

## **SITUATION OF DRINKING WATER IN GAZA STRIP**

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### **BACKGROUND**

Gaza Region is semi-arid area-roughly estimated by 365 Km<sup>2</sup>, which lies on the coastal line of Mediterranean Sea. On this narrow strip, almost one million of the Palestinian people live and work. The ground water is used for irrigation, as well as for industrial and domestic purposes.

Water shortage, water pollution with high salinity and micro-pollutants, lack of swages and solid waste treatment, maritime pollution, overcrowding poverty and uncontrolled use of pesticides are most pressing environmental problem in Gaza region.

Pesticide, which considered mutagenic and carcinogenic are still used in the agricultural environment Mediterranean Sea, is used for the disposal of sewage's water, solid wastes, and agricultural and industrial waste. In general these environmental problems have multiplied the Palestinian human environment problems, socio-economic problems and increasing health hazard.

### ***History***

Gaza region as well as west bank were under Israel occupation until May 1994 when Palestinian National Authority took over responsibility Led by his Excellency President Yaser Arafat after Oslo Agreement had been signed.

### ***Location***

Gaza region is located on the coastal line of Mediterranean Sea west of Asia continent, between Israel at North and Egypt at south.

Gaza Region Climate:

G.R. climate is temperate in spring and autumn, rainy mild winter, and dry to hot in summer. The lowest temperature average in winter 8-15 degrees C and the highest

temperature in summer is 25-35 degrees C.

### ***Currency***

Till present time (PNA) has not issued national currency, but dealing with a basket of currencies such as Israel new Shaqi. Jordanian, U.S.

### ***Education system***

Education system consists of four educational stages:

- 1- Primary 6 years.
- 2- Preparatory 3 years.
- 3- Secondary 3 years.
- 4- University Education.

### ***Area***

Gaza region is a narrow strip about 46 Km in length and from 5-7 Km in north side to 12 Km in south in width. The total area of G.R. is about 365 Km<sup>2</sup>. This very narrow area is very small and slightly more the twice of Washington DC, and comparatively very small of the total size of Israel 27,000 Km<sup>2</sup> or West Bank 5555 Km<sup>2</sup>. Gaza Region is divided into 5 districts:

- 1- North area.
- 2- Gaza city.
- 3- Middle-Zone area.
- 4- Khan Younis.
- 5- Rafah.

These districts consist of 4 Cities and 8 Villages and 8 Camps.

The 4 Cities are: Gaza, Deair EL-Balah, Khan youns and Rafah.

The 8 villages are: Beit Hanoun, Beit lahya, Jabalia EL-Nazlah, EL-Zawaydah, EL-Karrarah, Abssan, EL-Saghera, Abssan EL-Kaberah, Khuza'ah.

The 8 Camps: Jabalia, Beach, EL-Nusirat, EL-Bureij, EL-Maghazi, Deir EL-Balah, Khan

Younis, Rafah.

### ***Population of Gaza Region***

Gaza Region has an estimated population of 924,800 persons. Two-third of the total population lives in refugee camps. Population density average in all G.R. is 2,400 /km<sup>2</sup>, while it is very much higher in refugee camps 50,000/Km<sup>2</sup>. It is expected that G.R. population will be 1,182,000 by year 2000, and 1,753,000 by year 2010. Annual growth was 35/1000 in 1987, increased to 50/1000 in 1995. Birth rate is 53/1000 while death rate 4.5/1000.

## **CURRENT SITUATION OF DRINKING WATER**

### **Main Causes of Water Pollution in Gaza Strip**

#### **Sea Water Intrusion**

We suffer from severe sea intrusion to our aquifer and raising of salinity the cause of sea intrusion is over pumping of water that occur from the high consumption of domestic, Agricultural.

The raising in salinity as CL-We can be observed in Table 1 and the map:

- In the North of the region we had a good drinking water and salinity under the limit of (W.H.O.) 150 P.P.m.
- In the southern coastal area and the center we have the same value also.
- In the middle of the region it is from 300-600 P.P.m. as CI.
- In the southeast areas we have more than 1000 P.P.m.

**In filtration of sewage to aquifer:** from population areas that haven't any sewage system mainly in refugees' camps and rural area more than 50% of our population are not covered with sewage system and they get rid of the wastes by septic tanks and bit-latrines.

This indicates the great pollution that we suffer and the large range of disease related to the

biological pollution.

### **Decreasing of water table level in our aquifer**

It caused by over pumping and shortage in the put water aquifer the output near 130 mcm/year divided as follow:

- Agricultural and industrial consumption 70 mcm/year.
- Domestic Water near 60 mcm/year calculated as follow:  
The domestic water consumption estimated 41 mcm/year.

Calculated on growth rate of the population 5%.

But actual domestic consumption is more than the registered due to illegal connection and defect and leakage in the system it could be estimated to be:

Leakage 25% = 10.2 mcm/year.

Illegal 20% and unregistered connection = 8.2 mcm/year.

Total = 41+10.2+8.2 = 59.4 mcm/year.

The input to aquifer from rains harvesting and infiltration 50 mcm/year.

From rejected water after using 20 mcm.

Input=50+20=70 mcm/year.

Output=70+60=130 mcm/year.

Shortage=130-70=60 mcm/year.

This figure leads to decrease the level of water table by 5 m / year.

Through the Last five years the level of water table decreases by (1-3 m) around the region mainly in coastal aquifer than sea intrusion occurred.

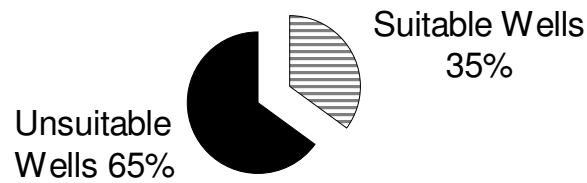
### **In filtration of industrial wastes**

During the occupation theirs no specific areas for industrial zone and industry had spreading randomly through the region although theirs no specific sewerage system and pre-treatment plant reflex the raising heavy metals value in water.

**In filtration agriculture fertilizers and wastes**

The agricultural land in our region is about (180.000 donams) Donam = 1000 m<sup>2</sup>. Partly rained (80.000) and under irrigation (100.000) citrus (60.000) vegetables (20.000) and green houses (20.000). This figure mains intensive agriculture and intensive use for fertilizer and pesticides and herbicides mainly.

**Drinking Wells in the Gaza Strip**



**Figure (1)**

Table (1)

Chemical Characteristics of Drinking Wells in the Gaza Strip 1998							
Number	TDS	Nitrate	Chloride	Number	TDS	Nitrate	Chloride
BH02	482	60.00	70.00	GZ27	516	77.00	71.00
BH03	860	43.00	235.00	JB01	756	77.00	70.00
BH04	1211	43.00	470.00	JB02	790	210.00	142.00
BL01	596	40.00	85.00	JB04	610	110.00	120.00
BL02	587	85.00	85.00	JB05	498	60.00	78.00
BL03	439	80.00	56.00	JB07	675	130.00	100.00
BL04	446	60.00	63.00	JB08	63	60.00	108.00
BL05	450	55.00	56.00	JB09	800	195.00	145.00
BS01	3650	240.00	1200.00	JB10	857	200.00	142.00
BS02	3450	95.00	1190.00	JB11	680	140.00	121.00
DR01	1600	60.00	541.00	JB12	505	70.00	71.00
DR02	1555	80.00	538.00	JB13	702	85.00	135.00
DR04	1218	45.00	400.00	JB14	630	60.00	135.00
DR05	635	50.00	106.00	JB15	683	120.00	121.00
DR06	769	72.00	168.00	JB16	728	170.00	140.00
DR07	519	50.00	99.00	KH01	2062	300.00	660.00
DR08	550	50.00	99.00	KH02	1769	308.00	588.00
DR09	1457	39.00	461.00	KH03	1230	260.00	248.00
GZ01	1111	135.00	284.00	KH04	1810	330.00	491.00
GZ02	2280	84.00	774.00	KH05	323	35.00	92.00
GZ03	873	80.00	206.00	KH06	1838	85.00	598.00
GZ04	1917	224.00	497.00	KH07	3400	50.00	1001.00
GZ05	1639	140.00	426.00	KH08	2380	360.00	782.00
GZ06	1973	80.00	603.00	KH09	2700	190.00	923.00
GZ07	1490	135.00	461.00	KH11	2197	50.00	944.00
GZ08	2247	128.00	745.00	KH12	707	35.00	210.00
GZ09	1172	130.00	319.00	KH13	140	6.00	21.00
GZ10	588	63.00	120.00	KH14	475	70.00	71.00
GZ11	533	88.00	78.00	MG01	1950	50.00	731.00
GZ12	580	88.00	85.00	MG03	2170	86.00	1015.00
GZ13	1436	148.00	461.00	QR01	511	80.00	71.00
GZ14	527	78.00	78.00	QR02	1291	80.00	369.00
GZ15	1769	165.00	483.00	RF01	480	45.00	85.00
GZ16	1756	224.00	511.00	RF02	335	20.00	50.00
GZ17	811	70.00	30.00	RF03	691	32.00	248.00
GZ18	715	98.00	156.00	RF04	3200	210.00	1136.00
GZ19	2025	102.00	707.00	RF05	1752	147.00	617.00
GZ20	1420	60.00	390.00	RF06	1231	120.00	348.00
GZ21	650	35.00	135.00	RF08	685	35.00	177.00
GZ22	1107	173.00	362.00				

