written by Israeli journalist Gideon Weikert entitled "Flourishing Jerusalem, 1977" and the Israeli official bulletins, "Desert The Green Revolution in Gaza Strip.

Supervision of Water Utilization in Gaza Strip

The Gaza Agriculture Department (one of the civil administration departments) supervises water utilization in Gaza Strip, excluding the wells belonging to the Israeli settlements. The Israeli Regional Water Company, Mekorot, supervisies the wells that belong to it on contract with the Agriculture Department. Regarding supervision of the Gaza Strip water, the Agriculture Department carries out the following:

1. It controls drawing from the wells by checking once every 2 months the water meters installed on wells. As for meters installed on municipal wells and wells belonging to village and local councils, the Agriculture Department checks them once a month.

2. It watches the underground water level in wells, using a special apparatus for the purpose. Monthly checks on underground water levels are conducted on nearly 150 wells (some of them municipal) spread throughout the Strip.

The wells subjected to monthly checks have been selected to represent all parts of the Strip, which is divided into specific quadrangles by the Agriculture Department's hydrology section. The underground water level is also checked in nearly 50 other wells once every 6 months as a further test.

3. It watches the water quality by collecting water samples every 6 months (in May and October) to determine the salinity rate. Nearly 90 percent of the Strip wells are subjected to this analysis. These 2 months have been chosen on the basis that May represents the beginning of summer when drawing from the underground water increases and that October represents the beginning of another phase in the underground water reservoir, which is usually exhausted as a result of drawing in the preceding period.

The Agriculture Department's hydrology section sends the outcome of the analysis and all its reports to the main hydrology section in Jerusalem.

4. It provides technical assistance to well owners. The Gaza Agriculture Department instructs well owners on how to exploit their wells properly and how to avoid problems and obstacles that may encounter them.

5. The Agriculture Department intervenes at times as a mediator between well owner and farmer to determine the water price. Its intervention comes on the basis of complaint by one party against the other.

6. The department issues the permits to drill and exploit wells and watches to make sure that the conditions contained in the permits are observed. In November 1974, the Israeli military administration issued Directive No 498 on water affairs with the aim of tightening the Israeli authorities' control on Gaza Strip's water resources on the pretext of protecting the water resources and the water level against the dangers of salinity and excessive consumption. This pretext is in flagrant contrast with the facts which the occupation is eager to conceal and on which it is eager not to publish any data. The first fact is the unprecedented drain of water resources by the Israeli settlements and Israeli settlers in Gaza Strip (see the Research and Documentation Center of Bi'r Zayt University, "Settlement and Confiscation of Lands in Gaza Strip," p 11).

Through this military order, the authorities imposed strict restrictions on the citizens' water consumption and forced the citizens to obtain permits for drilling or renewing wells and other permits to pump water

out of the ground and to install meters to make it possible to check the quantity consumed. At the same time, the authorities set the maximum quantities that may be consumed in the permits given the citizens and levied exorbitant fines on whoever violates the terms spelled out in the permits.

Article 16a of Directive No 498 on water affairs states: "The authority concerned may issue instructions prohibiting the production, supply, or consumption of water from a certain water source or in a certain area except on a permit issued by this authority and in accordance with the terms spelled out in the permit. If the authorities concerned issue such instructions, then the production, supply, or consumption of water and the quantity of the water pumped out, supplied, or consumed shall be in accordance with the terms of the permit as of the date the authority concerned specifies in its instructions. The said permit shall be called the production permit."

Article 20 of the same directive states that the authority concerned may at any time issue an order cancelling or reducing the quantity of water allowed by the production permit if there is a shortage of water or for other reasons determined by the authority concerned and stated in the order it issues.

Article 24a of the order states that "nobody is allowed to drill a well or set up an installation without a permit issued by the authority concerned in accordance with the provisions of this order."

Article 28 states that a permit to drill a well or build an installation does not absolve the permit holder from the duty of obtaining the permits and approvals needed in accordance with this order and with every legislation and security legislation concerning the production, consumption, or supply of water from a well or an installation.

In accordance with this order, the Agriculture Department issues annual water production and supply permits in which it spells out the name of the permit holder and his annual water share in cubic meters from the specified well at the specified site. The share is distributed in accordance with an appendix containing the names of the consumers and considered an inseparable part of the permit. The permit appendix--Appendix B--contains the basic conditions for water production and consumption, the most important of which are the following:

--A permit holder shall immediately inform the authority concerned of any change in the details noted in the permit, such as any trees removed, any drop in a well's flow, and so forth.

--Should owners of a well produce, supply, or consume a quantity of water greater than allowed in the permit by supplying a consumer unlisted in the permit, they shall be subject to the strictest penalties and measures stipulated in the water law and its appendices, including license cancellation and termination of water production from the well.

--The validity of this permit shall be tied to maintaining the legality of all aspects of the well, including drilling and equipment installation.

--A license holder may not transfer the water or a share of the water allotted to one consumer to any other consumer prior to obtaining a written permit from the authority concerned.

--It is totally forbidden to supply water to any consumer whose name is not listed in the license prior to obtaining an advance written permit from the authority concerned.

--Nobody shall be permitted to produce, consume, or supply water without a working water meter approved by the authority concerned.

--In case of a meter breakdown, the owner or owners of a well shall notify the authority concerned within 48 hours of the breakdown.

--The quantity of water consumed during the breakdown shall be indisputably determined by the authority concerned.

We can note here that the quantity of water allotted for each type of crop was reduced by 10 percent as of the beginning of April, with a dunum of citrus fruits thus getting 900 cubic meters instead of 1,000 cubic meters annually and a dunum of vegetables getting 630 cubic meters instead of 700 cubic meters annually. As for olives and guavas which require supplementary irrigation throughout the year, they get 270 cubic meters annually instead of the previous 300 cubic meters.

On the other hand, the Agriculture Department laws permit the change or replacement of a well only within a circle with a diameter of 20 meters. This being the case, replacement becomes meaningless, especially if the owner wants to change the well site because of an increase in chlorides.

Water Uses

We have not been able to obtain data on how Gaza Strip citizens use water. The available data deals only with the inhabitants' use of water for two main purposes: agricultural irrigation and home and industrial use.

In the following, we will deal with these two uses in detail, noting the scanty data available on water wells in the settlements.

First, Home and Industrial Use:

Home and industrial water consumption in the Strip ranges from 20-25 million cubic meters annually. The rest is used for agricultural irrigation.

Chart 7 demonstrates water distribution, quantities, and sources in the various areas.[11]

Chart 7. Water Distribution, Quantities, and Sources in the Various Areas According to the Latest Statistics

Name of Area	Annual Water Consumption in Cubic Meters	Water Sources in Area
Bayt Hanun Village	145,000	2 wells belonging to village council.
Bayt Lahiya Village	270,000	3 wells belonging to village council.
Jabaliya Area	900,000 (estimate)	2 wells belonging to council and several private wells supplying inhabitants with water on contract.
Gaza City	11,500,000	15 municipal wells.
Al-Nusayrat Camp	575,000	These areas rely on Mekorot Company for their water in general, especially since UNRWA wells in camps were shut down in 1983.
Al-Burayj Camp	540,000	
Al-Maghazi Camp	360,000	
Al-Zawayidah Village	228,000	From Israeli Mekorot Water Company.
Dayr al-Balah	1,460,000	3 municipal wells.
Al-Qararah Village	[No figure given]	Village council does not have any wells even though it has existed since 1983. Inhabitnats rely on private wells.
Bani Suhayla Village	360,000	264,000 cubic meters from 2 village council wells and rest are purchased from Mekorot Company.
Smaller 'Absan Village	144,000	From single village council well and from Israeli Mekorot Water Company.
Greater 'Absan Village	324,000	From two council wells and from Israeli Mekorot Water Company.
Khaza'ah Village	144,000	From single council well and from Israeli Mekorot Water Company.
Khan Yunis Town	3,180,000	108,000 cubic meters from Mekorot Company, 90,000 cubic meters from private well, and rest from five municipal wells.
Rafah Town	26,350,000 [as published]	From 2 operating municipal wells. Four other municipal wells are broken down.

By examining the above chart, we find that the various areas' consumption for home and industrial use amounts to nearly 22 million cubic meters of water annually, according to readings taken from the meters in the areas. This figure excludes, of course, the water loss which results from the old water networks and other factors and which amounts to nearly 25 percent in Gaza and to 30 percent in Khan Yunis, Rafah, and Dayr al-Balah. We also find that the water used for home and industrial purposes does not actually exceed 18 million cubic meters annually. Before dividing this quantity among the 650,000 inhabitants of the Strip, we wish to point out here that the daily water consumption of the town of al-Majdal, which has a population of nearly 60,000 people, amounts to 18,000 cubic meters whereas the daily consumption of Khan Yunis, which has a population of nearly 100,000 people, amounts to about 8,000 cubic meters. I believe that this comparison alone is enough to demonstrate the degree of difference between the Gaza citizen's consumption and the consumption of any Israeli citizen.

At the same time, most of the areas suffer from water scarcity generally, from water salinity, or from both, as in the case of Khan Yunis City, Jabaliya, the central camps, and the villages of Eastern Khan Yunis.

The water problem does not stop at this point but goes beyond to the exorbitant prices at which the municipalities, the village councils, and the local councils sell water to the citizens. We will try here to shed light on the monthly prices at which water is sold to the citizens in some areas.[13]

Gaza City:

- Minimum to 10 cubic meters: 19 (agoras).

- From 10-20 cubic meters: 2 agoras per cubic meter.

- From 20-30 cubic meters: 2.5 agoras per cubic meter.

Khan Yunis City:

- Minimum to 20 cubic meters: 75 agoras.

- From 20-30 cubic meters: 35 agoras per cubic meter. The price for every cubic meter over the first 30 cubic meters is 45 agoras.

Rafah City:

- Minimum to 20 cubic meters: 55 agoras.

- From 20-30 cubic meters: 30 agoras per cubic meter.

- Over 30 cubic meters: 35 agoras per cubic meter.

In Bani Suhayla Village, water is sold to the citizens at the following prices:

- Minimum to 10 cubic meters: 4 new shekels.

- From 10-20 cubic meters: 6 agoras per cubic meter.

- From 20-30 cubic meters: 8 agoras per cubic meter. A price of 10 agoras is charged for every cubic meter over the first 30 meters.

As for the central camps (al-Burayj, al-Maghazi, al-Nusayrat, and al-Zawayidah) and for the other villages which rely on the Israeli Mekorot Water Company to supply them with water, the company sells water to the municipal and village councils at 5.3 agoras per cubic meter and the village councils and local committees then sell the water to the citizens at astronomical prices. For example, al-Burayj Camp Local Committee sells water to the citizens as follows:

- From 1-10 cubic meters: 6.7 agoras per cubic meter.

- From 10-20 cubic meters: 7.4 agoras per cubic meter.

- From 20-30 cubic meters: 7.6 agoras per cubic meter.

- Over 30 cubic meters: 8.9 agoras per cubic meter.

On the other hand, there are scattered areas that suffer from the irregular availability of drinking water, such as the remote areas of al-Qararah Village in Khan Yunis District. This village has a population of nearly 5,000 people and it has had a village council since the middle of 1983. However, the council has not yet supplied the inhabitants with any water source, thus forcing them to rely on private wells to meet their domestic needs. Even though the Jabaliya Village Council has two wells to supply the population, we find that hundreds of families rely on private wells because the inhabitants' needs greatly exceed the capacity of the two wells.

We also find that the private well of Abu Mas'ud (the village council chief) supplies water 1 hour a day to nearly 150 families at a monthly cost of 7 new shekels per subscriber.

The well of Farah Ahmad Husniyah supplies water 1 hour a day to nearly 200 families at a cost of 1.2 agoras per cubic meter.

The well of Abu Yusuf al-Bahtimi (al-Hasayinah well) operates for 2 hours a day at a capacity of 60 cubic meters per hour to serve nearly 40 homes. In return, the inhabitants supply fuel oil and maintenance for the well.

Abu Rashid well operates 18 hours a day at a capacity of 120 cubic meters per hour to supply water to nearly 1,000 subscribers. The well owner pumps water for 1 hour a day through each waterline in return for a monthly subscription of 7 new shekels per subscriber.

The well of 'Abd-al-Latif Zahir operates 7-8 hours a day and pumps water, without meters, through 5 waterlines to nearly 650 subscribers, supplying each line with water for 1 hour a day in return for a monthly subscription of 7 new shekels per subscriber. The owners of these wells have said in comment: Many citizens ask us to help them and supply them with water. But the capacity of the wells and the available resources do not permit us to produce more water.

This example demonstrates to us the tragedy of the Jabaliya area inhabitants and the difficulty of obtaining the simplest necessities of life.

We must note here that the Jabaliya Village Council was negative with us when we conducted this study and that this is why we inserted the word "estimate" with the figure we gave for the Jabaliya area in Chart 7.

As for the Bayt Lahiya Village Council, it suppliesthe inhabitants with water according to a good program which covers parts of the village. The village inhabitants await the completion of a fourth water well in an endeavor to eliminate the water crisis.

UNRWA also contributes to supplying some of the camps with water from six wells distributed as follows:

- Two wells in the Jabaliya area, one of which produces water unfit for drinking. The two wells operate 7 hours a day and supply the centers under UNRWA control and some of the camp inhabitants.

- One well in al-Shati' Camp, which operates for 2 hours a day.

- One well in Dayr al-Balah Camp, which operates for 4 hours a day.

- One well in Khan Yunis Camp, which operates for 8 hours a day, and one well in Rafah Camp, which operates for 8 hours a day.

Second, Agricultural Consumption:

As we noted when discussing the underground water resources, the Strip population has increased its underground water consumption with the growth of irrigated agriculture, especially the cultivation of citrus trees, and with the shift from crops relying on rainwater to crops relying on irrigation, such as vegetables. This is in addition to the non-agricultural factors leading to expansion.

According to the 1985 figures, the total area of Gaza Strip is nearly 360,000 donums, of which nearly 214,000 donums are utilized in agriculture and distributed as follows:

- A total of 65,000 donums cultivated with citrus fruit trees, all irrigated.

- A total of 30,000 donums cultivated with fruits, all irrigated.

- A total of 35,000 donums cultivated with vegetables, all irrigated.

- A total of 24,000 donums cultivated with crops and vegetables relying on rainwater. The rest consists of forests.

It is obvious from the above that the total irrigated acreage amounts to 130,000 donums representing nearly 63 percent of the total cultivated acreage in Gaza Strip, including the forests. Gaza Strip's water consumption for agricultural purposes amounts to nearly 75 million cubic meters, representing 75-80 percent of the total volume of water drawn from the underground water reservoir--a volume amounting to nearly 100 million cubic meters annually.

Amidst this stifling water crisis in Gaza Strip, the Israeli Regional Water Company, Mekorot, drilled 31 wells in the southern part of the Strip and in the Israeli settlements to serve the settlers and their crops, even though it is said that this company supplies the inhabitants with drinking water only, i.e., for home and industrial use. These wells are concentrated south of Dayr al-Balah, located at a distance of nearly 1 km from the coastline and extend all the way to the city of Rafah. Their distribution is demonstrated in Chart 8.

Chart 8. Distribution of Wells in Israeli Settlements

Name of Settlement or Area	Number of Wells
Jadid	10
Qatif	7
Kefar Darom	2
Nitzarim	2
Morag	1
West Khan Yunis	5
Southwest Dayr al-Balah	4
Total	31

Here we must remind our readers of what the UNRWA commissioner general notes in connection with the Gaza Strip water problem in his current annual report to the UN General Assembly, which will convene shortly. After reviewing the generally poor conditions under which the Strip's refugee population suffers, the commissioner states in his report:

"There is another fearful development in Gaza Strip, namely the increased salinity in the water supplies resulting from the expansion of irrigation and of other engineering activities. Some experts estimate that the volume of the underground water pumped out is twice the volume of the water seeping into the underground. This fact, and the need for a satisfactory system for draining flood water, increase the threat of pollution in an area in which some camps live under unhealthy environmental conditions. The continued construction of settlements in Gaza Strip is likely to add to the unsatisfactory living conditions by reducing the area of land available for cultivation and by increasing thepressure on the inadequate water resources."

The general commissioner added: "I believe that it is my duty to draw the member states' attention to the worsening conditions in Gaza Strip and to urge the international community to devote significant attention to what can be done to ease the conditions there. This problem requires urgent attention."

The intensity of the water problem being experienced by Gaza Strip has been increased by the high population density and by external factors, such as the Israeli settlements which have received full support from the authorities to devour the land and its water at a time when the officials preach the seriousness of the water problem, as if they have not contributed to the problem, have not used feeble pretexts to increase the water's salinity through excessive consumption of underground water, and have not failed to put an end to this constant drain that has been caused by the settlements. The emergence of underground water salinity coincides with the beginning of the concentration on settlement in Gaza Strip in the second half of the 1970's.

In conclusion, we say that the Gaza Strip water problem is characterized by the scarcity of the data available on the problem. However, some studies have been conducted on water conditions in the Strip and we have deemed it beneficial to list them here:

1. A soil and water study sponsored by UNRWA within the framework of its plan to set up agricultural expansion projects and conducted by an Egyptian land expert in 1953-54.

2. A study conducted in 1958 by an exploratory mission of the Egyptian Desert Institute.

3. Dr Hume's study in 1917 on the water resources of the Gaza Valley area and Rafah.

4. Dr Jordan's 1946 study on Arab wells in the Negev area of Palestine.

5. A study conducted by UNRWA in 1954 with the Egyptian Ministry of Agriculture.

6. A study conducted by Dr Joseph Weinbaz, who held the position of chairman of the Israeli Department of Land Organization and who was a member of the Jewish Agency's Agriculture and Planning Department in 1944. The study is entitled "The Agricultural Potentials of Palestine," Tel Aviv, 1944.

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1. Mahmud 'Abd-al-Halim 'Asim, "Agriculture in Gaza," Egyptian Ministry of Agriculture, 1960.

2. The Agriculture Department, varied periodical publications.

3. Rural Studies Center of al-Najah National University in Nabulus, "The Annual Statistical Report on the West Bank and Gaza Strip."

4. Jihad Abu Tawilah, Arab Research and Studies Center, unpublished study, Cairo, 1984.

5. The Agriculture Department, Falah Yunis, "Agricultural Development."

6. Muhammad 'Ali Khulusi, "Economic Development in Gaza Strip," Cairo, 1967.

7. The Official Statistical Report for Gaza Strip, 1964.

8. 'Abd-al-Rahman Abu 'Arafah, "Settlement," Jerusalem, 1981.

9. Firas Sawalihah, "Citrus Production."

10. Strip's municipalities, village councils, and local committees.

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