REGIONAL WATER SUPPLY AND SANITATION PROJECT IN BENI SUEF GOVERNORATE

SURFACE WATER RESOURCE INVENTORY FINAL REPORT

Prepared By

ASHRAF F. EWISS

M.Sc Hydrogeology
Hydrogeology & Drilling Expert

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SUMMARY

The study area is located between Beba and El Fashen markaz approximately between longitudes 30° 30' and 31° E and latitudes 28° 46' and 28° 56' . It is lies approximately on the level 38.4 m above the main see level. It is covers an area of about 800 Km² . the area are bounded by river Nile from the east and the new reclaimed land from the west, Beba markaz from the north and El Fashen markaz from the south.

A. CLIMATE

The area is characterized by:

i. The maximum recorded monthly average temperature is 38.4 C in July , while the minimum average recorded monthly temperature is 5.60 C in January.

ii. The amount of rainfall is not significant through the year. During the winter time, occasional short rainy storms may take place over the area . The main annual value rain fall is about 6.20 mm / year.

iii. Wind velocity varies from month to another . The maximum monthly mean value is 12.4 knot (6.4 m/s) as recorded during June and July, while the minimum value is 5.8 knot (3 m/s) as recorded during December .

iv. The mean maximum monthly value of the relatively humidity is 63.30% in December, while the minimum value is 37.60 % in May.

v. The maximum recorded evaporation is 19.20 mm/day in June and the minimum reaches 5.3 mm / day in December. It is worth mentioning that there is a high percentage of evaporation and inconsiderable value of rainfall in the area west of the Nile Valley.

vi. The total amount of area rain precipitation is about 4,960,000 m³ /year where the catchment area is about 800 km².

vii. The surface water evaporation (Eo) = 61,780,000 m³ / year where, the surface water area is about 25.8 Km².While the evapotranspiration by plants (Et) = 1,210,600,000 m³ / year where, land is (119800 feddans) 503.20 Km². And the evaporation from soil (Es) =677,900,000 m³ / year where, the area in which the Es take place is about(64600 feddans) 271.20 Km² .

B. SURFACE WATER HYDROLOGY

The surface water hydrology in the study area is represented by the regime of the water in the irrigation canals and drains. The main irrigation canals in area are El Ibrahemiya and Bahr Youssef canals which get their water from the River Nile. The manner of the irrigation in the study area is by flood irrigation.

Before the construction of the high dam and during the flood period, the Nile water was seeping laterally to the graded sand layer, but in the period of low River levels a reverse flow was taking place .However , since the construction of the High Dam and regulation the river discharges downstream of Aswan, water in the river has been almost lower (along 11 month of the year) than the ground water levels . Therefore, the ground water now seeps to the River Nile.

The need for the drainage system was limited before the construction of the High Dam. At that time, the ground water heads all over the area were low enough for a vertical downward seepage during the Nile draught seasons. After the completion of the High Dam, however and due to the lack in developing an efficient drainage network, the water tables have continuously rise as the result of excessive surface water seepage. Thus, the waterlogging problems have been observed in some areas of the old cultivated and reclaimed lands.

The main problems related to the land reclamation activities in the area are; the excess of the water which pumps from Bahr Youssef to the reclaimed area, the large seepage from the canal sides , poor water management at the farm level due to the irrigation schedule that is not suitable to the soil texture in the area of study (sandy soil) and there is no complete drainage system in the high land. Therefore the results of the problems are water logging and soil salinization in the old cultivated land.

C. SURFACE WATER QUALITY

i. The total salinity of the canals water range from 218 ppm beside the Nile to 474 ppm in the western part i.e. in the reclaimed part, while for the drains water is ranging from 742 beside the Nile to 5046 ppm in the new cultivated land.

ii. The relation between electrical conductivity EC and the total dissolved solids TDS plays a highly positively significant correlation and shows a best linear regression.

iii. The water type of the Nile and canals (chemical classification) is calcium bicarbonate, while the water type of Bahr Youssef is sodium bicarbonate and the drains is sodium chloride.

iv. The biological contamination by algae increase from north to south direction along the Nile El Ibrahemiya and increase from south to north along Bahr Youssef, where, all taken samples during preliminary surface water program are biological and bacteriological contaminated.

v. The bacteriological contamination take place along all sampling locations of the Nile, Ibrahimiya, branch canals and Bahr Youssef.

vi. Oil nests distributed along the main surface water resources and branch canals.

D. THE EFFECT OF THE RECLAMATION ON THE SURFACE WATER QUALITY

The hydrochemical profiles along El Ibrahemiya and Bahr Youssef canals east of the reclaimed area show that the reclamation activities affect on the salinity of the water quality , ion concentration and hypothetical salt combinations of Bahr Youssef, while there is no considerable effect on the El Ibrahemiya canal.

1. INTRODUCTION

1.1. GENERAL OUTLINE

The situation nowadays shows the importance of water droplet either fresh water, saline, ground or surface, where, by the high technology the saline water has its importance as well as the fresh water. Moreover, the increasing of population needs a very accurate plan to fulfill the water demands in the future.

Accordingly, with taking into consideration the reality that the surface water and ground water are the main water resources in Egypt a need for controlling & measuring these resources have been raised in Beni Seuf Governorate.

The surface water system of the study area is principally represented by the regime of water in the River Nile and its secondary irrigation canals (Ibrahimiya and Bahr Youssef). While, groundwater resource is represented by a relatively thick sedimentary section, where, this section act as an important aquifer and its ground water occasionally used for domestic, iirigation and industerial purposes.

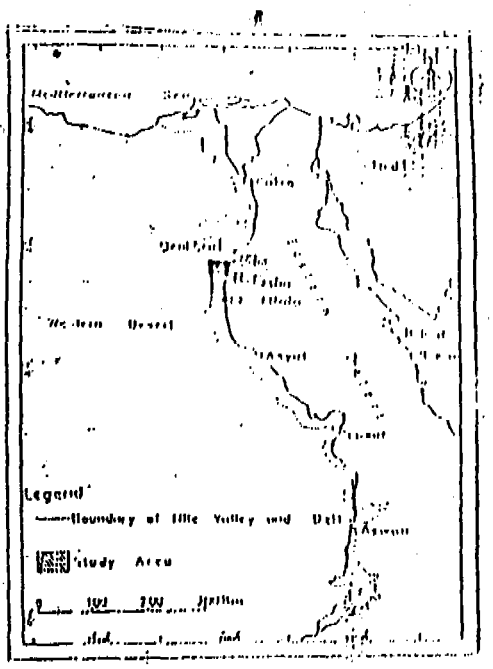
Water shortage from the River Nile becomes so clear while requirments are of increasing demand, from this point the importance of groundwater as a main potential sorce for domestic uses is very clear where it is less subjected to pollution and has more or less constant temprature. So, the development of water resorces (surface and ground water) along the study area receive special attention from RWSSP specially groundwater resource which have great advanages due to the flexibility and low costs of production and their high reliability during emergencies.

From this point of view surface water and ground water resorce inventory studies were prepared and implemented by RWS&SP staff along the study area (Sumusta, Beba, and El Fashen).

1.2. STUDIED AREA DESCRIPTION

1.2.1. Location

The area under investigation is located between Beba and El Fashen markazes approximately between longitudes 30° 30' and 31° 00' E and latitudes 28° 46' and 28° 56' **(fig. 1)** . Its lies approximately on the level 38.4 m above the mean sea level. It covers an area of about 800 km². The area is bounded by River Nile from east, the desert boundary of reclaimed land from the west, Beni Seuf town from the north and southern boundary of El Fashen markaz from the south.



Fig(1 Location Map

GIZA

WASTA

FAIYUM

BUSH

BENI SUEF

WESTERN DESERT

EASTERN DESERT

BIBA

SUMUSTA

MINYA

Figure 1

BOUNDARY OF THE STUDY AREA

Governorate capital

Markaz capital or ot town

Governorate boundar for limit of populate

Markaz boundary

0 5 10

The area under study can be divided into two main areas; the old cultivated land and the new cultivated land .

The old cultivated land is situated west of the River Nile with elevation 30 m to 34 m above the main sea level . It is covered with silty clay deposits which become thinner towards the valley edges. The reclaimed area is situated on the sandy and gravely west slope of the Nile Valley **(Fig. 2).**

1.2.2. Morphology

The area of the study lies along the alluvial plains which were developed into a flood plain of the River Nile.

It passes through a high eastern and western calcareous plateau, with a general slope from south to north of about 0.1 m/km . The Nile tends to occupy the
eastern portion of its valley, so that the cultivable lands on the west of the river are generally much wider than those of the east. The cliffs of the east side of the valley are closer and much higher than those on the west side.

The River Nile in the area of the study favors the eastern portion of the flood plain, where many island are exposed within the river channel which have been developed by braiding processes .

The following morphological features (land forms) can recognized in the study area and its vicinities **(fig 3) :**

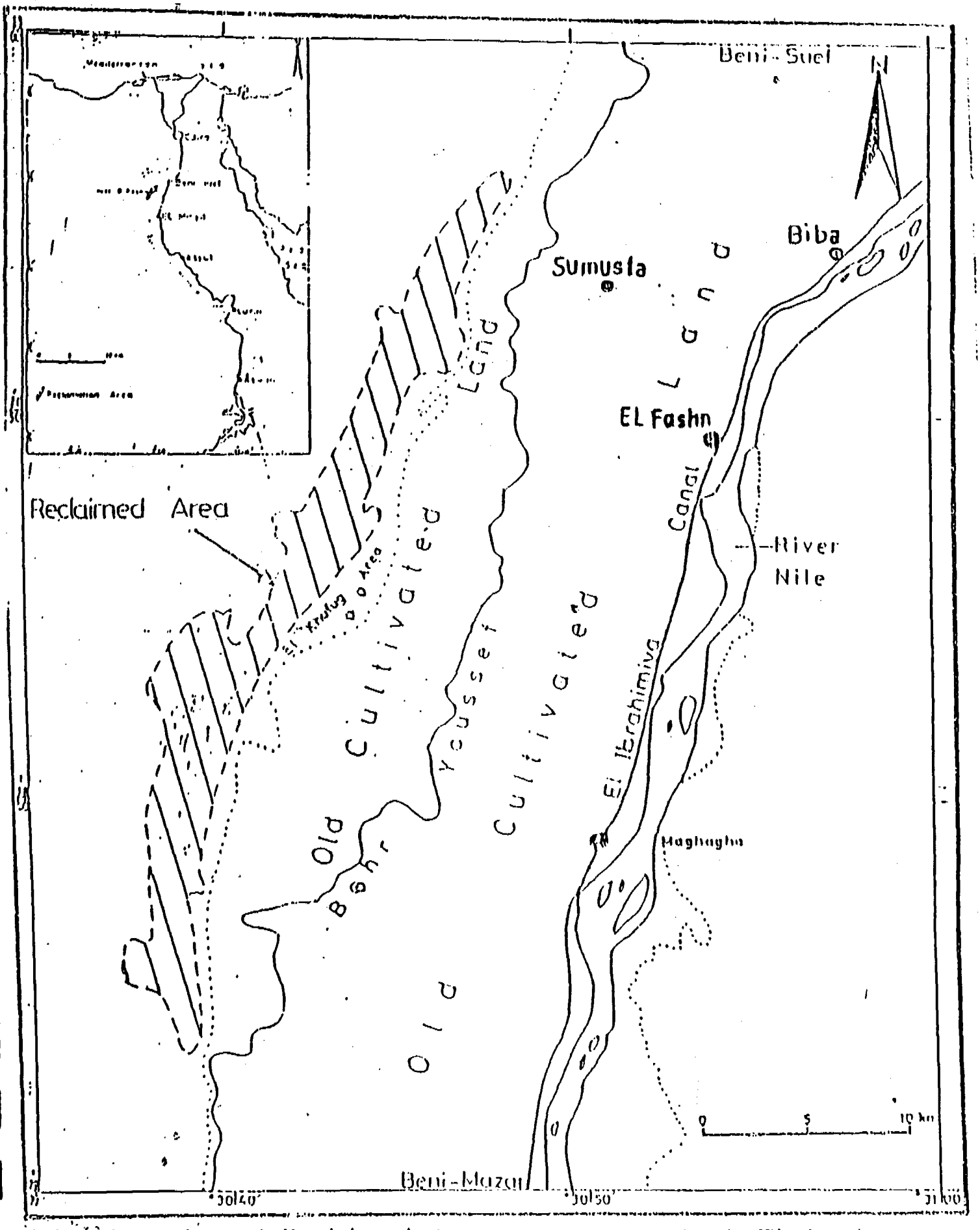
i. The young alluvial plains of the Nile (Holocene silty clay).
ii. Sand dune accumulations.
iii. The old alluvial plains of the Nile (Quaternary sand and gravel).
iv. The calcareous structural plateau and their sloping boundaries (Middle Eocene limestone).

1.2.3. Climate

Beni Seuf area is generally characterized by arid climate. it is marked by hot summer and cold winter. During the spring season, hot winds and dust storms occur during the period of about 50 days and is locally known as " El Khamaseen Period".

The arid climate plays an effective role on the present hydrologic response in Beni Suef area. It represents one of the active parameters in the manner of hydrogeologic evaluation of ground water and surface water resources in the study area.

The study of different climatic features in concerned area requires the analysis of meteorological data represented in **table 1.**
From this table the following are noticeable :



Fig(2)Location of Reclaimed Desert Area West of El Fashn.

(Modified after RIGW , 1989)

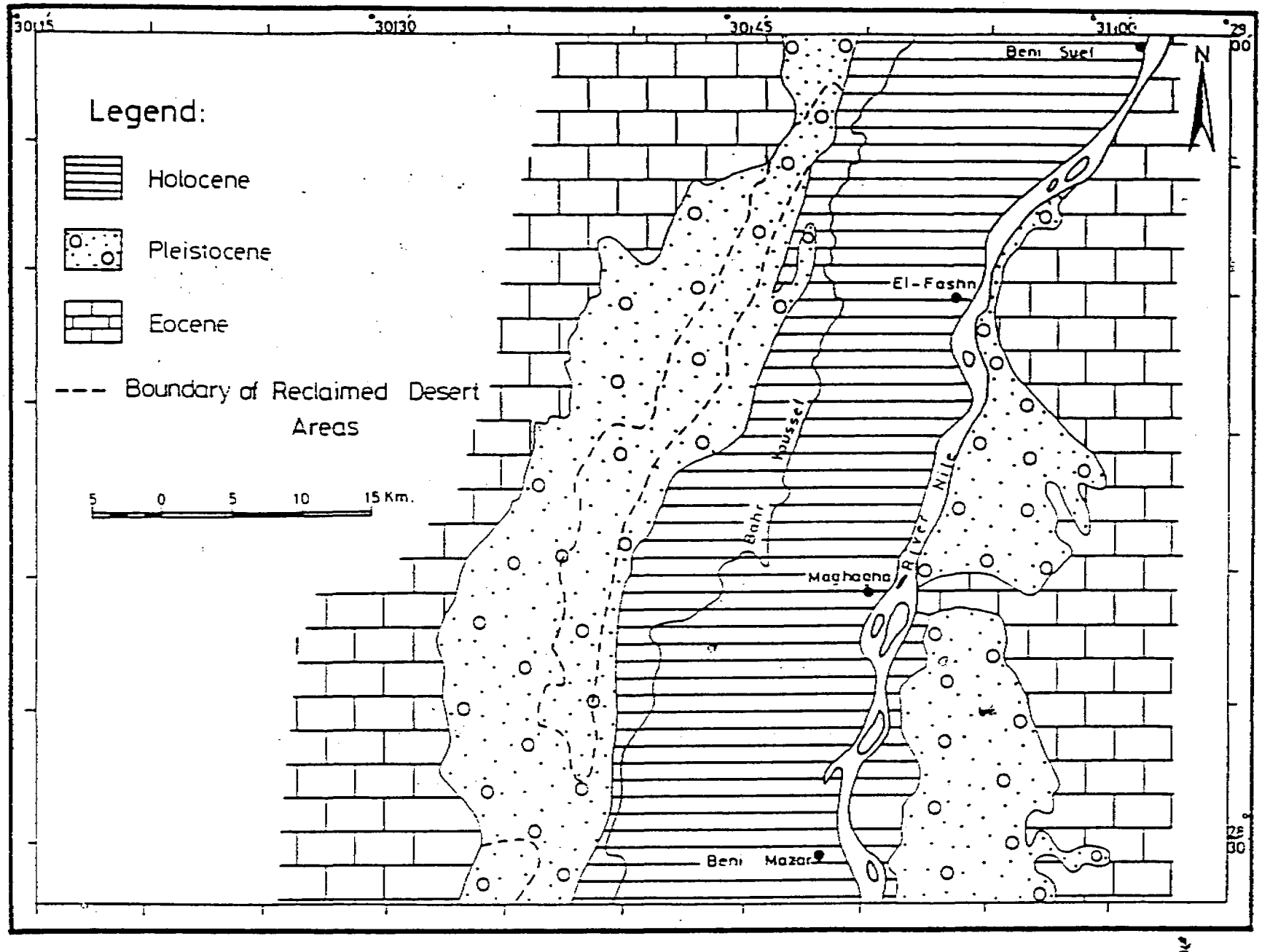


Fig.(3)Geomorphological Map of the Area Between Beni-Suef and Beni-Mazar

(After Said , 1981)

Table (1) : Meteorological records for the average long-term of Beni- Seuf
(Period 1952-1994)

Month	Temp. °C			Relative Humidity (in %)	Evaporation (mm/day)	Mean scalar wind speed (Knots)	Rainfall (mm)
	Max.	Min.	Average				
January	20.8	5.6	13.0	60.2	6.0	8.0	1.5
February	22.2	6.9	15.1	53.2	7.6	7.7	0.99
March	26.2	9.7	18.3	45.9	10.5	9.4	1.1
April	31.2	13.6	23.1	40.6	15.2	10.6	0.2
May	35.4	17.6	27.2	37.6	17.5	11.5	0.1
June	38.0	20.5	30.3	39.5	19.2	12.4	0.0
July	38.4	21.4	30.8	45.8	17.0	12.4	0.0
August	37.9	21.9	30.5	49.9	15.1	11.3	0.0
September	35.9	20.2	28.6	52.1	14.4	11.8	0.0
October	32.0	17.1	24.9	53.4	11.3	9.7	0.0
November	27.1	12.5	20.4	59.2	7.4	8.4	1.4
December	21.8	7.8	15.0	63.3	5.3	5.8	1.0
Annual mean	30.6	14.6	23.1	50.1	12.2	9.7	-

i. The maximum recorded monthly average temperature is 38.40 °C in July , while the minimum average recorded temperature is 5.60 ° C in January.

ii. The amount of rainfall is not significant through the year .during the winter time, occasional short rainy storms may take place over the area . The main annual value rain fall is about 6.20 mm / year

iii. Wind velocity varies from month to another . The maximum monthly mean value is 12.4 knot (6.4 m/s) as recorded during June and July, while the minimum value is 5.8 knot (3 m/s) as recorded during December .

iv. The mean maximum monthly value of the relatively humidity is 63.30 % in December, while the minimum value is 37.60 % in May.

v. The maximum recorded evaporation is 19.20 mm / day in June and the minimum reaches 5.3 mm / day in December. It is worth mentioning that there is a high percentage of evaporation and inconsiderable value of rainfall in the area west of the Nile Valley. **(Fig.4)** shows the graphical representation of the average climatic data for the studied area, in the period 1952 to 1994.

vi. The total amount of area rain precipitation is about 4,960,000 m^3 /year where the catchment area is about 800 km^2.

vii. The surface water evaporation (Eo) = 61,780,000 m^3 / year where, the surface water area is about 25.8 Km^2. While the evapotranspiration by plants (Et) = 1,210,600,000 m^3 / year where, land is (119800 feddans) 503.16 Km^2. And the evaporation from soil (Es) =677,900,000 m^3 / year, where the area in which the Es take place is about (64600 feddans) 271.16 Km^2 .

1.3. SCOPE OF THE STUDY

This study deals with the hydrological and quality properties of the surface water (River Nile, Canals and Bahr Youssef) from the potable points of view along the study area of RWS&SP (Sumusta, Beba and El Fashen). This was done through three types of sampling and monitoring programs beside the data collection phase.

So, the sampling and monitoring programs were include:

i. Random monitoring program: where a group of random distribution samples were collected along the study area.

ii. Preliminary monitoring program: depending on the collected data and the results of the random sampling program certain points were selected depending on their locations and importance.

iii. Regular monitoring program: depending on all collected data from the previous programs certain points are determined to sampling and detection of water quality along certain periods through the year.

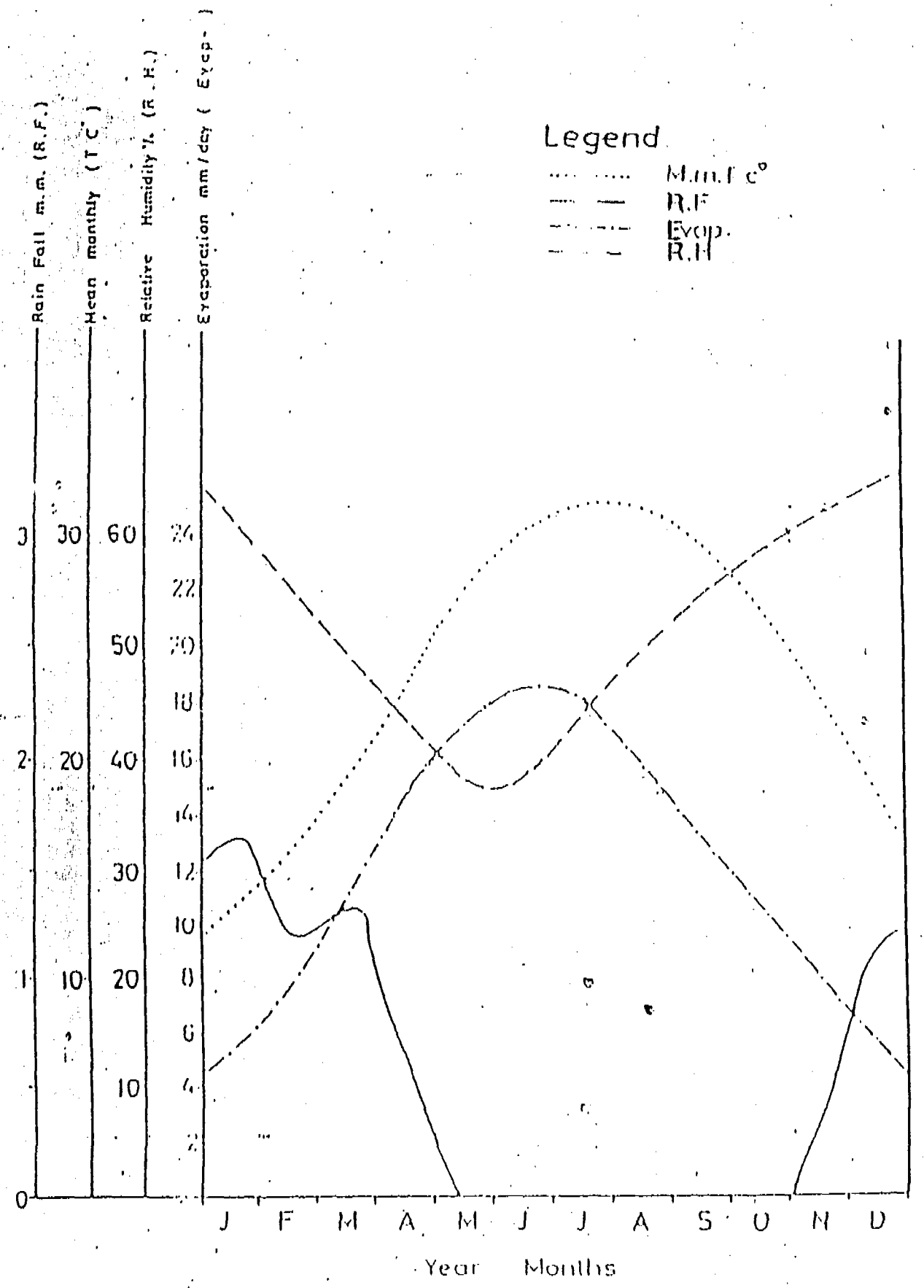


Fig 4 Graphical Representation Of The Average Climatic Data For The Studied Area (In The Period 1952-1984)

Also the study of the reclamation effect on the surface water quality has been taken place through the chemical analysis of the surface water in the western part (reclaimed land) and in the eastern part of Bahr Youseef in the direction of the Nile to detect the changes in the water quality which consider as the result of the reclamation activities.

All these tools have been used to clarify the hydrology, water quality and sources of surface water contamination along the study area.

1.4. MATERIALS AND METHODS

The present work is based mainly on the following data that are collected from several sources :

i. The periodical records of climatic data during the period 1952 to 1994 in the study area (The Egyptian Meteorological Authority-Cairo)

ii. The periodical records of the surface water levels (River Nile, irrigation canals and drains) discharge of the main canals and water duties for different groups, and purpose of drinking and industry(Directorate of irrigation in Beni Seuf) .

iii. The hydrochemical data, representation and models of the surface water along Sumusta, Beba and El Fashen. (Nile Researches Institute-El Knater El Kairea Cairo).

iv. Surface water hydrology and quality study along Sumusta, Beba and El Fashen markaz - Ashraf F. Ewiss - Cairo University 1992.

v. Chemical analysis results of random, preliminary and regular monitoring program - RWS&SP - Beni Suef.

2. SURFACE WATER HYDROLOGY

2.1. SURFACE WATER SYSTEM

The surface water system of the study area is principally represented by the regime of the Nile, the water irrigation canals and the agriculture drains.

The River Nile is more or less running along the eastern boundary of the valley with width ranging from 500 m to 1000 m. The River cuts completely through the surfacial semi.pervious layer with its own bed of fine clayey sands.

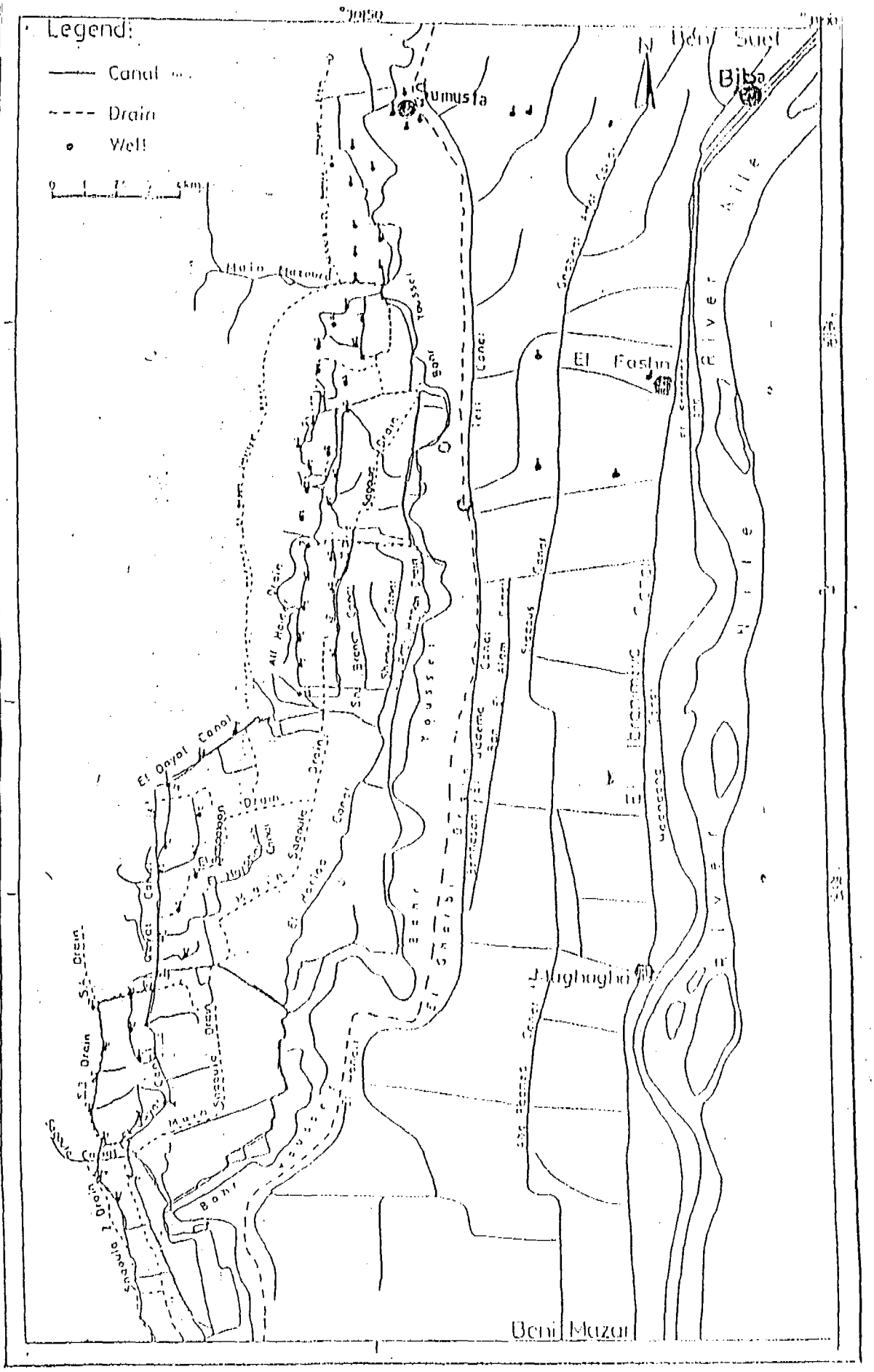
El . Ibrahimiya canal gets its water from the River Nile at the upstream portion of the Assiut barrage, and it is extend with length 268 km until downstream at El . Aiaat town.

Bahr Youssef gets its water from El Ibrahimiya canal at the upstream portion of the Dairut barrage. Bahr Youssyef functioned as a branch of the Nile until the year 1869 when El Ibrahimiyia canal was dug . Since that time it derived its water from El.Ibrahimiyia canal. More over, different branches are existed in the study area **(fig.5)**.

The main drains in the study area are; El.Mohait El.Gharbi drain, Mazoura El-Bahary and Mazoura El Qabely intercepted drains **(fig.5)**.

2.2. WATER CONVEYANCE

The River Nile and its secondary canals are the only sources of the surface water in the study area and in Beni Suef governorate. The amount of the water inflow and out flow are measured by Beni Seuf irrigation directorate with different methods to control and insure its value. The monthly total surface water inflow and out flow from the three main surface water sources (Ibrahemya, Bahr Youssef and the Nile) in Beni Seuf during 1994 is shown in table 2) .



Fig(5.)Surface Water and Groundwater Location Map in the Area Between Beni-Suef and Beni-Mazar. (Modified after Irrigation Directorate of Beni Suef)

Table (2) : Monthly volume of surface water inflow and outflow from Main Water Streams during 1994. (Beni Suef Irrigation Directorate)

MONTH	INFLOW (MCM)	OUTFLOW (MCM)	BENI SUEF CONSUMPTION (MCM)
January	1400.199	1058.15	342.049
February	2681.252	2263.9642	417.2878
March	3474.01	2874.0114	599.9986
April	3535.747	3007.355	528.392
May	3719.875	3216.576	503.299
June	4398.666	3529.569	869.097
July	5187.728	3875.118	1312.61
August	5102.372	3876.146	1226.226
September	3941.793	3456.141	485.652
October	3339.400	2925.284	414.116
November	2936.386	2517.620	418.766
December	2805.475	2414.048	391.427
The total in million cubic me.	42522.903	35013.9826	7508.9204

The potable water consumption along the study area (Sumusta, Biba and El Fashen) -NOPWASED / NATIONAL PLAN 1996 in m^3/day) is shown in table 3

Table 3 (potable water consumption along the study area in 1995)

Markaz/Year	1995
Sumusta	12852 m^3/day
El Fashen	31945 m^3/day
Beba	30163 m^3/day
Total	74960 m^3/day

2.3. CONVEYANCE LOSSES

In the old cultivated lands the conveyance losses cannot be easily calculated for the system stabilization from long period due to low permeability of the surrounding layer which leads to low losses and also the leak of new data for calculate the losses accurately.

In the reclaimed desert area the irrigation canals are generally not lined and running through sandy deposits, which leads to considerable losses and accordingly leakage into the aquifer takes place. The total length of these canals equals about 100 km .The total leakage from the irrigation's system in the reclaimed desert is estimated as 65 million m^3/year (RIGW 1994), which represent 30 % of the total inflow of surface water .

The leakage from irrigation canals contributed more than 40 % to the total ground water recharge to the aquifer in the reclaimed desert area (RIGW, 1994).

2.4. RELATIONSHIP BETWEEN THE SURFACE WATER & GROUND WATER

The interrelationship between the surface water and ground water will be concerned with the River Nile , the irrigation canals and surface drains.

Referring to the River Nile before the construction of the High Dam the ground water flow used to take place laterally from the Nile to the aquifer (effluent seepage). The flow from the aquifer to the Nile (influent seepage), however, has occurred only during the draught seasons. After the construction of the High Dam (1966), the water level of the River Nile becomes fully controlled all over the year, and so it acts as a drain for ground water in many parts of the basin **(fig. 6&7).**

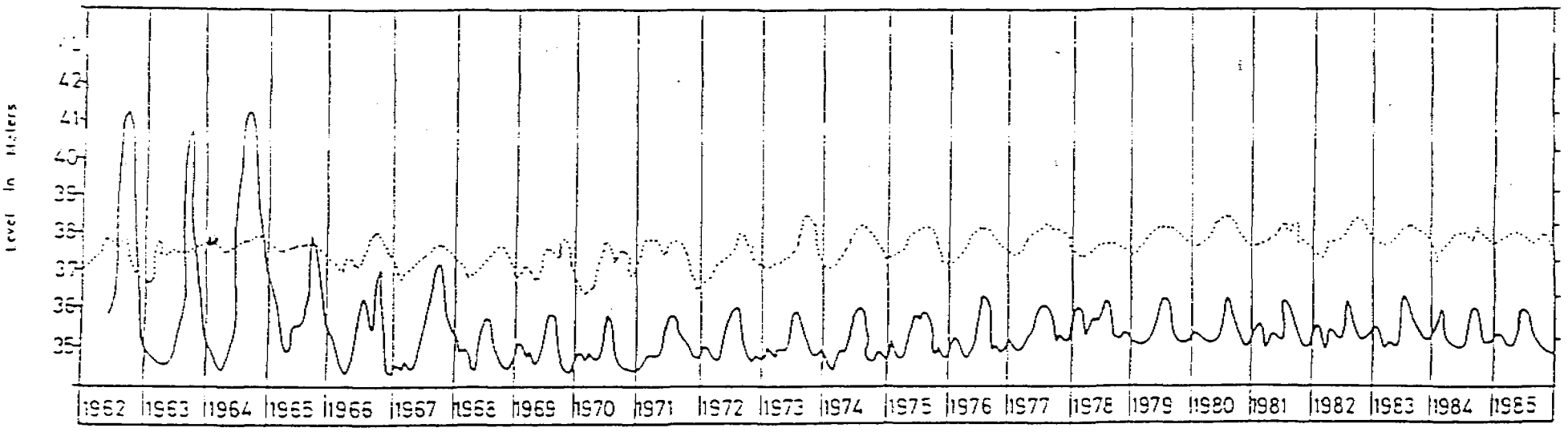
Rising in the water level of the Nile during June, July and August, while it drops in December, January and February is presented in **(fig.7)** .

In some observation wells H, E and C **(fig.8)** which are located very close to the River Nile, The ground water level is obviously controlled by the fluctuation of the water level in the River Nile, while in the far wells no relation between the water level in the river and that of the ground water could be detected.

Referring to the aforementioned discussion it can be announced that the River Nile as well as the system of irrigation canals play the most important role in recharging the aquifer. This is obvious from the water table maps, also from local fluctuation of both surface water and ground water **(fig.6)** . During the winter close period , these canals act as drains for the ground water . On the other hand, the small irrigation canals become dry during this period and accordingly they have a negligible effect on the ground water fluctuations.

Consequently a marked lowering in the ground water level was recorded in the cultivated old lands as shown in **(fig.7)** and the irrigation canals play an observable role in discharging the ground water from shallow aquifer. At the end of this period, water level begins to rise rapidly to its original position.

With respect to the irrigation water, after completion of the High Dam, all the lands that were practically flood irrigated, have been transferred into perennial irrigation. This situation leads to continuous usage of



Legend:

Nile Water Level

Groundwater Level

Fig(6)Fluctuation in Groundwater and Surface Water Levels Before and after the Construction of the High Dam at El-Minia District (Modified after El-Sayed , 1987).

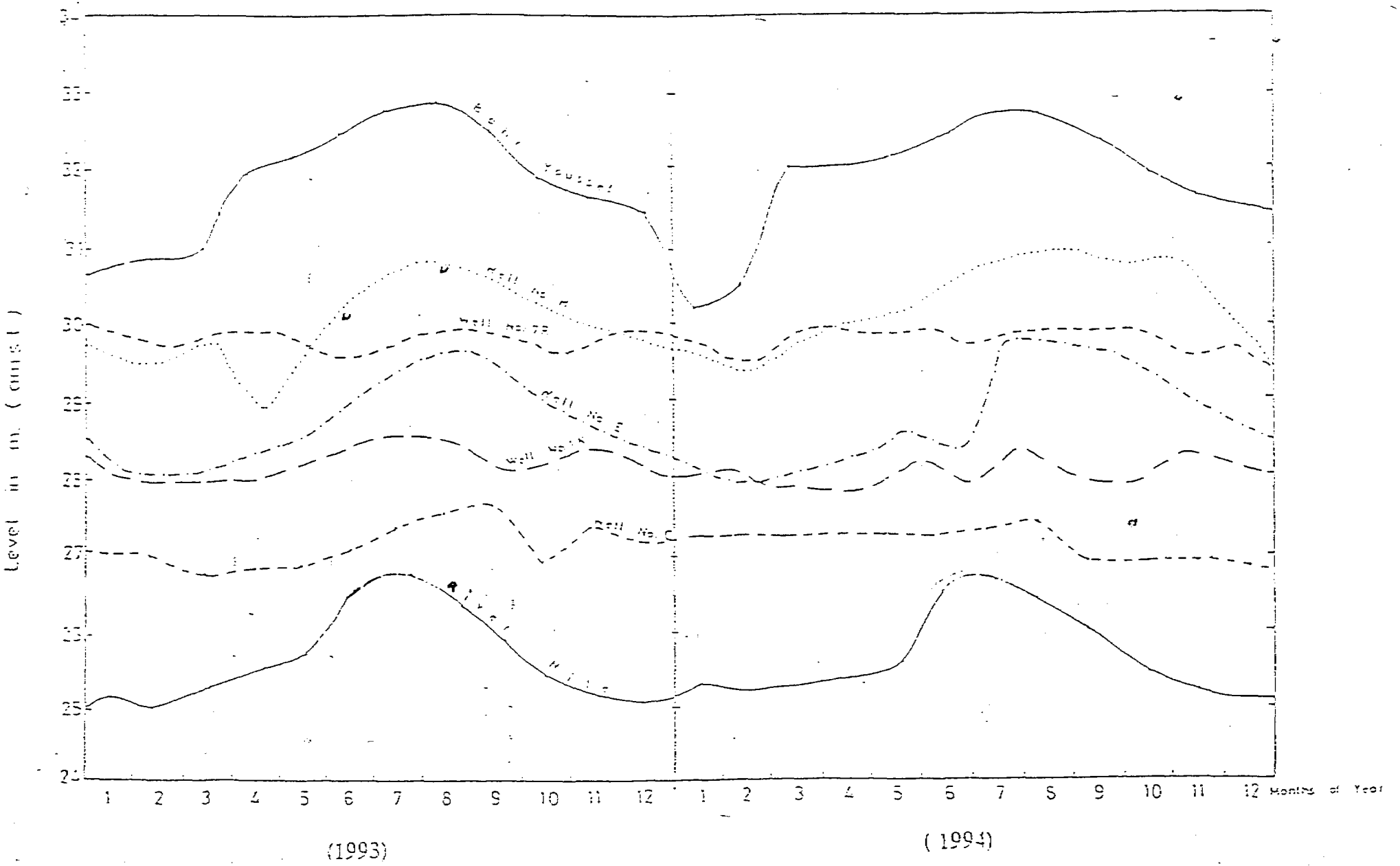
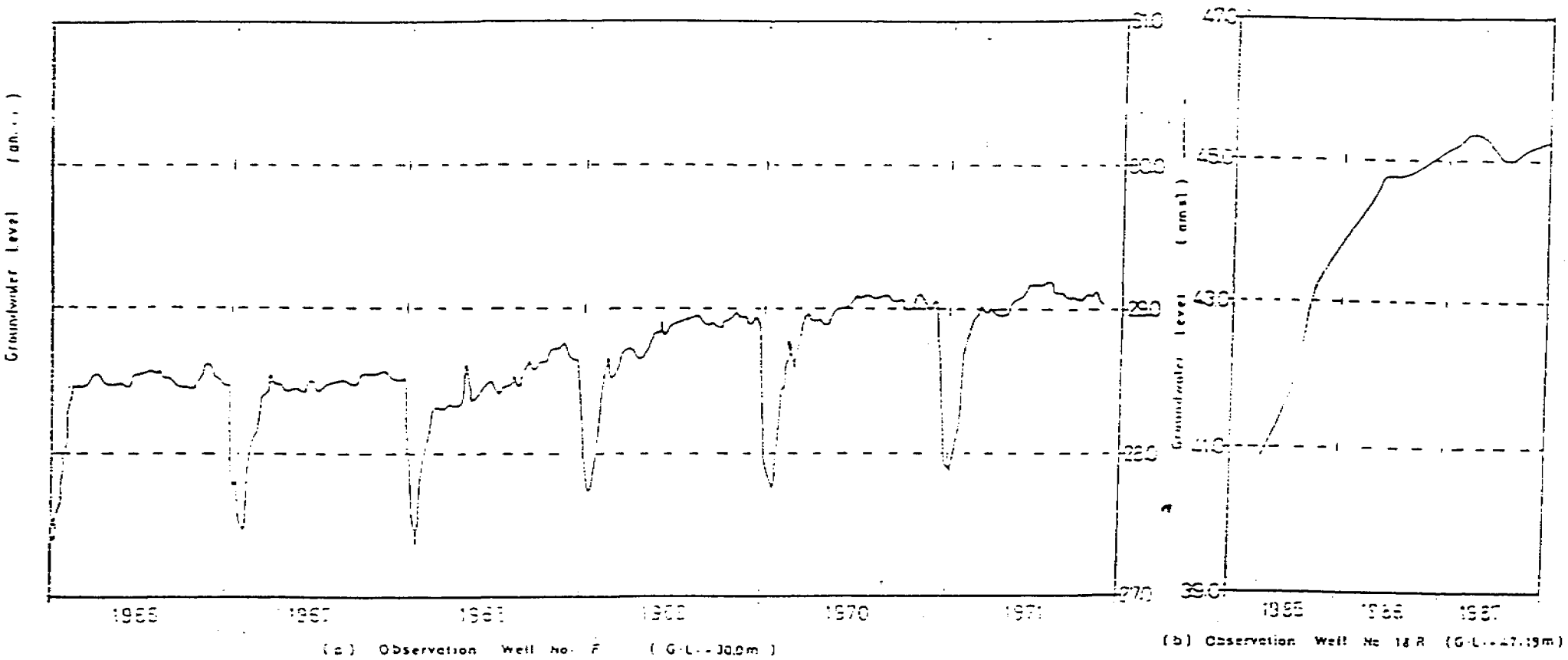


Fig 7 fluctuation In the Groundwater And Surface Water In The Study Area



Fig(8)Hydrographs of Observation Wells 18 R and F

(After RIGW, 1989)

additional amounts of irrigation water which have generated new problem, mostly related to rising the water table, waterlogging, and increasing salinity in various cultivated areas. Moreover, the additional increase in the irrigation water plays obviously the important role in the irregularities which have been noticed in local fluctuations of the water in the ground water.

With regard to the surface drains, the need for drainage system was limited before the construction of the High Dam. At that time, the ground water heads allowed the area were low for enough for vertical downward seepage during the Nile draught seasons. After the completion of the High Dam, however and due to the lack in developing an efficient drainage network, the water tables have continuously rise as a result of excessive surface water seepage. Thus, the waterlogging problems have been observed in some areas of old cultivated and reclaimed lands.

2.5. DRAINAGE

In the west of Bahr Youssef, The main objective of drains except the famous objectives would be to discharge the upward ground water flow from the aquifer to the unsaturated zone. The average rising up of water level in the old cultivated area west of Bahr Youssef amounts to 0.76 mm/day (RIGW. 1995).

A drainage system has been designed to discharge the high seepage rates, but there are some reasons hindered this function. These reasons can summarized as:

i. The bottom of these drains are generally less than 3 m below land surface, i.e. their bottom does not reach the ground water table and accordingly the drains do not discharge considerable amounts of water.

ii. The majority of these drains were dug in fine sand deposits and they are not subjected to any serious maintenance. As a result, these drains do not function properly.

iii. The total water losses from flood irrigation and seepage from canals are ranging between 30% and 65% from the pumped water (RIGW. 1995). in general the drains discharge only a small amount of water which has been estimated as 126.8 m^3/day (RIGW. 1995). Hence, only 31.6% of the total water outflow from the reclaimed area is intercepted by these drains.

2.6. RECLAMATION ACTIVITIES

The reclaimed desert area lies west of El Fashen and Sumusta districts. The topography of the reclaims area is characterized by gently rolling sandy plains. The area has general slope from west to east of roughly

5 m per kilometer. The elevation of the reclaimed area vary from 35 to 65 m above the main sea level.

The reclaimed land is separated from the old cultivated lands by a narrow strip of land with width of about 3 km, it is referred to as "El Khuffug", generally this is sandy and non cultivate (sand dune) see **(fig.2) .**

The majority of the soils in the reclaimed area are characterized by limited suitability for irrigated agriculture. the major soil problems are low available moisture capacity, the low organic matter content and presence of sodium chloride and gypsum.

Extensive areas of the old cultivated lands along the study area (specially in Sumusta and El Fashen districts) have become waterlogged and salinized since the adjacent reclaimed desert lands are cultivated and irrigated. **(fig. 9).**

The reclaimed areas west of El Fashen and Sumusta are situated on a high plateau with a deep ground water table (RIGW. 1990). Subsurface drainage water from the irrigated fields and seepage water from the irrigation canals, percolate to the ground water table and recharge the ground water aquifer. A part of the ground water recharge is stored in the saturated and unsaturated zone and leads to rise of the ground water table. Where, **(fig. 10)** shows the hydrograph of the observation well 18 R, where the piezometric head in the aquifer increased by more than 4 m during the period of less than two years. However, more or less steady state situation was established after 1988.

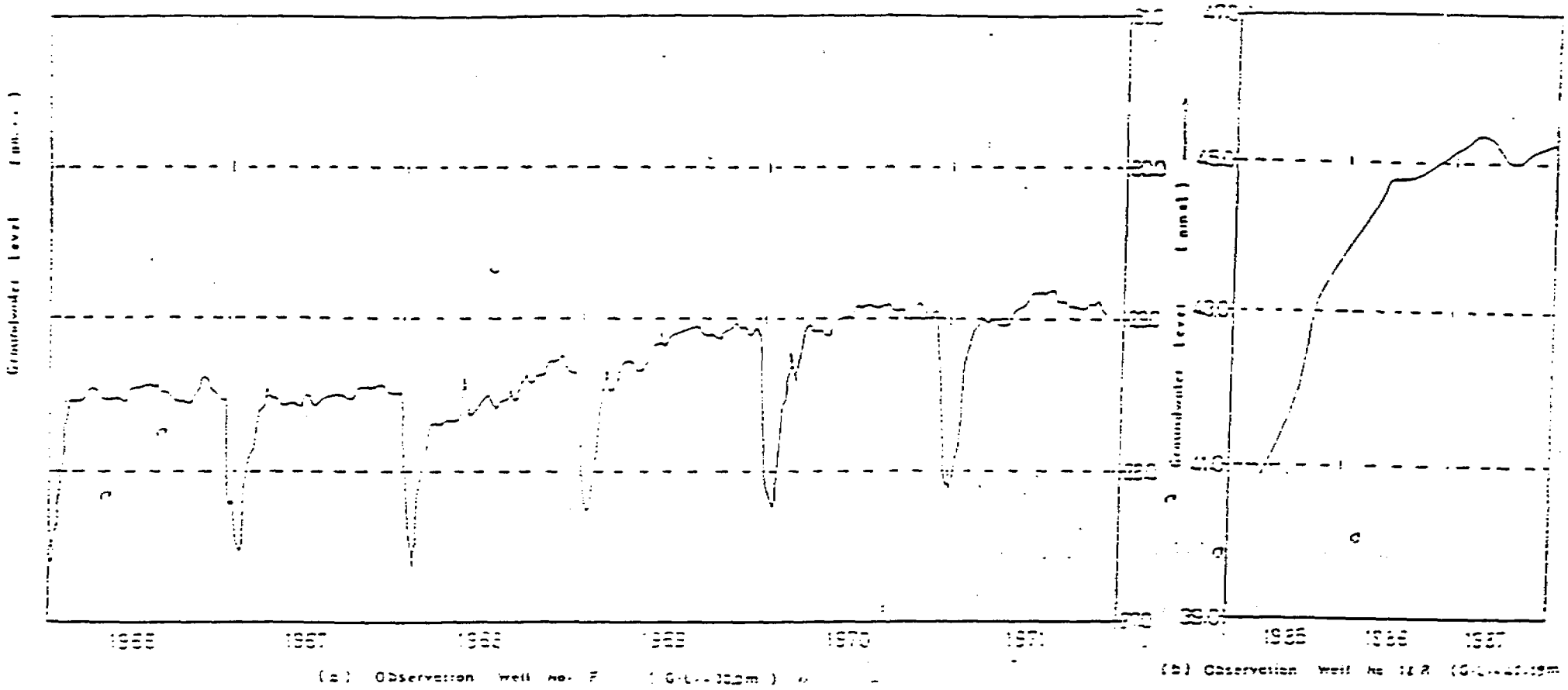


Fig 10)Hydrographs of Observation Wells 18 R and F

(After RIGW- 1990)

3. SURFACE WATER CHEMISTRY

The study of the water chemistry and its relation to the prevailing hydrogeology and environmental conditions in the area under investigation is the main target of that study.

Group of samples of surface water representing the River Nile, the main canals and drains as well as branches along the study area were collected and analyzed through preliminary monitoring program that was designed and implemented by RWSSP from 4/8 /1996 to 18/8/1996 as first phase of permanent water quality monitoring program for the study area and the Governorate. Where this phase represent the flood time period of the Nile (August, i.e. the high level season) to study water quality and to show the effect of the change water quantity on the water quality along the year.

The locations, method and technique of sampling as well as the dates of sampling are presented in **(fig. 11 , fig. 12** and **Appendix 1-8)**. Also the results from data collection are presented in **(Appendixes 8-11).**

During the design of this preliminary monitoring program many vital points are taken in consideration like :

i. The drainage order.

ii. The locations of the water supply intakes.

iii. Sources of industrial and waste water contamination.

iv. Density of population.

v. The distance between sampling points not exceed 20 km.

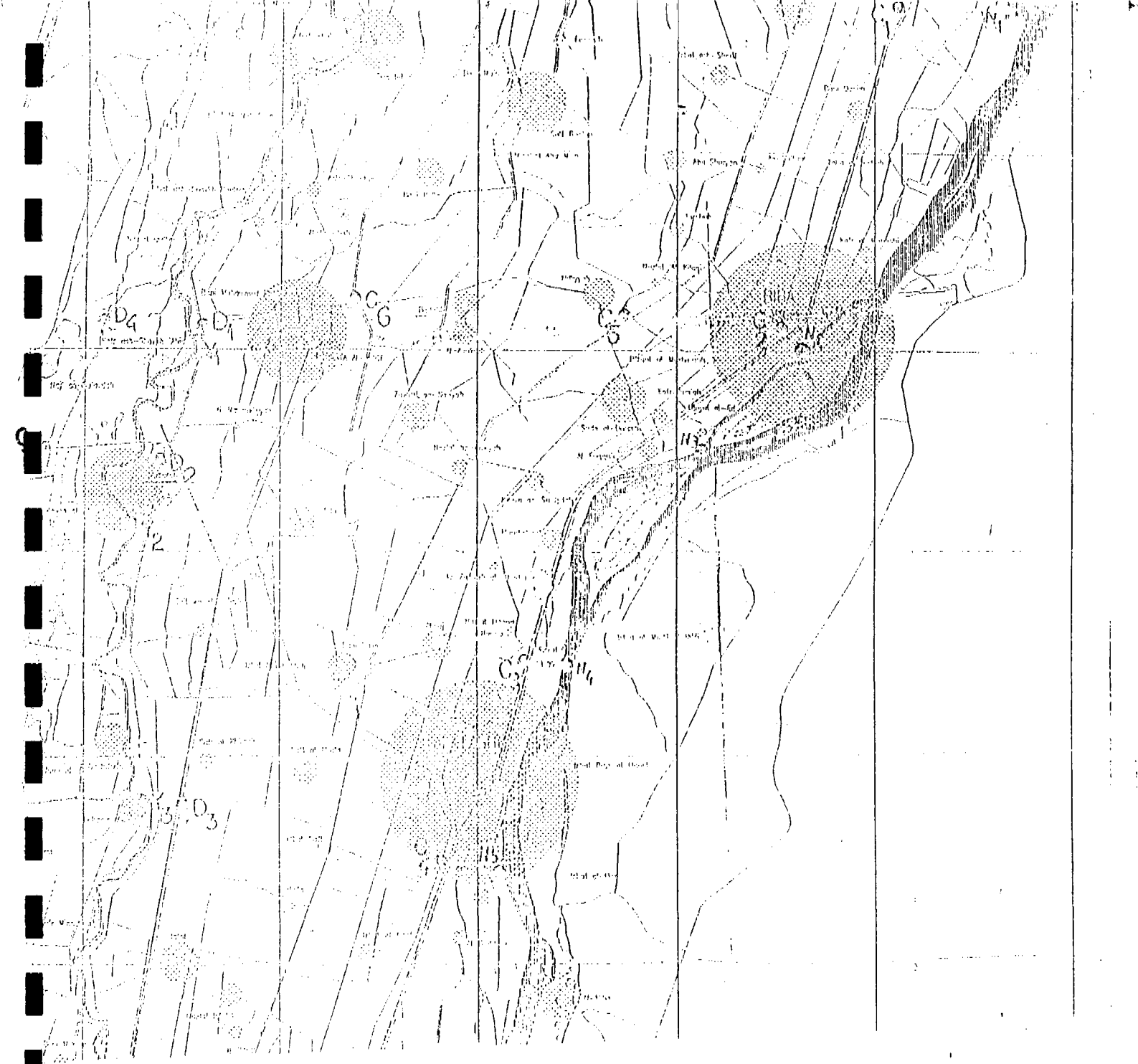
3.1. THE MEASURED PARAMETERS

Parameters measured by water quality random and preliminary monitoring program are highly dependent upon the objectives, basic characteristics and the budget required.

A group of basic parameters (table 4) measured in all samples (i.e., in the Nile, irrigation canals and drains) in addition to some specific parameters depending on the type of effluent and the importance of the site.

Table(4) Insitu chemical analysis program (Sumusta laboratory)

. Temperature (in the field)
. Turbidity.
. Color.
. Odor.



LEGEND

N1 Bani Haroun
N2 New Intake of Biba
N3 Minyat Al Jid
N4 El Waqilliyya
C1 Bani Haroun C.U. Intake
C2 Old Water Intake Of Biba
C3 El Waqilliyya
C4 Old Water Intake Of El Fashen
C5 Ganabite Abu Hadid, Hilliyyah
C6 El Sultani canal, Sumusta
C7 Upper Land Canal, El Gabel Wa
Y1 El Sheikh Abed C.U. Intake
Y2 Mazurah
Y3 Delhanis Birdge
D1 El Mohcit Drain El sheikh Abed Village
D2 Mazurah Drain
D3 Dilhanis Drain
D4 Mazura El Bahry Drain

Fig. 11 Preliminary Monitoring Program Sampling Locations

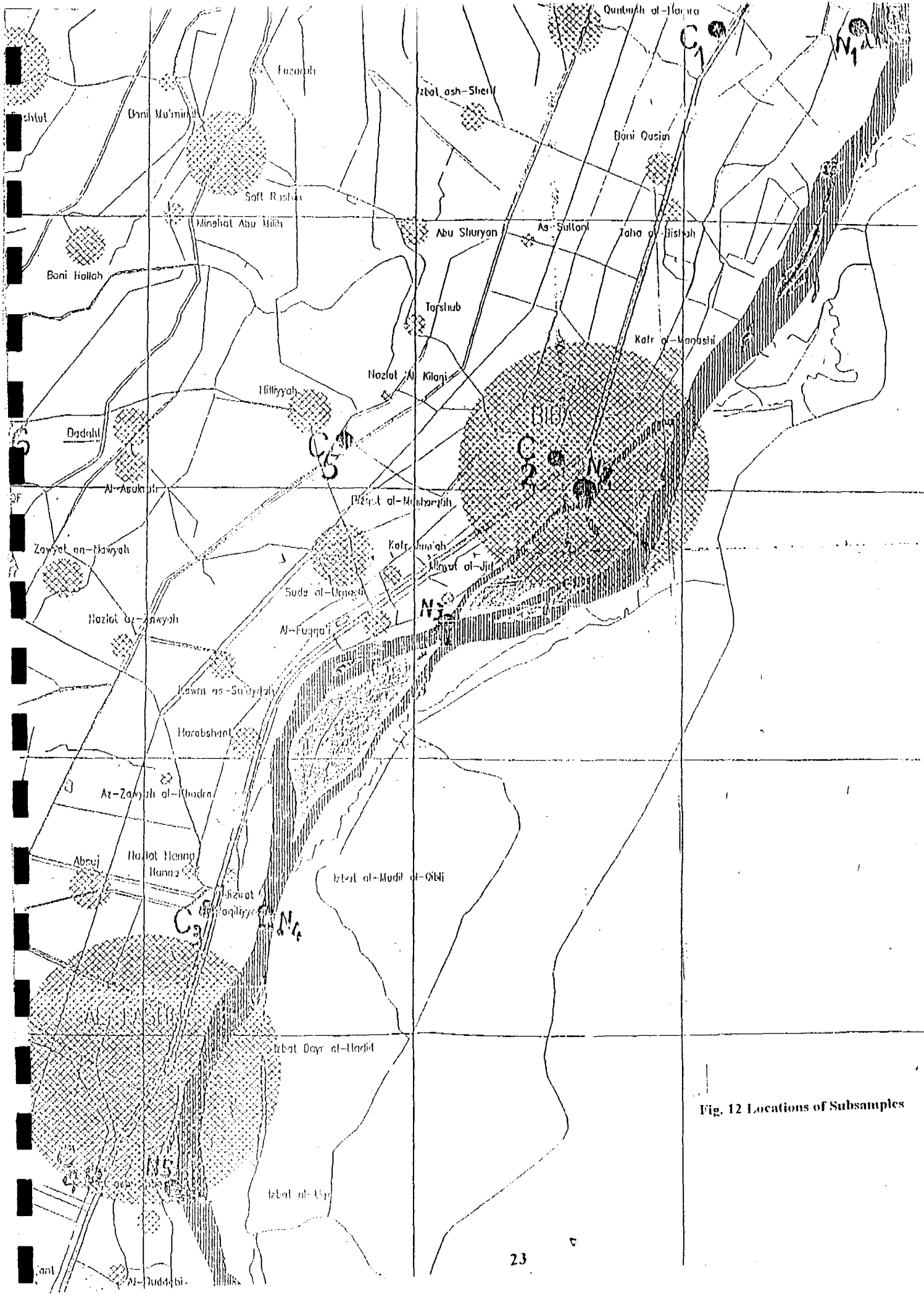


Fig. 12 Locations of Subsamples

. Electric conductivity. (in the field)
. pH.
. Hardness
. Alkalinity
. Carbonate
. Ca++
. Mg++
. Chloride
. Bicarbonate
. Nitrate
. Nitrite
. Fe++
. Mn++
. Ammonia.
. Total coliforms
. Algae content.

Table(5)Laboratory chemical analysis program (EL Fustat Laboratory .Cairo)

i. Physical analysis

.Temperature
.Turbidity.
.Color.
.Taste.
.Odor.

ii. Chemical analysis

. Electric Conductivity
. T.D.S.
. pH.
. Total alkalinity.
. Total Hard.
. K+, Na+ , Mg++, Ca++.
. $HCO3^{-}$, $CO3^{--}$, $SO4^{--}$.
. Nitrate.
. Nitrite.
. Total Chlorides.
. Copper.
. Lead.
. Fe++.
. Mn++.
. Ammonia.

iii. Bacteriological analysis

.Total and Shape of coliform col / 100 m

iv. **Biological analysis**

. Algae count. unit / ml

The results of chemical analysis of the samples which have been collected through the preliminary surface water monitoring program are given in **appendixes (1-9)** and have been compared with WHO recommendations and Egyptian standards.

3.2. WATER QUALITY

Based on these analysis the following topics will be discussed:

3.2.1. Physical Properties

The physical quality of all water samples at all locations follow the requirements of the Egyptian standards and WHO recommendations except turibidty and odor which consider the main problems in the physical properties

a. Turbidity & Odor

i. River Nile

Turbidity increase in the Beni Suef bridge direction gradually where it is 5 NTU to 20 NTU at *N1.1, *N1.2 and *N1.3 where this area characterize by island bars and also as the result of the bridge construction effect on the water velocity which cause braided effect as the result of sudden velocity decrease. Generally the season along which 1st phase of the monitoring program take place (August) represent the high water level, where, the River Nile bring its high load of silt to downstream but generally the Nile water turbidity increase in the bridge direction along the year. Also in the winter the strong rainstorm in the eastern plateau cause strong flood which bring fines from the upper plateau to increase the Nile water turbidity where, the turbidity some times reach to 500 NTU.

Also some locations are show unfavorable odor like N1.1*,N1.3,N3.1,N4,N5.1 and N5.3 that also due to the effect water plants (Nile rose) accumulation specially during the flood time in the August..

The rest of the Physical water properties are follow the Egyptian standards and WHO recommendations see **appendixes 1 table 1.5.**

ii. Ibrahemya and Branch Canals

Turbidity of the water does not meet the requirements of the Egyptian Standards or WHO recommendations along this periods (flood period) at all locations of El.Ibrahemya, Ganabiet Abu Hadeid, El Sultani, Bahr Youssef and the Upper land canal are not follow.

Where the turbidity rang from 10 NTU at El Fashen old intake C4** to 25 NTU at C5 and C7 .

Many irrigation canals samples show unfavorable odor vary from H_2S, grassy to waste odor see appendix 1. table 6,7 and 8. Where the grassy odor is due to the effect of flood that bring Nile Rose from the south, while the waste odor is due to sewage out falls and the H_2S odor is due the fermentation action of anaerobic bacteria .

iii. Bahr Youssef

The turbidity of the Bahr Youssef samples vary from 16 NTU at Y1 (El Sheik Abed compact unit intake) to 20 NTU at ***$Y2_{.1}$, $Y2_{.2}$ and Y3.

vi. Drains

Also the water turbidity of the drains samples do not meet the Egyptian standards or WHO recommendations at all locations, where it vary from 40 NUT at D1 to 13 NTU at D3.

The water odor of the drains samples vary from metal to grassy that is due to the growth of water plants and accumulation of algae colonies.

3.2.2. Chemical Properties

a. TDS

The (TDS) of the collected surface water samples are slimly varying in the River Nile and in the irrigation canals while it is widely difference along the drains.

i. River Nile

The (TDS) of the surface water in the Nile varying from 169 ppm at Beba new water intake N2.1 to 193.7 ppm at El Fashen new water intake N5.2.

ii. El Ibrahemia

The (TDS) of the surface water in the irrigation canal as following:

El Ibrahimiya canal : The TDS varying also slightly from 164.5 ppm at C1 (Bani Haron compact unit Intake) to 183.3 ppm at El Fashen old water station.

(Fig. 13) show the TDS profile along EL Ibrhimeya canal from N to S.

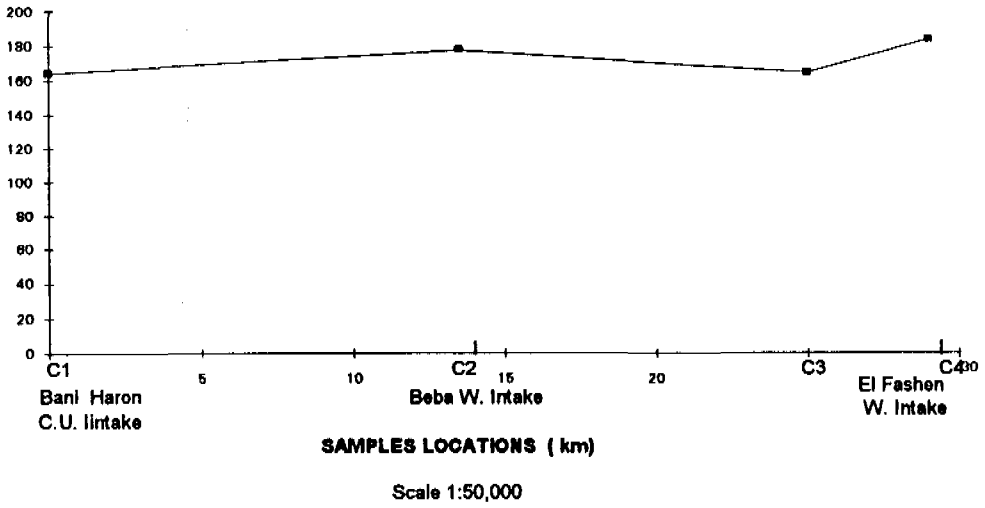


Fig. 13 TDS PROFILE IN IBRAHEMYA CANAL

iii. Bahr Youssef

The TDS varying along Bahr Youssef from 239.85 ppm at Y1 (EL Sheik Abed Compact Unit Intake) to 290 ppm at Y 2.1 and Y2.2 (Mazora compact unit intake and El Gendi bridge).

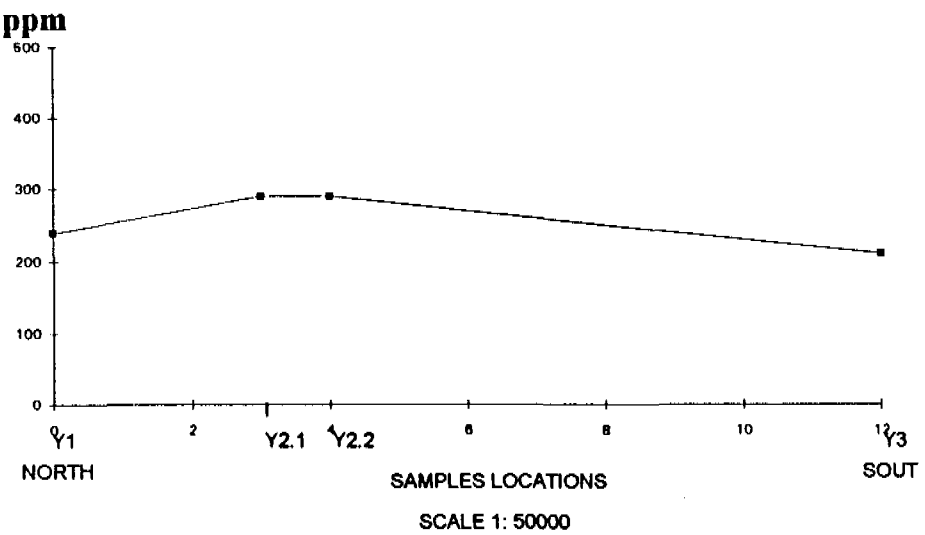


Fig. 14 TDS PROFILE IN BAHR YOUSSEF.

* N : Is the symbol of the Nile water samples
** C: Is the symbol of the canals water samples
*** Y: Is the symbol of Bahr Youssef water samples

All major components of the Ibrahimeya water samples(C1, C2, C3 and C4) are meet Egyp. stand. and WHO recommendations except NO_2^-, which reach 0.01ppm at C3.

- Other Irrig. Canals

Also NO_2^- reach 0.01 mg/l at C5, C6 and C7.

iii. Bahr Youssef.

All major components of Bahr Youssef water samples (Y1, Y2.1, Y2.2 and Y3) are meet the Egyp. stand. and WHO recommendations except NO_2^-, which reach 0.01 at Y2.2 and Y3.

iv. Drains

NO_2^- do not follow Egypt. stand or WHO. recommendations at D4 (0.01 mg/l).

*The presence of relatively high nitrite (NO_2^-) contend along these locations is from two sources one is of organic origin decay of organic remains) and the other from inorganic origin (dissolved amm. nitrite fertilizer).

c. Micro components (Trace Elemen) (Fe++ ,Mn++ ,Pb++, Cu++)

i. Nile River

Only two locations are not follow the Egyp. stand. (N3.1 and N4.2), where, Fe++ is 0.78 at N3.1 (Meniet El Gid) and Mn++ is 0.25 mg/l at N4.2.

ii. Ibrahemiya and Branch Canals

- Ibrahimeya Canal

The trace elements content of water samples from El Ibrahimeya canal are meet the Egypt. stand and WHO recomm. at all locations.

-Other canals

Fe++ is 1.3 mg/l at C5 (Abu Hadeid canal) and 2.14 at mg/l at C6 (El Sultani canal), while, Mn++ is 0.15 at C7 .

iii. Bahr Youssef

Fe++ is 0.78 mg/l at Y1 and is 0.6 at Y3, while is 0.25 mg/l at Y2.1.
The trace elements content of the water samples of Bahr Youssef are not meet the Egypt. stand. or WHO recomm.

iv. Drains

D1 and D2 where Fe++is 0.68 mg/l at D1, , while Mn++ is 0.15 at D and D2.

*The presence of iron and manganese in the canals and drains water is due to sewage outfalls and presence of high iron and manganese oxides in the soil.

d. Ion Dominance

The dominant ions in the water samples can be detected from the chemical analysis and hydrochemical formula.

i. Nile River and Canals

The water type in the Nile is Ca (HCO3)2 (Ovitchnkov Classification), Which is quite known for fresh surface water everywhere. The dominant anions in the Nile are in orders of HCO_3^{-} $>Cl^{-} > SO_4^{--}$. On the other hand, the dominant cations are mostly of the orders Ca++ > Na+ > Mg++.

ii. Bahr Youssef

The water type in Bahr youssef is Na HCO3 . The dominant anions in Bahr Youssef are in order of $HCO3^{-} > So4^{--} > Cl^{-}$. On the other hand, The dominant cations are in orders Na+>Ca++>Mg++.

iii. Drains

The water type of the sampled drains is Na_2SO_4 while, the dominant anions Na++>Ca++>Mg++.

e. Effect of The Reclaimed Area on The Surface Water Chemistry.

In order to study the effect of the reclaimed area on the concentration and behavior of the major ions in Bahr Youssef and El Ibrahimiya canal, 3 main were taken along Bahr Youssef and 4 samples from El Ibrahimiya where, these samples represent the southern, central and northern portions of the study area.

i. Bahr Youssef

The total dissolved solids (TDS) and the major ions increased towards the north due to the effect of the reclaimed area which located west El Fashen area .

The hypothetical salt combinations of surface water samples are namely :-

- Assemblage I: (Na+K)Cl, Na_2SO_4, $NaHCo_3$, $Mg(HCO_3)_2$, $Ca(HCO_3)_2$ which represents water samples of the south part of Bahr Youssef .
- Assemblage II: (Na+K) Cl, Na_2SO_4, Na_2SO_4, $MgSO_4$, $Mg(HCO_3)_2$, $Ca(HCO_3)_2$. which represents the water samples of the north part of Bahr Youssef

These changes in hypothetical salt combinations from assemblage I to II indicate effect of reclamation activities on the pollution of the surface water in Bahr Youssef e.g., the appearance of $MgSO_4$ in assemblage II instead of $NaHCO_3$ in assemblage I.

ii. El Ibrahimiya Canal

The total dissolved salts and the major ions are slightly change towards the north, due to the effect of leaching distance. With respect to the hypothetical salt combinations, the same salts along the profile from north to show no significant change, i.e., NaCl, Na2Cl , Na2SO4, Na HCO3, Mg(HCO3)2, Ca(HCO3)2.

f. Oil Nests

i. Nile River

All collected samples from Nile for oil contamination test (N2.1, N2.2, N5.1, N5.2) at Beba new intake and El Fashen new intake respectively gave +ve results and oil content vary from 0.9µg/l at N2.1 to 0.07 µg/l at N5.2.

ii. Ibrahimiya Canal

Three samples were collected for oil contaminated test along this canal, where, they represent the intakes of Bani Haroun compact unit, Biba old intake and El Fashen old intake and all the locations are contaminated where, oils content vary from 5.81 µg/l at Bani Haroun intake (C1) to 0.72 µg/l at Biba old intake C2, while C4 is 2.07 µg/l.

iii. Bahr Youssef

Only one sample was collected for oils contamination test at Y1 (EL Sheik Abed compact unit) and it is also oily contaminated where, the oil content is 0.37 µg/l.

iv. Drains

One representative sample was taken from El Moheit drain and also indicate the oily contamination, where, oil contamination is 2.07µg/l.

Thus oil contamination of the surface water consider as one of the most important sources of contamination which effect on the quality of surface water as a water supply source.

g. Pesticides and Herbicides

Nine samples were collected for pesticides and herbicides detection from the Nile, Irrigation canals, Bhar Youssef and the drains at certain points during the implementations of the 1st phase of monitoring program. pesticides were detected at one locations only along the study area, where it is N5.1 (Endrinketon) and its content is 0.264 µg/l.

3.2.3. Bacteriological analysis

Coliform bacteria are used as indictor organisms, where, their presence is a warning that pathogenic organisms may also present although these are not pathogenic, they are found in the intestinal tract of all warm.blood animals, so their presence is a warning that pathogenic organisms may also present.

i. River Nile

The bacteriological quality of all water samples at all locations does not meet the requirements of the Egyptian standards and WHO recommendations.

Where, the total coliform vary from 150 col/100 ml at $N3_{.3}$ to 1300 col/100 ml at $N2_{.3}$.

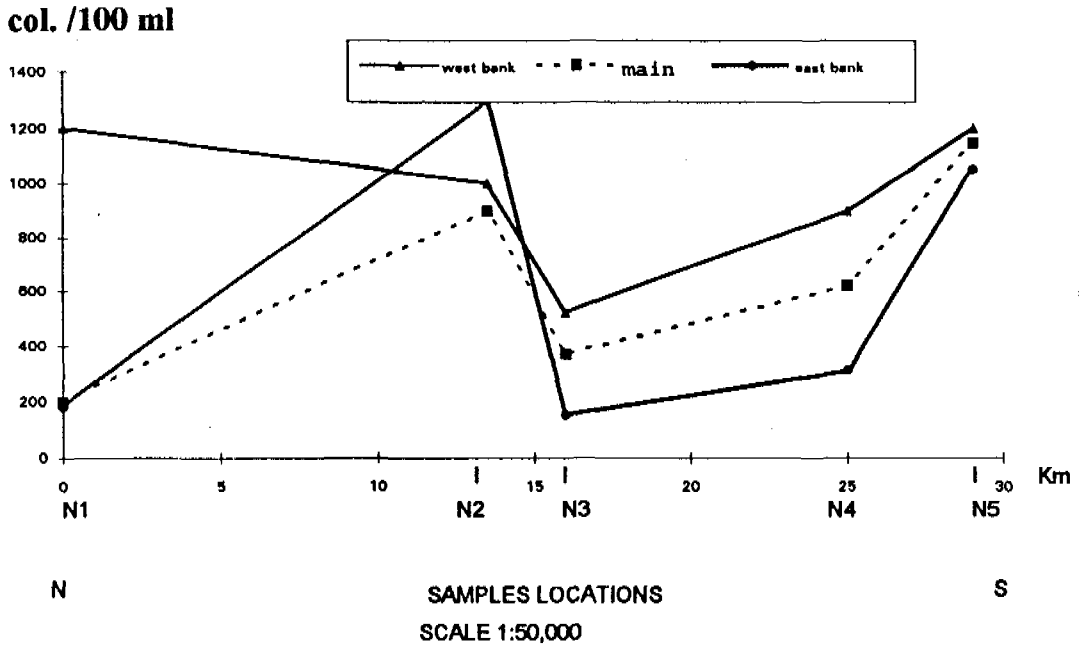


Fig .16 Bacterilogical profile along the Nile from N1 toN5.

ii. Irrigation Canals

The bacteriological quality of all water samples at all locations does not meet the requirements of the Egyptian standards and WHO recommendations. Where, the total coliform vary from 400 col/ 100 ml at C1 to 9400 col/100 ml.

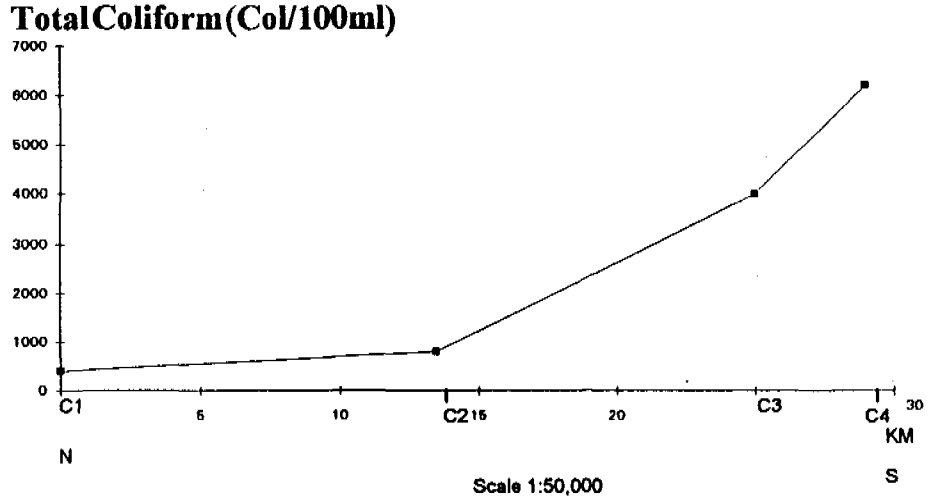


Fig. 17 Distribution of the total coliform along El Ibrahimiya canal from north to south .

iii. Bahr Youssef

The bacteriological quality of all water samples at all locations does not meet the requirements of the Egyptian standards and WHO recommendations. Where, the total coliform vary from 1800 col/100 ml at Y1 to 3000 col/100 ml at Y3. See **(fig. 18.)**

Total coliform (coli/100 ml)

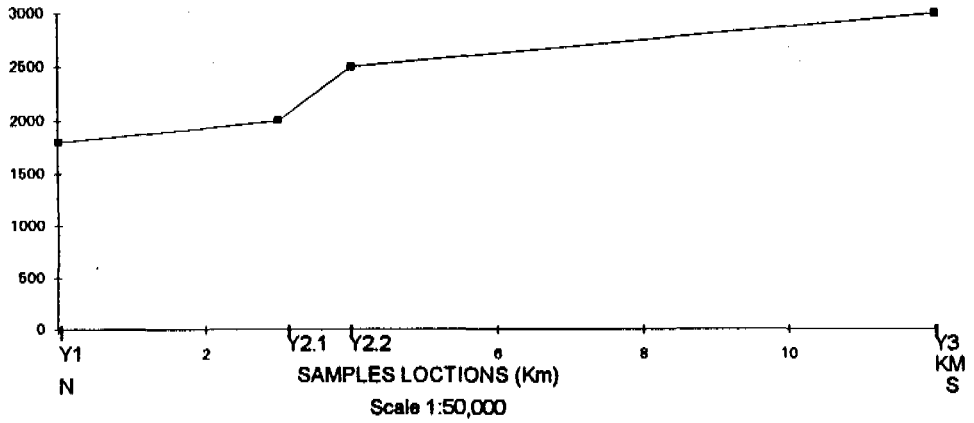


Fig.18 Distribution of the total coliform along Bahr Youssef from North to South

iv. Drains

The bacteriological quality of all water samples at all locations does not meet the requirements of the Egyptian standards and WHO recommendations. Where, the total coliform vary from 7200 col/100 ml at D2 to 10000 col/ 100 ml at D4.

* Generally the total coliform increase in the south direction where barrage, bridges and barrels barrier are found, which separate animals and plant remains that consider as the main nutrient sources for bacteria.

3.2.4. Biological Analysis

Although the presence of algae may be beneficial in the production of dissolved oxygen, too much produces blooms, which are extremely troublesome and can lead to eutrophication (slow death) of the body of water . Also when algae have reached the end of their growing season they die and provide a rich source organic material for bacteria. Thus all of these shall cause many problems for the intakes, filters, taste and odor in the finished water, where these problems are shown in many water stations specially in El Fashen old water station and the new water intake of El Fashen.

i. River Nile

The biological quality of all water samples at all locations does not meet the requirements of the Egyptian standards and WHO recommendations. Where, it vary from 5000 unit/ml at N2.1 to 114000 unit/ml at N5.1 (**fig. 19** show the distribution of the algae along River Nile.

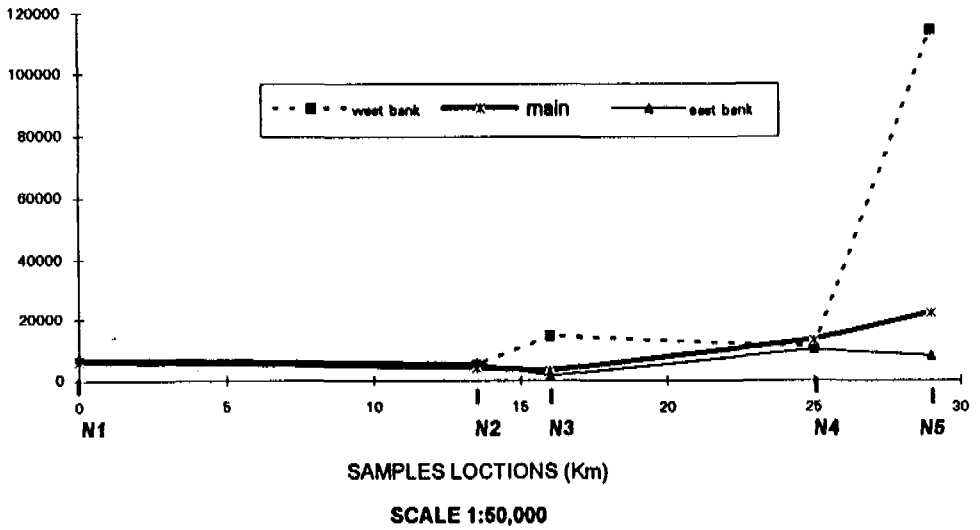


Fig. 19 Biological pollution by algae on the Nile River along the study area.

ii. Ibrahimeya and Branch Canals

- El Ibrahimeya

The biological quality of all water samples at all locations does not meet the requirements of the Egyptian standards and WHO recommendations, where there is general increase of algae cont. to the south direction where the content reach 600,000 unit /ml at El Fashen old intake **(fig. 20).**

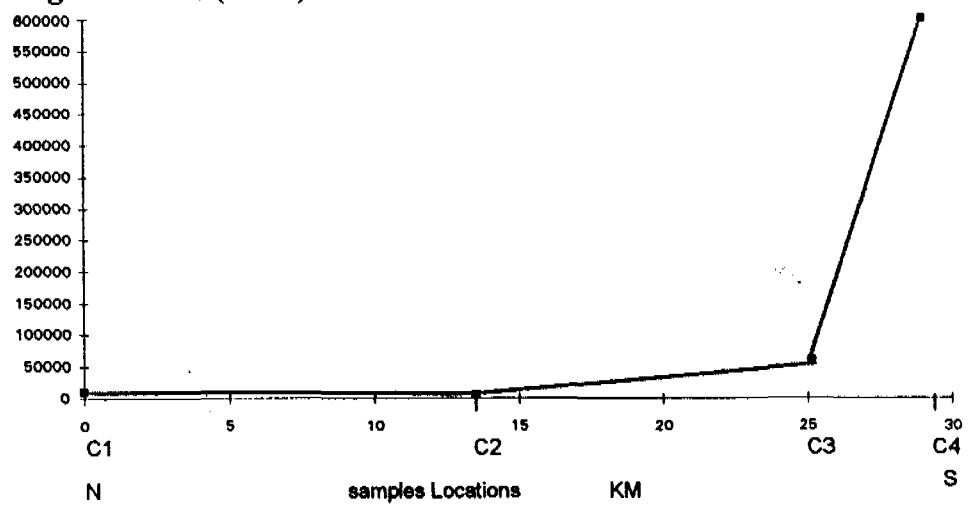


Fig.21 Algae profile along El Ibrahemiya canal

iii. Bahr Youssef

The biological quality of all water samples at all locations does not meet the requirements of the Egyptian standard and WHO recommendations, Where, there is general decrease from north to south as the results of the Mazoura barrage decrease the velocity of the water and this lead to accumulate the water plants, animal remains and of course algae. see **fig. 21**

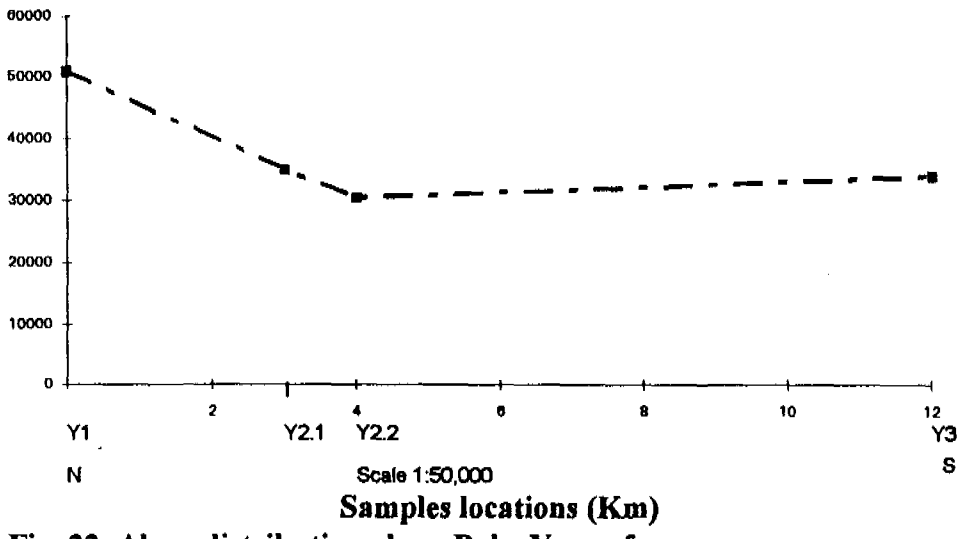


Fig. 22 Algae distribution along Bahr Youssef.

4. EVALUATION OF THE SURFACE WATER QUALITY FOR DOMESTIC PURPOSE

Depending on all collected data, different phases of the surface water sampling program along the study area, data representation and analysis and study of the hydrologic system of the main streams, we can divide the surface water resources of the study area from "QUALITY " point of view as following ;

4.1. RIVER NILE

i. TDS ranges from 170 to 200 ppm.

ii. Total Hardness 100 to 135 ppm.

iii. Types of contaminates:

- Algae
- Coliform bacteria.
- Oil nests

iv. The water type in the Nile is Ca $(HCO_3)_2$ (Ovitchnkov Classification), which is quite known for fresh surface water everywhere.

v. The dominant anions in the Nile are in orders of $HCO_3^- > Cl^- > SO_4^{--}$. On the other hand, the dominant cations are mostly of the orders Ca++ > Na+> Mg++.

vi. The water quality of the Nile follow WHO recomm. and Egyptian Stand. from the chemical point of view but the main problems are turbidity, biological and bacteriological contamination which make the treatment plant more difficult from the coagulation, filtration and disinfection points of view.

vii. The water samples which have been collected from Nile consider as excellent to good resource for potable water.

4.2. EL IBRAHEMIYA CANAL

i. The TDS ranges from 170 to 270 ppm.

ii. Total hardness ranges from 100 to 140 ppm.

iii. The main contaminates are:
- algae
- coliform bacteria
-water plants (Nile Rose),
-NH_3^- , NO_2^- and oil nests.

iv. The water type is Ca $(HCO_3)_2$.

v. The dominant anions in El Ibrahemiya canal are in orders of $HCO_3^- > Cl^- > SO_4$. On the other hand, the dominant cations are mostly of the orders Ca++ > Na+ > Mg++.

vi. The main problems which meet the water plants and compact unit which have their intakes on these canals is due to accumulation of the plants and animals remains, industrial outfalls, sewage outfalls and high algae specially in the summer. So, all these problems increase the cost of treatment and decrease the water quality specially that from compact units have not the possibility of removal oil nests or chemical contaminates, also the water plants are very old fashion stations and have not any modern technique to deal with chemical contaminates, where four stages of treatment are take place along these stations (natural aeration, coagulation, filtration and disinfection) and have not professional technicians staff or laboratory staff for treatment, sampling and monitoring.

vii. The water samples which have been collected from this canals are good to permissible.

4.3. BAHR YOUSSEF

i. The TDS ranges from 210 to 300

ii. Total hardness ranges from 140 to 160 ppm.

iii. The main contaminates are:
- Algae
- Coliform bacteria
- Water plants (Nile Rose)
- NH_3^- , NO_2^- , Fe++ and oil nests.

iv. The water type is Na HCO_3.

v. The dominant anions in El Ibrahemiya canal are in orders of $HCO_3^- > Cl^- > SO_4^-$. On the other hand, the dominant cations are mostly of the orders Na+>Ca++ > Mg++ in the southern part, but as the result of reclamation activities in the south west part contamination take place in the north part of Bahr Youssef and the dominant anions became $SO_4^{--} > HCO_3^- > Cl^-$. On the other hand, the dominant cations are mostly of the orders Na+> Mg++ >Ca++.

vi. Beside the pervious contaminates the miner metals (Fe++ & Mn++) are of relatively high content in some locations specially beside El Sheik Abed C.U. intake (Fe++ is 0.75 ppm and Mn++ is 0.25), that is due the high content of these elements as ore minerals in the soil this area and also due to the sewage outfalls which distributed along both sides of Bahr Youssef to the degree that the water quality is not suitable for potable purposes till after coagulation, filtration and disinfection through many compact units .

vii. The water samples which have been collected from Bahr Youssef are permissible and need relatively high cost for treatment to reach the potable water quality standards (WHO Recomm. and /or Egy. stand.)

4.4. Drains

i. The TDS ranges from 420 ppm east Bahr Youssef drains specially (El Moheit drain) to 5000 ppm in the intercept drains of new cultivated land west Bahr Youssef.

ii. Total hardness ranges from 300 ppm in the drains of the eastern bank to 1100 ppm in the intercept drains of new cultivated land .

iv. The water type is Na_2SO_4 in the drains east Bahr Youssef, while it is NaCl in the drains of west Bahr Youssef.

v. The dominant anions in El Ibrahemiya canal are in orders of HCO_3^- > Cl^- > SO_4^{--}. On the other hand, the dominant cations are mostly of the orders Ca++ > Na+ > Mg++.

vi. The dominant anions in the drains water east Bahr Youssef are $SO4^{--}$ > Cl^- > $HCO3^-$ and the main dominant cations are Na+ > Ca++ > Mg++. While that in the western bank and reclaimed land are Cl^- > $SO4^{--}$ > $HCO3^-$ and the main dominant cations are Na+ > Ca++ > Mg++.

vii. All the water samples which are collected from drains are unsuitable as resource for potable water from quality point of view.

4.4. Drains

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ii. Total hardness ranges from 300 ppm in the drains of the eastern bank to 1100 ppm in the intercept drains of new cultivated land .

iv. The water type is Na_2SO_4 in the drains east Bahr Youssef, while it is NaCl in the drains of west Bahr Youssef.

v. The dominant anions in El Ibrahemiya canal are in orders of HCO_3^- > Cl^- > SO_4^{--}. On the other hand, the dominant cations are mostly of the orders Ca++ > Na+ > Mg++.

vi. The dominant anions in the drains water east Bahr Youssef are $SO4^{--}$ > Cl^- > $HCO3^-$ and the main dominant cations are Na+ > Ca++ > Mg++ . While that in the western bank and reclaimed land are Cl^- > $SO4^{--}$ > $HCO3^-$ and the main dominant cations are Na+ > Ca++ > Mg++ .

vii. All the water samples which are collected from drains are unsuitable as resource for potable water from quality point of view.

TIME SCHEDULE AND TECHINQUE OF SURFACE WATER SAMPLING PROGRAM.

Sampling order (No.)	Sampling date	Sampling site	Sampling location	Transportation and driver	Sampling staff	Sampling preparation	Analyses of samples	Comments
11	4.8.1996	N1/ The Nile	Bani Haron site	Two Priv. cars	SST,CHE, Ashraf	Boat, bailer	Sumusta lab.	from other side of Nile
12	4.8.1996	N1/ The Nile	Bani Haron site	Two Priv. cars	SST,CHE, Ashraf	Boat, bailer	Sumusta lab.	from other side of Nile
13	4.8.1996	N1/ The Nile	Bani Haron site	Two Priv. cars	SST,CHE, Ashraf	Boat, bailer	Sumusta lab.	from other side of Nile
14	4.8.1996	C5/Abu Hadid canal	On the Sumusta road	Two Priv. cars	SST,CHE, Ashraf	bailer	Sumusta lab.	1 sample
15	6.8.1996	N2/ The Nile	Beba new water plant	Two Priv. cars	SST,CHE, Ashraf	Boat, bailer	Sumusta + Cairo lab.	from other side of Nile
16	6.8.1996	N2/ The Nile	Beba new water plant	Two Priv. cars	SST,CHE, Ashraf	Boat, bailer	Sumusta + Cairo lab.	from other side of Nile
17	6.8.1996	C2/The intake bridge	Beba old water station	Two Priv. cars	SST,CHE, Ashraf	bailer	Sumusta + Cairo lab.	1 sample
18	6.8.1996	C1/El Ebrahemia	Bani Haron/ the miller	Two Priv. cars	SST,CHE, Ashraf	Bailer	Sumusta + Cairo lab.	1 sample
19	8.8.1996	N3/ The Nile	Minyat Aol Jid	Two Priv. cars	SST,CHE, Ashraf	Boat/bailer	Sumusta lab.	1 sample
20	8.8.1996	N3/ The Nile	Minyat Aol Jid	Two Priv. cars	SST,CHE, Ashraf	Boat/bailer	Sumusta lab.	1 sample
21	8.8.1996	Y3/ Dilhanis bridge	Dilhanis site	Two Priv. cars	SST,CHE, Ashraf	Boat/bailer	Sumusta lab.	1 sample
22	8.8.1996	D3/Dilhanis drain	Dilhanis site	Two Priv. cars	SST,CHE, Ashraf	bailer	Sumusta lab.	1 sample

APPENDIX 1

Sample No.	Sampling Date	Sampling site	Sampling	Transportation		Sampling	Analysis	
23	11.8.1996	N4/The Nile	El Waqiliyya	Two Priv. cars	SST,CHE, Ashraf	Boat/ bailer	Sumusta lab.	1 sample
24	11.8.1996	N4/The Nile	El Waqiliyya	Two Priv. cars	SST,CHE, Ashraf	Boat/ bailer	Sumusta lab.	1 sample
25	11.8.1996	N4/The Nile	El Waqiliyya	Two Priv. cars	SST,CHE, Ashraf	Boat/ bailer	Sumusta lab.	1 sample
26	11.8.1996	C3/ El Ebrahemia	El Waqiliyya	Two Priv. cars	SST,CHE, Ashraf	Boat/ bailer	Sumusta lab.	1 sample
27	13.8.1996	N5/ The Nile	El Fashen new water plant	Two Priv. cars	SST,CHE, Ashraf	Boat/ bailer	Sumusta + Cairo lab.	1 sample
28	13.8.1996	N5/ The Nile	El Fashen new water plant	Two Priv. cars	SST,CHE, Ashraf	Boat/ bailer	Sumusta + Cairo lab.	1 sample
29	13.8.1996	N5/ The Nile	El Fashen new water plant	Two Priv. cars	SST,CHE, Ashraf	Boat/ bailer	Sumusta lab.	1 sample
30	13.8.1996	C4/ The intake bridge	El Fashen old water station	Two Priv. cars	SST,CHE, Ashraf	Bailer	Sumusta + Cairo lab.	1 sample
31	15.8.1996	Y1/ Bahar Youssef	El Sheik Abed site	Two Priv. cars	SST,CHE, Ashraf	Boat/bailer	Sumusta + Cairo lab.	1 sample
32	15.8.1996	D2/El Moheit drain	Mazoura site	Two Priv. cars	SST,CHE, Ashraf	Bailer	Sumusta + Cairo lab.	1 sample
33	15.8.1996	C7/ Upper land canal	Elgabal way mazoura	Two Priv. cars	SST,CHE, Ashraf	Bailer	Sumusta lab.	1 sample
34	15.8.1996	C6/El Sultani drain	Sumusta garden	Two Priv. cars	SST,CHE, Ashraf	Bailer	Sumusta lab.	1 sample
35	18.8.1996	D1/ Abo Shosha drain	El Sheik Abed station	Two Priv. cars	SST,CHE, Ashraf	Bailer	Sumusta lab.	1 sample
36	18.8.1996	D4/ Elbahary drain	Mazoura site	Two Priv. cars	SST,CHE, Ashraf	Bailer	Sumusta lab.	1 sample
37	18.8.1996	Y2/Bahar youssef	El gendi bridge	Two Priv. cars	SST,CHE, Ashraf	Bailer	Sumusta lab.	1 sample
38	18.8.1996	Y2/Bahar youssef	El gendi bridge	Two Priv. cars	SST,CHE, Ashraf	Bailer	Sumusta lab.	1 sample

REGIONAL WATER SUPPLY & SANITATION PROJECT IN BENI SEUF GOVERNORATE

RESULTS OF WATER QUALITY ANALYSES for SECTOR PLAN

Laboratory :SUMUSTA lab.

Site :Surface water sites(BANI HARON village-the -nile)

Sampling locations :1)BANI SOLIMAN village N1-1
2)" " " " " " " N1-2
3)" " " " " " " N1-3

Sampling date :4/8/96

Samples analyzed :4/8/96

Parameter NO. Lab. NO.	1	2	3	LAB.
Color 00 TCU	5	5	5	sumusta lab
Taste (descrip.)	---------	---------	--------	ELFUSTAT lab.
Odor (descrip.)	grassy	odorless	fishy	Sumusta lab.
pH 00.0	8.566	8.47	8.361	Sumusta lab.
Temperatur e y00.0	26	28	28	in the field
Turbidity NTU 0-10 0.0 10-40 00	20.0	10.0	11.00	Sumusta lab.
TDS mg/l 0000	---------	--------	--------	ELFUSTAT lab.
Conduct. uS/cm 0000	320	310	310	in the field
Hardness CaCO3 mg/l 000	117.0	112	106.0	Sumusta lab.

Alkalinity CaCO3 mg/l 000	138.0	138	142.6	Sumusta lab.
Ammonia NH4 mg/l 00.0	0.05	0.16	nil	Sumusta lab.
Carbonate CaCO3 mg/l 00.0	4.7691	3.8242	3.0754	Sumusta lab.
Calcium mg/l 00.0	27.78	26.0	24.7	Sumusta lab.
Chloride mg/l 000	11.9	11.4	11.4	Sumusta lab.
Bicarbonat e CaCO3 mg/l 00.0	137.81594	137.852	142.4852	Sumusta lab.
Iron mg/l <1 0.00 >1 00.0	nil	nil	nil	Sumusta lab.
Mang. mg/l <1 0.00 >1 00.0	nil	nil	nil	Sumusta lab.
Sulphate SO4 mg/l 000	---------	--------	---------	ELFUSTAT lab.
Nitrate NO3 mg/l 00.0	0.1	0.1	0.08	Sumusta lab.
Nitrite NO2 mg/l 0-1 0.00 >1 00.0	nil	nil	nil	Sumusta lab.
Magnesium mg/l 00.0	11.6	11.5	10.8	Sumusta alb.
Sodium mg/l 00.0	---------	---------	--------	ELFUSTAT lab.
Potassium mg/l 00.0	----------	---------	--------	ELFUSTAT lab.
Copper ppm 00.0	----------	---------	--------	ELFUSTAT lab.
Lead ppb 00.0	---------	---------	---------	ELFUSTAT lab.

Phosphates mg/l 00.0	----------	--------	----------	ELFOUSTAT lab.
Oils mg/l 00.0	----------	--------	----------	ELFUSTAT lab.
Pesticides mg/l 00.0	----------	--------	---------	ELFUSTAT lab.
Herbicides mg/l 00.0	---------	-------	---------	ELFUSTAT lab.
Algae count unit/ml	6250	6030	7300	Sumusta lab.
Total coliform col/100 ml	1200	200	180	Sumusta lab.

------- not tested

APPENDIX 3

REGIONAL WATER SUPPLY & SANITATION PROJECT IN BENI SEUF GOVERNORATE

RESULTS OF WATER QUALITY ANALYSES for SECTOR PLAN

Laboratory :SUMUSTA lab.

Site :Surface water sites(the nile)

Sampling locations :1)BEBA new water station N2-1
2)" " " " " " " " N2-2

Sampling date :6/8/96

Samples analyzed :6/8/96

Parameter NO. Lab. NO.	1/5 cairo	2/6 cairo		LAB.
Color 00 TCU	5	5		sumusta lab
Taste (descrip.)	acceptable	acceptable		ELFUSTAT lab.
Odor (descrip.)	odorless	odorless		Sumusta lab.
pH 00.0	8.366	8.345		Sumusta lab.
Temperatur e 00.0	25	25.0		in the field
Turbidity NTU 0-10 0.0 10-40 00	7.5	6.5		Sumusta lab.
TDS mg/l 0000	170.90	169.00		ELFUSTAT lab.
Conduct. uS/cm 0000	300	280		in the field
Hardness CaCO3 mg/l 000	128	144.0		Sumusta lab.
Alkalinity CaCO3 mg/l 000	138	138		Sumusta lab.

Ammonia NH4 mg/l 00.0	0.25	nil		Sumusta lab.
Carbonate CaCO3 mg/l 00.0	3.0105	2.8685		Sumusta lab.
Calcium mg/l 00.0	27.8	24.7		Sumusta lab.
Chloride mg/l 000	17.90	17.9		Sumusta lab.
Bicarbonat e CaCO3 mg/l 00.0	137.8839	137.8893		Sumusta lab.
Iron mg/l <1 0.00 >1 00.0	nil	0.2		Sumusta lab.
Mang. mg/l <1 0.00 >1 00.0	nil	nil		Sumusta lab.
Sulphate SO4 mg/l 000	14.00	13.00		ELFUSTAT lab.
Nitrate NO3 mg/l 00.0	0.1	0.09		Sumusta lab.
Nitrite NO2 mg/l 0-1 0.00 >1 00.0	nil	nil		Sumusta lab.
Magnesium mg/l 00.0	14.3	20.02		Sumusta alb.
Sodium mg/l 00.0	18.00	17.00		ELFUSTAT lab.
Potassium mg/l 00.0	7.36	5.00		ELFUSTAT lab.
Copper ppm 00.0	<0.01	<0.01		ELFUSTAT lab.
Lead ppb 00.0	8.60	4.40		ELFUSTAT lab.
Phosphates mg/l 00.0	0.0003	0.0004		ELFOUSTAT lab.

Oils ug/l 00.0	0.9	0.29		ELFUSTAT lab.
Pesticides ug/l 00.0	ND	ND		ELFUSTAT lab.
Herbicides mg/l 00.0	ND	ND		ELFUSTAT lab.
Total coliform col/100 ml	1000	1300		Sumusta lab.
Algae count unit/ml	5000			Sumusta lab.

------ not tested
ND not detected at or above the method reporting limit.

APPENDIX 4

REGIONAL WATER SUPPLY & SANITATION PROJECT IN BENI SEUF GOVERNORATE

RESULTS OF WATER QUALITY ANALYSES for SECTOR PLAN

Laboratory :SUMUSTA lab.

Site :Surface water sites(the nile)

Sampling locations :1)MENIA AL GAID N3-1
2)" " " " " N3-2

Sampling date :8/8/96

Samples analyzed :8/8/96

Parameter NO. Lab. NO.	1	2		LAB.
Color 00 TCU	5	5		sumusta lab
Taste (descrip.)	----------	----------		ELFUSTAT lab.
Odor (descrip.)	grassy	odorless		Sumusta lab.
pH 00.0	8.123	8.21		Sumusta lab.
Temperatur e 00.0	27.1	26.0		in the field
Turbidity NTU 0-10 0.0 10-40 00	6.0	5.9		Sumusta lab.
TDS mg/l 0000	--------	--------		ELFUSTAT lab.
Conduct. uS/cm 0000	320	300		in the field
Hardness CaCO3 mg/l 000	152	128.0		Sumusta lab.
Alkalinity CaCO3 mg/l 000	138	135.7		Sumusta lab.

Ammonia NH4 mg/l 00.0	nil	nil		Sumusta lab.
Carbonate CaCO3 mg/l 00.0	1.7211	2.0687		Sumusta lab.
Calcium mg/l 00.0	27.8	27.8		Sumusta lab.
Chloride mg/l 000	12.9	12.9		Sumusta lab.
Bicarbonat e CaCO3 mg/l 00.0	137.9336	135.6189		Sumusta lab.
Iron mg/l <1 0.00 >1 00.0	0.78	0.2		Sumusta lab.
Mang. mg/l <1 0.00 >1 00.0	nil	nil		Sumusta lab.
Sulphate SO4 mg/l 000	--------	---------		ELFUSTAT lab.
Nitrate NO3 mg/l 00.0	0.1	0.06		Sumusta lab.
Nitrite NO2 mg/l 0-1 0.00 >1 00.0	nil	nil		Sumusta lab.
Magnesium mg/l 00.0	20.1	14.3		Sumusta alb.
Sodium mg/l 00.0	--------	--------		ELFUSTAT / lab.
Potassium mg/l 00.0	---------	-------		ELFUSTAT lab.
Copper ppm 00.0	---------	---------		ELFUSTAT lab.
Lead ppb 00.0	---------	---------		ELFUSTAT lab.
Phosphates mg/l 00.0	----------	---------		ELFOUSTAT lab.

Oils ug/l 00.0	---------	---------		ELFUSTAT lab.
Pesticides ug/l 00.0	---------	----------		ELFUSTAT lab.
Herbicides mg/l 00.0	---------	---------		ELFUSTAT lab.
Total coliform col/100 ml	520	150		Sumusta lab.
Algae count unit/ml	14500	15000		Sumusta lab.

------ not tested

REGIONAL WATER SUPPLY & SANITATION PROJECT IN BENI SEUF GOVERNORATE

RESULTS OF WATER QUALITY ANALYSES for SECTOR PLAN

Laboratory :SUMUSTA lab.

Site :Surface water sites(the nile)

Sampling locations :1)ELWAQULIA village N4-1
2)" " " " " " N4-2
3)" " " " " " N4-3

Sampling date :11/8/96

Samples analyzed :11/8/96

Parameter NO. Lab. NO.	1	2	3	LAB.
Color 00 TCU	5	10	5	sumusta lab
Taste (descrip.)	---------	----------		ELFUSTAT lab.
Odor (descrip.)	grassy	grassy	grassy	Sumusta lab.
pH 00.0	8.04	8.116	8.064	Sumusta lab.
Temperatur e 00.0	28.0	27.4	26.9	in the field
Turbidity NTU 0-10 0.0 10-40 00	5.5	7.5	6.0	Sumusta lab.
TDS mg/l 0000	--------	--------	--------	ELFUSTAT lab.
Conduct. uS/cm 0000	320	310	310	in the field
Hardness CaCO3 mg/l 000	96	100.8	99.2	Sumusta lab.
Alkalinity CaCO3 mg/l 000	128.8	135.7	128.8	Sumusta lab.

Ammonia NH4 mg/l 00.0	nil	nil	nil	Sumusta lab.
Carbonate CaCO3 mg/l 00.0	1.3269	1.6661	1.4023	Sumusta lab.
Calcium mg/l 00.0	26.0	27.8	26.54	Sumusta lab.
Chloride mg/l 000	12.9	10.92	11.91	Sumusta lab.
Bicarbonat e CaCO3 mg/l 00.0	128.7452	135.6347	128.7421	Sumusta lab.
Iron mg/l <1 0.00 >1 00.0	nil	nil	nil	Sumusta lab.
Mang. mg/l <1 0.00 >1 00.0	nil	0.25	nil	Sumusta lab.
Sulphate SO4 mg/l 000	--------	---------	---------	ELFUSTAT lab.
Nitrate NO3 mg/l 00.0	nil	nil	nil	Sumusta lab.
Nitrite NO2 mg/l 0-1 0.00 >1 00.0	nil	nil	nil	Sumusta lab.
Magnesium mg/l 00.0	7.6	7.65	8.0	Sumusta alb.
Sodium mg/l 00.0	--------	--------	--------	ELFUSTAT lab.
Potassium mg/l 00.0	---------	-------	----------	ELFUSTAT lab.
Copper ppm 00.0	---------	---------	---------	ELFUSTAT lab.
Lead ppb 00.0	---------	---------	---------	ELFUSTAT lab.
Phosphates mg/l 00.0	----------	---------	---------	ELFOUSTAT lab.

Oils ug/l 00.0	---------	---------	---------	ELFUSTAT lab.
Pesticides ug/l 00.0	---------	----------	----------	ELFUSTAT lab.
Herbicides mg/l 00.0	---------	---------	---------	ELFUSTAT lab.
Total coliform col/100 ml	900	620	310	Sumusta lab.
Algae count unit/ml	11000	13000	10000	Sumusta lab.

------ not tested

APPENDIX 6

REGIONAL WATER SUPPLY & SANITATION PROJECT IN BENI SEUF GOVERNORATE

RESULTS OF WATER QUALITY ANALYSES for SECTOR PLAN

Laboratory :SUMUSTA lab.

Site :Surface water sites(the nile)

Sampling locations :1)EL FASHEN new water plant N5-1
2)" " " " " " " " N5-2
3)" " " " " " " " N5-3

Sampling date :13/8/96

Samples analyzed :13/8/96

Parameter NO. Lab. NO.	1/9 Cairo	2/10 Cairo	3	LAB.
Color 00 TCU	5	5	<5	sumusta lab
Taste (descrip.)	acceptable	acceptable	--------	ELFUSTAT lab.
Odor (descrip.)	grassy	0d0rless	fishy	Sumusta lab.
pH 00.0	7.896	8.05	8.043	Sumusta lab.
Temperatur e 00.0	23.3	23.1	22.7	in the field
Turbidity NTU 0-10 0.0 10-40 00	5.0	4.5	4.5	Sumusta lab.
TDS mg/l 0000	193.7	192.0	--------	ELFUSTAT lab.
Conduct. uS/cm 0000	300	290	290	in the field
Hardness CaCO3 mg/l 000	132.8	123.2	123.2	Sumusta lab.
Alkalinity CaCO3 mg/l 000	140.3	133.4	133.5	Sumusta lab.

Ammonia NH4 mg/l 00.0	nil	nil	nil	Sumusta lab.
Carbonate CaCO3 mg/l 00.0	1.0377	1.4063	1.3849	Sumusta lab.
Calcium mg/l 00.0	27.16	25.92	24.69	Sumusta lab.
Chloride mg/l 000	10.92	12.9	10.92	Sumusta lab.
Bicarbonat e CaCO3 mg/l 00.0	140.2606	133.3438	133.4448	Sumusta lab.
Iron mg/l <1 0.00 >1 00.0	0.161	nil	nil	Sumusta lab.
Mang. mg/l <1 0.00 >1 00.0	nil	0.05	0.0	Sumusta lab.
Sulphate SO4 mg/l 000	14.5	14.5	---------	ELFUSTAT lab.
Nitrate NO3 mg/l 00.0	nil	nil	0.05	Sumusta lab.
Nitrite NO2 mg/l 0-1 0.00 >1 00.0	0.0	0.0	0.0	Sumusta lab.
Magnesium mg/l 00.0	15.43	14.22	14.97	Sumusta alb.
Sodium mg/l 00.0	19.7	19.7	--------	ELFUSTAT lab.
Potassium mg/l 00.0	6.6	4.7	----------	ELFUSTAT lab.
Copper ppm 00.0	<0.01	<0.01	---------	ELFUSTAT lab.
Lead ppb 00.0	14.1	10.10	---------	ELFUSTAT lab.
Phosphates mg/l 00.0	0.01	0.012	---------	ELFOUSTAT lab.

Oils ug/l 00.0	0.22	0.07	---------	ELFUSTAT lab.
Pesticides ug/l 00.0	ND/0.264 ENDRINKETON	ND	----------	ELFUSTAT lab.
Herbicides mg/l 00.0	ND	ND	---------	ELFUSTAT lab.
Total coliform col/100 ml	1200	1150	1050	Sumusta lab.
Algae count unit/ml	114000	22100	8000	Sumusta lab.

------ not tested
------- not detected at or aboe the method reporting limit.

REGIONAL WATER SUPPLY & SANITATION PROJECT IN BENI SEUF GOVERNORATE

RESULTS OF WATER QUALITY ANALYSES for SECTOR PLAN

Laboratory :SUMUSTA lab.

Site :Surface water sites(ELEBRAHEIMIA canal)

Sampling locations :1)BANI HARON compact unit intake C1
2)BEBA old water plant(bridge) C2
3)ELWAQUILIA village C3

Sampling date :6/8/96

Samples analyzed :6/8/96

Parameter NO. Lab. NO.	1/8 CAIRO	2/7 CAIRO	3	LAB.
Color 00 TCU	5	5	5	sumusta lab.
Taste (descrip.)	acceptable	acceptable	---------	ELFUSTAT lab.
Odor (descrip.)	odorless	H2S	odorless	Sumusta lab.
pH 00.0	8.054	8.198	7.967	Sumusta lab.
Temperatur e 00.0	25.0	25.0	26.6	in the field
Turbidity NTU 0-10 0.0 10-40 00	15.0	16.0	15.0	Sumusta lab.
TDS mg/l 0000	164.5	177.5	--------	ELFUSTAT lab.
Conduct. uS/cm 0000	300	285	300	in the field
Hardness CaCO3 mg/l 000	126.4	120.0	96.0	Sumusta lab.
Alkalinity CaCO3 mg/l 000	138	128.8	131.1	Sumusta lab.

Ammonia NH4 mg/l 00.0	0.13	0.25	0.01	Sumusta lab.
Carbonate CaCO3 mg/l 00.0	1.4683	1.9089	1.1418	Sumusta lab.
Calcium mg/l 00.0	23.5	21.6	27.16	Sumusta lab.
Chloride mg/l 000	20.85	17.87	10.92	Sumusta lab.
Bicarbonat e CaCO3 mg/l 00.0	137.9434	128.7211	131.0537	Sumusta lab.
Iron mg/l <1 0.00 >1 00.0	nil	0.02	0.16	Sumusta lab.
Mang. mg/l <1 0.00 >1 00.0	nil	nil	nil	Sumusta lab.
Sulphate SO4 mg/l 000	14.8	17.00	---------	ELFUSTAT lab.
Nitrate NO3 mg/l 00.0	0.2	0.3	0.22	Sumusta lab.
Nitrite NO2 mg/l 0-1 0.00 >1 00.0	nil	nil	0.01	Sumusta lab.
Magnesium mg/l 00.0	16.5	16.1	7.985	Sumusta alb.
Sodium mg/l 00.0	17.7	20.0	--------	ELFUSTAT lab.
Potassium mg/l 00.0	5.0	4.86	----------	ELFUSTAT lab.
Copper ppm 00.0	<0.01	<0.01	---------	ELFUSTAT lab.
Lead ppb 00.0	12.5	10.0	---------	ELFUSTAT lab.
Phosphates mg/l 00.0	0.023	0.0149	---------	ELFOUSTAT lab.

Oils ug/l 00.0	5.81	0.72	---------	ELFUSTAT lab.
Pesticides ug/l 00.0	ND	ND	----------	ELFUSTAT lab.
Herbicides mg/l 00.0	ND	ND	---------	ELFUSTAT lab.
Total coliform col/100 ml	400	800	4000	Sumusta lab.
Algae count unit/ml	10000	7000	54100	Sumusta lab.

------ not tested
ND not detected at or above the method reporting limit

REGIONAL WATER SUPPLY & SANITATION PROJECT IN BENI SEUF GOVERNORATE

RESULTS OF WATER QUALITY ANALYSES for SECTOR PLAN

Laboratory :SUMUSTA lab.

Site :Surface water sites(canals)

Sampling locations :1)ELFASHEN old water plant(bridge) C4
2)ABO HADEID canal C5
3)ELSULTANI canal C6
4)Upper land canal C7

Sampling date :4,13,15/8/96

Samples analyzed :4,13,15/8/96

Parameter NO. Lab. NO.	1/11 CAIRO 13.8.96	2 4.8.96	3 15.8.96	LAB.	4 15.8.96
Color 00 TCU	10	5	10	sumusta lab	5
Taste (descrip.)	acceptable	--------	-------	ELFUSTAT lab.	----
Odor (descrip.)	waste	odorless	H2S	Sumusta lab.	grassy
pH 00.0	7.912	7.8	8.163	Sumusta lab.	8.455
Temperatur e 00.0	22.1	28.0	22.2	in the field	20.2
Turbidity NTU 0-10 0.0 10-40 00	10.0	25	41.0	Sumusta lab.	25.0
TDS mg/l 0000	183.3	--------	-------	ELFUSTAT lab.	----
Conduct. uS/cm 0000	280	300	250	in the field	340
Hardness CaCO3 mg/l 000	116.8	115.2	120	Sumusta lab.	153.6

Alkalinity CaCO3 mg/l 000	126.5	133.4	140.3	Sumusta lab.	144.9
Ammonia NH4 mg/l 00.0	0.43	nil	nil	Sumusta lab.	nil
Carbonate CaCO3 mg/l 00.0	0.9707	0.7910	1.9185	Sumusta lab.	3.8794
Calcium mg/l 00.0	27.16	26.0	27.78	Sumusta lab.	32.71
Chloride mg/l 000	10.92	12.41	11.91	Sumusta lab.	20.85
Bicarbonate CaCO3 mg/l 00.0	126.4592	133.3685	140.2272	Sumusta lab.	144.7574
Iron mg/l <1 0.00 >1 00.0	0.2	1.3	2.14	Sumusta lab.	nil
Mang. mg/l <1 0.00 >1 00.0	0.05	nil	0.05	Sumusta lab.	0.15
Sulphate SO4 mg/l 000	14.5	--------	-------	ELFUSTAT lab.	----
Nitrate NO3 mg/l 00.0	0.15	0.2	0.5	Sumusta lab.	0.53
Nitrite NO2 mg/l 0-1 0.00 >1 00.0	0.0	0.01	0.01	Sumusta lab.	0.01
Magnesium mg/l 00.0	11.92	12.3	12.32	Sumusta lab.	17.5
Sodium mg/l 00.0	19.2	--------	-------	ELFUSTAT lab.	-----
Potassium mg/l 00.0	4.8	--------	-------	ELFUSTAT lab.	-----
Copper ppm 00.0	<0.01	--------	-------	ELFUSTAT lab.	-----
Lead ppb 00.0	3.93	--------	-------	ELFUSTAT lab.	-----

Phosphates mg/l 00.0	0.015	----------	----------	ELFUSTAT lab.	----
Oils ug/l 00.0	2.07	----------	----------	ELFUSTAT lab.	-----
Pesticides ug/l 00.0	ND	----------	----------	ELFUSTAT lab.	-----
Herbicides mg/l 00.0	ND	----------	----------	ELFUSTAT lab.	-----
Total coliform col/100 ml	6200	3500	9400	Sumusta lab.	2950
Algae count unit/ml	600000	80000	50000	Sumusta lab.	46000

------ not tested
ND not detected at or above the method reporting limit

APPENDIX 9

REGIONAL WATER SUPPLY & SANITATION PROJECT IN BENI SEUF GOVERNORATE

RESULTS OF WATER QUALITY ANALYSES for SECTOR PLAN

Laboratory :SUMUSTA lab.

Site :Surface water sites(BAHER YOSSEF)

Sampling locations :1)EL SHEIK ABD compcat unit intake Y1
2)MAZORA compact unit intake Y2-1
3)EL GENDI bridge Y2-2
4)Dilhanis bridge Y3

Sampling date :8,15,18/8/96

Samples analyzed :8,15,18/8/96

Parameter NO. Lab. NO.	15/12 CAIRO 15.8.96	2 18.8.96	3 18.8.96	LAB.	4 8.8.96
Color 00 TCU	5	5	10	sumusta lab	10
Taste (descrip.)	acceptable	--------	-------	ELFUSTAT lab.	-------
Odor (descrip.)	odorless	odorless	grassy	Sumusta lab.	odorless
pH 00.0	7.84	7.664	7.908	Sumusta lab.	7.873
Temperatur e 00.0	20.8	26.2	23.2	in the field	26.0
Turbidity NTU 0-10 0.0 10-40 00	20.0	16	20.0	Sumusta lab.	20.0
TDS mg/l 0000	239.85	--------	-------	ELFUSTAT lab.	-------
Conduct. uS/cm 0000	380	430	430	in the field	350
Hardness CaCO3 mg/l 000	156.8	140.8	145.6	Sumusta lab.	136.0

Alkalinity CaCO3 mg/l 000	149.5	154.5	154.1	Sumusta lab.	133.4
Ammonia NH4 mg/l 00.0	nil	0.18	0.33	Sumusta lab.	nil
Carbonate CaCO3 mg/l 00.0	0.97201	0.6699	1.1717	Sumusta lab.	0.9358
Calcium mg/l 00.0	32.71	33.95	27.78	Sumusta lab.	26.0
Chloride mg/l 000	26.8	40.697	11.91	Sumusta lab.	21.84
Bicarbonate CaCO3 mg/l 00.0	149.4654	154.4769	154.059	Sumusta lab.	133.3626
Iron mg/l <1 0.00 >1 00.0	0.78	0.12	nil	Sumusta lab.	0.6
Mang. mg/l <1 0.00 >1 00.0	0.1	0.25	0.1	Sumusta lab.	nil
Sulphate SO4 mg/l 000	36.0	--------	-------	ELFUSTAT lab.	----
Nitrate NO3 mg/l 00.0	0.2	0.3	0.4	Sumusta lab.	0.3
Nitrite NO2 mg/l 0-1 0.00 >1 00.0	nil	0.005	0.01	Sumusta lab.	0.01
Magnesium mg/l 00.0	18.27	12.3	23.03	Sumusta lab.	17.33
Sodium mg/l 00.0	89.70	--------	-------	ELFUSTAT lab.	-----
Potassium mg/l 00.0	4.7	--------	-------	ELFUSTAT lab.	-----
Copper ppm 00.0	<0.01	--------	-------	ELFUSTAT lab.	-----
Lead ppb 00.0	15.12	--------	-------	ELFUSTAT lab.	-----

Phosphates mg/l 00.0	0.335	--------	-------	ELFUSTAT lab.	----
Oils ug/l 00.0	0.37	--------	-------	ELFUSTAT lab.	-----
Pesticides ug/l 00.0	ND	--------	-------	ELFUSTAT lab.	-----
Herbicides mg/l 00.0	ND	--------	-------	ELFUSTAT lab.	-----
Total coliform col/100 ml	1800	2500	2000	Sumusta lab.	3000
Algae count unit/ml	51000	36000	30400	Sumusta lab.	34000

------ not tested
ND not detected at or above the method reporting limit

APPENDIX 10

REGIONAL WATER SUPPLY & SANITATION PROJECT IN BENI SEUF GOVERNORATE

RESULTS OF WATER QUALITY ANALYSES for SECTOR PLAN

Laboratory :SUMUSTA lab.

Supervisor :Dina Omar

Site :Surface water sites(drains)

Sampling locations :1)ABO SHOSHA drain-ELSHEIK ABD site D1
2)EL MOHEIT drain D2
3)MAZORA drin(el bahary) D4

Sampling date :15,18/8/96

Samples analyzed :15,18/8/96

Parameter NO. Lab. NO.	1	2/13 CAIRO	3	LAB.
Color 00 TCU	10	5	5	sumusta lab
Taste (descrip.)	----------	acceptable	---------	ELFUSTAT lab.
Odor (descrip.)	metal••	odorless	grassy••	Sumusta lab.
pH 00.0	7.846	7.79	7.846	Sumusta lab.
Temperatur e 00.0	22.8	19.7	22.4	in the field
Turbidity NTU 0-10 0.0 10-40 00	40.0	16.0	13.0	Sumusta lab.
TDS mg/l 0000	----------	421.2	--------	ELFUSTAT lab.
Conduct. uS/cm 0000	310	690	380	in the field
Hardness CaCO3 mg/l 000	115.2	240	144.0	Sumusta lab.
Alkalinity CaCO3 mg/l 000	140.3	172.5	149.5	Sumusta lab.

Ammonia NH4 mg/l 00.0	0.08	nil	0.33	Sumusta lab.
Carbonate CaCO3 mg/l 00.0	0.9249	0.9996	0.9855	Sumusta lab.
Calcium mg/l 00.0	27.78	64.81	18.52	Sumusta lab.
Chloride mg/l 000	18.86	32.76	23.82	Sumusta lab.
Bicarbonate CaCO3 mg/l 00.0	140.2649	172.4692	149.4649	Sumusta lab.
Iron mg/l <1 0.00 >1 00.0	0.68	nil	0.16	Sumusta lab.
Mang. mg/l <1 0.00 >1 00.0	0.15	0.15	0.1	Sumusta lab.
Sulphate SO4 mg/l 000	--------	85.00	---------	ELFUSTAT lab.
Nitrate NO3 mg/l 00.0	0.31	0.15	0.952	Sumusta lab.
Nitrite NO2 mg/l 0-1 0.00 >1 00.0	0.0	0.0	0.01	Sumusta lab.
Magnesium mg/l 00.0	11.15	28.38	23.76	Sumusta lab.
Sodium mg/l 00.0	----------	36.6	--------	ELFUSTAT lab.
Potassium mg/l 00.0	----------	5.4	----------	ELFUSTAT lab.
Copper ppm 00.0	----------	<0.01	---------	ELFUSTAT lab.
Lead ppb 00.0	----------	4.6	---------	ELFUSTAT lab.
Phosphates mg/l 00.0	----------	0.1	---------	ELFOUSTAT lab.

Oils ug/l 00.0	----------	2.07	---------	ELFUSTAT lab.
Pesticides ug/l 00.0	----------	ND	----------	ELFUSTAT lab.
Herbicides mg/l 00.0	----------	ND	---------	ELFUSTAT lab.
Total coliform col/100 ml	8000	7200	10000	Sumusta lab.
Algae count unit/ml	84000	52000	80000	Sumusta lab.

------ not tested
ND not detected at or above the method reporting limit

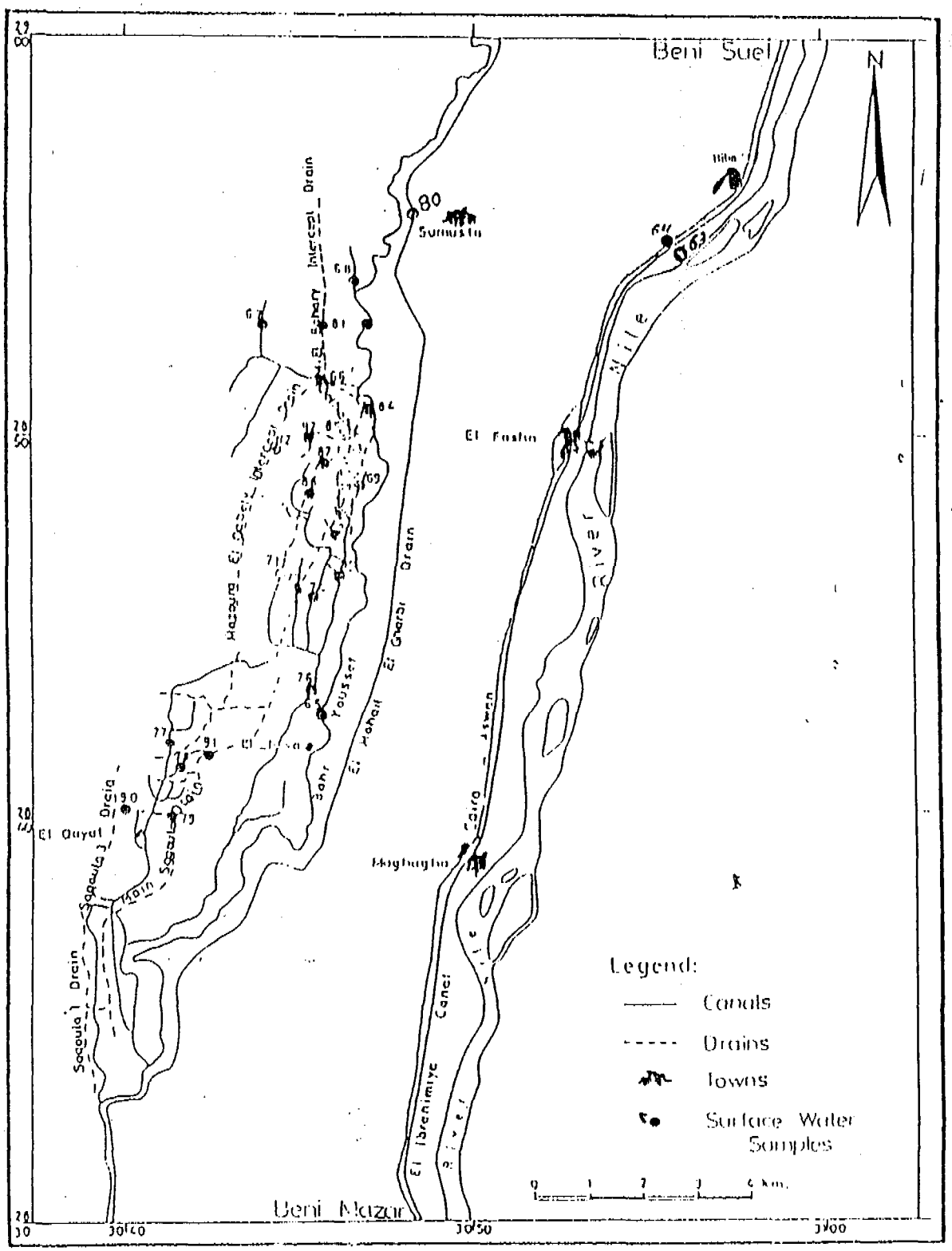
COLLECTED CHEMICAL ANALYSIS RESULTS ALONG THE STUDY AREA (1992-1994. RIWG)

APPENDIX 11

Table ( ): Key of surface water in the study area

(1\2)

Sample No.	Name
63	River Nile
64	El-Ibrahimiya canal
65	Bahr Youssef
66	Main Mazoura canal
67	Branch 3 canal
68	Quftan canal
69	Delhanes canal
70	Delhanes branch canal
71	Atf Haider canal
72	Abu El-Nour canal
73	Beni Warkan canal
74	Shenera canal
75	Shenera branch canal
76	El-Hariqa canal
77	El-Qayat canal
78	El-Halphayah canal
79	Kafr El-Maghrabi canal
80	----- El-Mohait drain-----
81	Mazoura El-Bahary intercept drain
82	Mazoura El-Qabely intercept drain
83	Main Saqoula drain
84	Saqoula 1 drain
85	El-Gaphadoon drain
86	El-Gamhoud drain
87	Atf Haider drain
88	Shenera drain
89	Beni Menan drain
90	El-Qayat drain
91	El-Basqaloon drain
92	Old Bahr Youssef



Locatrion Map Of The Sampled Surface water Along The Study Area .

Chmical Analysis Of Surface Water - Summry Cycle 1992

Sample No.	pH	E.C. µ mons/cm	T.D.S. ppm		Ca^{++}	Mg^{++}	Na^{+}	K^{+}	Total Cations epm	Co_3^{--}	HCo_3^{-}	So_4^{--}	Cl^{-}	Total Anions epm	Hydrochemical Formula				Water type
63	8.14	280	254	ppm	38.08	12.22	22.22	3.30		12	130	20.29	33.22			HCO_3 65.04	Cl 24.16	So_4 10.8	
				epm	1.90	1.01	0.97	0.08	3.96	0.4	2.13	0.42	0.94	3.89	S----------				Calcium
				e%	47.98	25.51	24.49	2.02		10.28	54.76	10.80	24.16		0.3	Ca 47.96	Na 26.51	Mg 26.51	Bicarbonate
64	8.13	290	286	ppm	35.73	11.24	21.16	3.27		12	110	19.82	20.76			HCO_3 68.57	Cl 18.18	So_4 12.85	
				epm	1.64	0.79	0.79	0.07	3.19	0.4	1.8	0.41	0.58	3.19	S----------				Calcium
				e%	48.28	24.76	24.76	2.19		12.54	56.43	12.85	18.18		0.3	Ca 48.28	Na 26.95	Mg 24.76	Bicarbonate
65	8.10	330	312	ppm	39.87	13.64	30.21	3.47		12	120	31.24	33.22			HCO_3 59.85	Cl 23.74	So_4 16.41	
				epm	1.75	0.98	1.15	0.08	3.96	0.4	1.97	0.65	0.94	3.96	S----------				Calcium
				e%	44.19	24.75	29.04	2.02		10.10	49.75	16.41	23.74		0.3	Ca 44.19	Na 31.06	Mg 24.75	Bicarbonate
66	8.40	450	474	ppm	48.03	16.6	48.93	3.8		6	150	67.58	49.82			HCO_3 48.83	So_4 25.78	Cl 25.59	
				epm	2.19	1.25	1.94	0.09	5.47	0.2	2.46	1.41	1.4	5.47	S----------				Calcium
				e%	40.04	22.85	35.47	1.65		3.66	44.97	25.78	25.59		0.5	Ca 40.04	Na 37.12	Mg 22.85	Bicarbonate
67	8.22	430	412	ppm	48.64	18.85	48.62	3.91		6	120	88.44	58.13			HCO_3 38.41	So_4 32.57	Cl 29.03	
				epm	2.22	1.41	1.93	0.09	5.65	0.2	1.97	1.84	1.64	5.65	S----------				Calcium
				e%	39.29	24.96	34.16	1.59		3.54	34.87	32.57	29.03		0.4	Ca 39.29	Na 35.75	Mg 24.96	Bicarbonate
68	8.20	410	350	ppm	49.01	15.48	52.08	3.90		6	160	68.38	53.98			HCO_3 48.96	Cl 26.39	So_4 24.65	
				epm	2.32	1.20	2.14	0.09	5.75	0.2	2.62	1.42	1.52	5.75	S----------				Calcium
				e%	40.35	20.87	37.22	1.57		3.47	45.49	24.65	26.39		0.4	Ca 40.35	Na 38.79	Mg 20.87	Bicarbonate
80	8.30	600	742	ppm	71.4	35.4	141.6	5.06		18	280.6	116.8	115.14			HCO_3 47.84	Cl 29.81	So_4 22.36	
				epm	3.04	2.46	5.24	0.13	10.87	0.6	4.6	2.43	3.24	10.87	S----------				Sodium
				e%	27.97	22.82	48.21	1.01		5.52	42.32	22.36	29.81		0.74	49.22	27.97	22.82	Bicarbonate

	Hydrochemical Parameters of the Investigated Water Samples															
	Ion Ratios							hypothetical Salt Combinations in %								
SAMPLE NO.	rCa/rCl	rMg/rCl	rNa/rCl	rK/rCl	rSo_4/rCl	rCl-r(Na+K)/rMg	r(Na+K)-rCl/rSo_4	KCl	NaCl	Na_2So_4	$NaHCO_3$	$MgCl_2$	$CaCl_2$	$MgSo_4$	$CaSo_4$	$Mg(HCO_3)_2$	$Ca(HCO_3)_2$
63	2.02	1.07	1.03	0.09	0.45	—	0.26	2	22	3	-	-	-	8	-	17	48
64	2.66	1.36	1.36	0.12	0.71	—	0.68	2	16	9	-	-	-	6	-	21	46
65	1.86	1.04	1.22	0.09	0.69	—	0.45	2	22	7	-	-	-	9	-	16	44
66	1.56	0.89	1.35	0.06	1.01	—	0.45	1	24	12	-	-	-	14	-	9	40
67	1.35	0.86	1.18	0.05	1.12	—	0.21	2	27	7	-	-	-	25	0.9	-	39
68	1.53	0.79	1.41	0.06	0.93	—	0.5	2	24	13	-	-	-	12	-	9	40
80	0.94	0.77	1.62	0.03	0.75	—	0.87	1	29	19	-	-	-	3	-	20	28

Chemical Analysis Of Surface Water - Summary Cycle 1993

Sample No.	pH	E.C. µ mons/cm	T.D.S. ppm	Units	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	Total Cations epm	CO_3^{--}	HCO_3^{-}	SO_4^{--}	Cl^{-}	Total Anions epm	Hydrochemical Formula	Water type
82	7.83	2520	2024	ppm	149.57	56.24	409.12	6.12		15	205	743.32	344.62		SO_4 53.30 Cl 33.41 HCO_3 13.28	
				epm	7.48	4.63	17.79	0.21	30.11	0.5	3.36	15.49	9.71	29.06	S----------	Sodium
				e%	24.84	15.38	59.05	0.72		1.77	11.66	53.30	33.41		C.C Na 59.78 Ca 24.84 Mg 15.38	Sulphate
83	8.0	2000	1544	ppm	125.6	56.4	283.4	7.44		15	244	40.69	389.3		Cl 67.22 HCO_3 27.57 SO_4 5.21	
				epm	4.51	3.45	9.22	0.14	16.32	0.5	4	0.85	10.97	16.32	S----------	Sodium
				e%	27.63	21.14	50.37	0.86		3.06	24.51	5.21	67.22		1.54 Na 51.23 Ca 27.63 Mg 21.14	Chloride
84	8.22	3090	2382	ppm	171.38	64.80	479.17	10.01		15	160	895.58	419.36		SO_4 55.01 Cl 34.82 HCO_3 10.17	
				epm	8.57	5.30	20.83	0.26	34.96	0.5	2.95	15.66	11.81	33.92	S----------	Sodium
				e%	24.51	15.16	59.56	0.74		1.47	8.7	55.01	34.82		2.4 Na 60.32 Ca 24.51 Mg 15.16	Sulphate
85	8.06	3010	2254	ppm	151.95	90.15	441.92	11.88		12	230	486.61	656.02		Cl 57.09 SO_4 30.03 HCO_3 12.89	
				epm	7.13	6.95	18.01	0.28	32.37	0.4	3.77	9.72	18.48	32.37	S----------	Sodium
				e%	22.03	21.47	55.64	0.86		1.24	11.66	30.03	57.09		2.3 Na 56.5 Ca 22.03 Mg 21.47	Chloride
86	8.10	2210	1672	ppm	142.66	74.66	273.86	5.15		12	220	264.38	510.70		Cl 60.18 SO_4 23.04 HCO_3 16.77	
				epm	6.74	6.80	11.25	0.12	23.91	0.4	3.61	5.51	14.39	23.91	S----------	Sodium
				e%	28.19	24.26	47.05	0.50		1.67	15.1	23.04	60.18		1.7 Na 47.55 Ca 28.19 Mg 24.26	Chloride
89	8.10	3070	2260	ppm	172.49	111.09	342.01	7.65		12	175	323.65	728.61		Cl 67.16 SO_4 22.11 HCO_3 10.73	
				epm	8.01	8.49	13.81	0.18	30.49	0.4	2.87	6.74	20.47	30.48	S----------	Sodium
				e%	25.27	27.85	45.29	0.59		1.31	9.42	22.11	67.16		2.3 Na 45.88 Mg 27.85 Ca 25.27	Chloride
92	8.29	4630	3280	ppm	177.35	169.77	701.79	27.44		15	425	371.43	1258.1		Cl 69.83 SO_4 15.25 HCO_3 14.91	
				epm	8.83	13.31	28.65	0.66	50.75	0.6	6.97	7.74	35.44	50.75	S----------	Sodium
				e%	16.41	25.83	56.45	1.3		1.18	13.73	15.25	69.83		3.3 Na 57.75 Mg 25.83 Ca 16.41	Chloride

APPENDIX 13 (1\2)

	Hydrochemical Parameters of the Investigated Water Samples															
	Ion Ratios							Hypothetical Salt Combinations in %								
SAMPLE NO.	rCa/rCl	rMg/rCl	rNa/rCl	rK/rCl	rSo$_4$/rCl	rCl-r(Na+K)/rMg	r(Na+K)-rCl/rSo$_4$	KCl	NaCl	Na$_2$So$_4$	NaHCO$_3$	MgCl$_2$	CaCl$_2$	MgSo$_4$	CaSo$_4$	Mg(HCO$_3$)$_2$	Ca(HCO$_3$)$_2$
82	0.77	0.48	1.83	0.02	1.60	—	0.54	1	32	26	-	-	-	16	12	-	13
83	0.41	0.31	0.75	0.01	0.08	0.76	—	1	50	-	-	16	-	5	4	-	23
84	0.73	0.48	1.76	0.02	1.58	—	0.50	1	33	26	-	-	-	15	14	-	11
85	0.39	0.38	0.97	0.02	0.53	0.03	—	1	53	-	-	1	-	21	9	-	13
86	0.47	0.40	0.78	0.01	0.38	0.52	—	1	47	-	-	12	-	12	11	-	17
89	0.39	0.41	0.67	0.01	0.33	0.76	—	1	45	-	-	21	-	7	15	-	11
92	0.24	0.37	0.81	0.02	0.22	0.47	—	2	56	-	-	11	-	15	1	-	15

(2\2)

Chemical Analysis Of Surface Water - Summary Cycle 1994

APPENDIX 13

Sample No.	pH	E.C. µ mohs/cm	T.D.S. ppm	Units	Ca^{++}	Mg^{++}	Na^{+}	K^{+}	Total Cations epm	Co_3^{--}	HCo_3^{-}	So_4^{--}	Cl^{-}	Total Anions epm	Hydrochemical Formula				Water type
77	8.39	410	262	ppm	41.78	14.44	36.99	3.71		12	170.8	29.18	38.93			HCO_3 65.18	Cl 22.4	So_4 12.42	
				epm	2.09	1.19	1.61	0.10	4.99	0.4	2.8	0.61	1.1	4.91	S----------				Calcium
				e%	41.88	23.85	32.26	2		8.15	57.03	12.42	22.40		0.3	Ca 41.88	Na 34.26	Mg 23.85	Bicarbonate
78	8.22	490	360	ppm	37.15	13.85	38.68	3.73		12	158.6	29.98	19.45			HCO_3 71.94	So_4 14.87	Cl 13.19	
				epm	1.62	0.99	1.47	0.09	4.17	0.4	2.6	0.62	0.55	4.17	S----------				Calcium
				e%	38.85	23.74	35.25	2.16		9.59	62.35	14.87	13.19		0.4	Ca 38.85	Na 37.41	Mg 23.74	Bicarbonate
79	8.60	380	243	ppm	35.69	13.51	36.76	3.64		12	158.6	27.72	29.19			HCO_3 66.2	Cl 18.63	So_4 13.18	
				epm	1.78	1.11	1.60	0.09	4.58	0.4	2.6	0.58	0.82	4.40	S----------				Calcium
				e%	38.86	24.24	34.93	1.97		9.1	59.1	13.18	18.63		0.24	Ca 38.86	Na 36.9	Mg 24.24	Bicarbonate
81	7.82	4590	3674	ppm	236.57	110.8	716	14.24		18	451.4	1405.2	516.5			So_4 56.59	Cl 27.99	HCO_3 15.42	
				epm	11.83	9.11	31.13	0.37	52.44	0.6	7.4	29.36	14.52	51.88	S----------				Sodium
				e%	22.56	17.37	59.36	0.71		1.16	14.26	56.59	27.99		3.7	Na 59.53	Ca 22.56	Mg 17.37	Sulonate
90	8.43	2350	1730	ppm	129.6	43.25	409.9	11.95		18	189.1	631.9	272.33			So_4 53.65	Cl 31.27	HCO_3 15.09	
				epm	6.58	3.07	15.35	0.27	24.27	0.6	3.1	13.16	7.67	24.53	S----------				Sodium
				e%	27.39	12.65	63.25	1.11		2.18	12.64	53.65	31.27		1.73	Na 64.36	Ca 22.99	Mg 12.65	Sulonate
91	8.06	6500	5046	ppm	217.6	220.2	765.9	4.61		36	536.8	1338.2	1196.3			Cl 47.08	So_4 38.95	HCO_3 13.97	
				epm	9.76	16.24	45.47	0.11	71.58	1.2	8.8	27.88	33.70	71.58	S----------				Sodium
				e%	13.64	22.69	63.52	0.15		1.68	12.29	38.95	47.08		6.05	Na 63.67	Mg 22.69	Ca 13.64	Chloride

(2\2)

SAMPLE NO.	Hydrochemical Parameters of the Investigated Water Samples															
	Ion Ratios							Hypothetical Salt Combinations in %								
	rCa/rCl	rMg/rCl	rNa/rCl	rK/rCl	rSo4/rCl	rCl-r(Na+K)/rMg	r(Na+K)-rCl/rSo4	KCl	NaCl	Na_2So_4	$NaHCO_3$	$MgCl_2$	$CaCl_2$	$MgSo_4$	$CaSo_4$	$Mg(HCO_3)_2$	$Ca(HCO_3)_2$
77	1.9	1.08	1.46	0.09	0.55	—	1.0	2	20	12	-	-	-	1	-	2[illegible]	42
78	2.95	1.8	2.67	0.16	1.13	—	1.63	2	11	15	9	-	-	-	-	24	39
79	2.17	1.35	1.95	0.11	0.71	—	1.5	2	17	13	5	-	-	-	-	24	39
81	0.81	0.63	2.14	0.03	2.02	—	0.58	1	27	32	-	-	-	18	6	-	16
90	0.73	0.40	2.0	0.04	1.72	—	0.60	1	30	33	-	-	-	13	8	-	15
91	0.29	0.48	1.35	0.003	0.83	—	0.43	1	46	16	-	-	-	23	-	[illegible]	1[illegible]

77.

PROPOSAL FOR REGULAR SURFACE WATER MONITORING PROGRAM

1. Background

A preliminary monitoring program as a first step of the water quality study program was planned and implemented in Beni Suef to determine the quality of the water resources and their degree of pollution along the study area .

Group of surface water samples were collected in August 1996 from River Nile, Ibrahemiya canal, Bahr Youssef, secondary irrigation canals and the main drains along the study area (Biba, Sumusta and El Fashen).

For the selection of the of the sampling locations certain technical factors were taken into consideration.

So, it is important to monitor continuously the surface water quality and levels in the study area and the governorate according to this proposal of regular monitoring program.

2. Program Objectives

i. Monitoring of the quality of water resources and follow up of changes and the important indications of these changes.

ii. Identify and follow up of the pollution sources and quantitative and qualitative monitor of pollutants .

iii. Analytical follow up of the different water on the River Nile and irrigation canals along different districts of the governorate that are subjected to pollution.

iv. Determine the quantitative seasonal variations of the water quality in the Nile and the main canals.

3. Sampling Locations

The locations of the permanent sites is probably the most critical factor in designing a monitoring program for water quality. Beside the permanent sits through which 1st phase of the program was implemented, other locations were determined in Ahnasya, Naser and El Wassta markaz **(fig. 1&2)** for the regular monitoring program. During the determination of these location certain points are taken into consideration like:

The work in the 1st phase of monitoring program started in July 1996

i. The locations of water supply intakes on the Nile and the main canals.

ii. The presence of sewage and waste water outfalls.

iii. The density of population

iv. The relative locations of industrial areas..

v. The distance between sampling points not exceed 20 km.

vi. The presence of barrages.

Table 1. Sampling locations along the southern part of Beni Suef Governorate

Site Locations	Nile	Canals	Bahr Youssef	Drains
1	EL Fant	Izbat El Fant (Ib)	El Kunayyisah.	El Mohiet (ElKoniesa)drain.
2	El Fashn new intake.	El Fashen old intake.(Ib)	Dilhaniss.	Bani Minayn drain.
3	El Waqilyyah.	El Fashen branch canal.	Mazurah C.U. intake	Shenira drain.
4	Minyat El Jid.	Absoj canal.	El Sheik Abed C.U. Intake	El Mohiet(Delh .aniss)drain.
5	Biba new intake.	El Waqilyyah. (Ib)	Nazlet Quftan.	Najaa Bahig drain.
6	Ghayyadiah El Sharqiyyah.	Suds. (Ib)	Dashtut C.U. intake.	El Gafadun drain.
7	Sannor.	Ganabiet Abu Haded.		El Mohiet (Ezbat Talt)
8		Biba old intake .(Ib)		El Waqilyyia drain.
9		Bani Qasim. (Ib)		El Kom El Ahmar drain
10		Badhl canal.		Mazourah El Keibly drain.
11		El Saultani canal (Sumusta).		Mazurah El Bahary drain.
12		Tala canal.		El Sheik abed drain.
13		Saft Al Urafa canal.		1st Village drain New reclaimedarea.
14		Shenera canal		
15		El Jafadon canal.		
16		Upper land canal		
17		Mazurah canal.		
18		El Sheik Abed canal.		

Table 2. sampling locations along the northern part of Beni Suef Governorate

Site Locations	Nile	Canals	Bahr Youssef	Drains
7	Tall El Niroze.	TABLE 1	Baraoh.	Mohy El Den drain outfall at the Nile.
8	Beni Seuf New Intake.	TABLE 1	Mianah.	Eahwah drain.(Eahwah)
9	Beni Seuf Old Intake.	TABLE 1	El Awawona.	El Shobak drain (El Shobak)
10	El Shanawiyalntake.	TABLE 1	Massraiet Nassan	Dandel drain (Dandel)
11	Bani Saleh C.U.Intake.	TABLE 1	El Lahoun	Massaret Nassan drain.
12	El Maimon New intake	TABLE 1		Sedi Bery drain(Dalass)
13	El Wassta.	TABLE 1		Eshmant El Sharky drain
14		TABLE 1		Kushesha drain
15		TABLE 1		El Mohiet drain Kom Abu Rady.
16		TABLE 1		
17		TABLE 1		
18		TABLE 1		
19		Wsslet Tansa Canal.		
20		Manshat Asem(Ib)		
21		Amaar Canal (Barote)		
22		Bani Haroun C.U Intake.(Ib)		
23		Tezmant canal		
24		EL Sharah canal Beni Seuf.		
25		Bohlar Miler (Ib)		
26		Shrief Basha C.U. intake.		
27		Naser old intake		
28		EL Sharah canal (El Shnawiya)		
29		Dalass bridge(Ib)		
30		Bahr Qushesha Dalass		
31		Eshmant eastern canal.		
32		Eshmant bridge (ib)		
33		El Mymoon C.U. intake (Ib).		
34		El Wassta Bridge (Ib).		
35		Atff Efuaa (Ib)		
36		El Gezawayh canal (Mydom)		
37		El Gezawayh canal Kom Abu Rady		
38		El Gezawayh ca. nal El Hammam.		
39		Maasaret Nassan canal.		
40		Sharahe canal (EL Nwaira)		
41		Ahnasia El Kadra canal.		
42		Manshat Abed El Samaad canal.		
43		El Sultani canal (El Dair & Brawh)		

4. Program Parameters

The main parameters that shall be measured by the regular monitoring program are highly dependent upon the objectives, basic characteristics and budget required.

A group of basic parameters (see table 1) must measure in all samples (i.e., in the river , canals or drains) in addition to some specific parameters depending on the type of effluent and the importance of the site.

Table 3 . Parameters to be used for regular surface water monitoring program.

All Samples (basic parameters)	Major River Sits	All Agricultural Drains	All Sewage Outfalls	Canal Intakes
*Ph	Ca++	Ca++	Ca++	Ca++
*Temp.	Mg++	Mg++	Mg++	Mg++
*ELEC. Cond.	Na+	Na+	Na+	Na+
*DO	K+	K+	K+	K+
*Total Alkalinty	Oil & Grease	Oil & Grease	Oil & Grease	Oil & Grease
*Turibidty	Phenols	Phenols	Phenols	Phenols
Ammonia	Pesticides	Pesticides	Pesticides	Pesticides
BOD	Herbicides	Herbicides	Herbicides	Herbicides
COD	Fe++	Cu++	Cu++	Fe++
Hardness	Mn++	Pb++	Pb++	Mn++
TDS	Ortho.phosphorus	Zn++	Zn++	Ortho.phosphorus
TSS		Fe++	Fe++	
Nitrate		Mn++	Mn++	
Nitrite		Ortho.phosphorus	Ortho.phosphorus	
Sulphates				
Total Phosphorus				
Chlorides				
Silicate				
Carbonates				
Bicarbonates				
E.coli				
Faecal coli				
Algae density				
Shesostoma				

*** MEASURE IN THE FIELD**

5. Program Frequency

The sampling frequency at each permanent sampling site within the study area and the governorate is a very important consideration in the design of water quality program. In the case of the Nile, constant frequencies overall at sites and samples from point sources may be the only means to implement a sampling program.

The sampling frequencies are planned to be in three stages as follows :

i. **Short . term (Monthly)**
Monthly for the water supply intakes sites on the Nile and the main canals.

ii. **Medium . term (Three time per year)**
To detect the seasonal quality variation through the year in all sampling locations of the Nile, canals and drains (that is in Jan., May and August)

iii. **Long . term (One time/ year)**
In addition to the short and medium term work, special studies could be done for all drains and on the bottom sediment of the major sites (in October) .

6. Implementation Team

i. Sampling	Water stations and Health Technicians
ii. Insitue and laboratory analysis	Health, Governorate Chemists and water station laboratories Chemists.(American water station & Bacteriology and chemical lab. in Beni Seuf).
iii. Results analysis and representations	Governorate staff.
iv. Supervision and revision	The Governorate and National Drinking and Sanitation Authority in Beni Seuf

7. Sampling Technique

i. Sampling from water ways shall preferably be made from the bridges. If the bridges can not be utilized (e.g. in the case of Nile), sampling must be take place by using boats. In the case of narrow canals sampling shall be as far as possible from the banks in order to minimize disturbances by the shore.

ii. For all canals and drains (except the Nile and Bahr Youssyf), one sample will be taken at every location and the suggested depth of sampling is 50 cm to avoid the effects of floating debris .

iii. With respect to the Nile and Bahr Youssef cross sectional profile and sampling depth play an important rule in water quality detection where substantial quality variations are anticipated across the profile i.e. there will be sub samples which represent the full flow profile.

iv. Sampling from sewages shall be made at the points of discharge, with convenient but at locations where the sewage has not yet mixed with the recipient water, In order to determine the likely time of arrival of the pollution body at specific points on the waterway, such as water supply intake.

8. Instruments and Tools

During the implementation of the preliminary surface water program, it was find that there are no any tools for sampling in all water stations along the study area and also there is a big shortage in the lab. instruments (Except Sumusta lab.) specially that required for biological and bacteriological analysis.

9. Training

To implement this regular program successfully certain training courses must be taken into consideration for the implementation (**table 4).**

Table 4 Essential Required Training Courses

COURSE NAME	TARGET GROUP	COURSE ITEMS
1.Sampling tools and techniques	.Sampling team (water statins and health technicians).	i.Identifications of different types of sampling tools. ii.Difftypes of water samples. iii.Different methods of sampling. iv.Preparation of the sampling tools and containers for field analysis.
2.Bacteriological and biological sampling.	.Water stations lab. chemists al. ong the governorate.	i.Preparation the sam. tools for bacteriological and bio. analysis ii.Chemicals and instruments required for bio.sample des. cription in the lab. iii.Preparation of the bact. and bio. sample in the lab. ii.detectionand microscopic of the bact.& bio.sample. iv. Bact. and bio. reporting.
3.Analysis, represe- ntation and interp - retation of the monitoring program results.	.Chemists and governorate staff.	.Points taken into considerati. on during monitoring program. .Sources of surface water con. tamination along the study area. .Factors effect on the analysis .Models of hydrochemical re. presention. .Expected Effects of seasonal quantitative changes of Nile water on the water quality .

10. Field Procedures

In order to get representative sampling sites, these general mmendations should be followed:

* At all sites depth integrates samples must be taken (form three to five samples). Composite samples must be formed from all the integrated taking into consideration the depth adjustment for the volume being contributed to the composite for each point in the cross.section. The

number of cross sectional sampling points can expanded beyond five if there is a considerable number of point source inflows upstream of the sampling sites. Field, biological, and bacteriological measurements must be determined in all vertically integrated samples for all sites. The best of the measurements must be conducted on the composite samples for all samples in the laboratory. The use of **(table 5)** for data collection recording about the sampling point shall help in interpretation and analysis of the results.

ITEM	DESCRIPTION
1- Location Name	
2- Canal Width	m
3- Average Depth of the canal	m
4- Factories Out falls To This Location .	a- present b- absent - distant from samp.location m - name. - type of activity. - daily discharge m^3/day
5- Sewage and Waste Water Out falls	a- absent. b- present c- distant from samp. loc. m.
6- Water Barriers	a- natural meandering b- island bar c- Barrage e- bridges
7- Any other contamination or pollution Sources.	