Section 4: Existing Environment

4.0 Existing Environment

4.1 INTRODUCTION

The route of Abr Seina pipeline 32″, 111 km, starts from El Tina Shark ***(long. 31^{o} 1'27.7" lat. 32^{o} 20' 47.4")*** to El Arish, northern Sinai.

A general survey was carried out on 11-12/7/2007 to provide the environmental profile requested for the concerned area. The site survey regarded the geological and meteorological data, topography, flora and fauna and socio-economic status. This area is of previous environmental profile knowledge.

This section gives an overview of the environmental and related issues in such area in relation to oil exploration. It also describes the environmental setting in the concerned area in terms of physical, geological and biological issues. It also details the prevailing climatic conditions within the area of concern.

4.2 Soil Geomorphology

The morphological characteristic, in the northern part of Sinai peninsula along the El-Salam canal could be recognized as follows:

- Coastal plain sand sheet and sand dunes (active & passive).
- Individual sabkha, march and swamp areas.
- Wadi El –Arish

The parent materials of soils in the northern part of Sinai along El-Salam canal could be categorized into four groups as follows:

- Nile alluvium, and lacustrine sand deposits of El-Tina plain area.
- Lacustrine sand deposits of the area surrounding the El-Bardawil lake in the Bair El-Abd and the El-Telol areas.

- Aeolian sand deposits of the active dunes and sand sheet deposits in the south El-Kantara shark, the Rabaa and Qatia areas.
- Calcareous and sand deposits in the Wadi El-Arish area.

4.2.1 Morphology of the El-Tina plain and the South El-Kantara Shark soils.

El Tina plain occupies the northwestern corner of the Sinai, as an integral part of the ancient Nile Delta. It has a triangular shape, bordered to the east by the Suez canal, to the north by the Mediterranean shoreline trending NW-SE, and to the south by a sharp straight contact with northern Sinai sand sheet. It is an extensive mud flat, reaching nearly 3 to 55m above sea level and is covered by a salt crust of thickness reaching nearly 2.5 to 9.5cm.

Section 4: Existing Environment

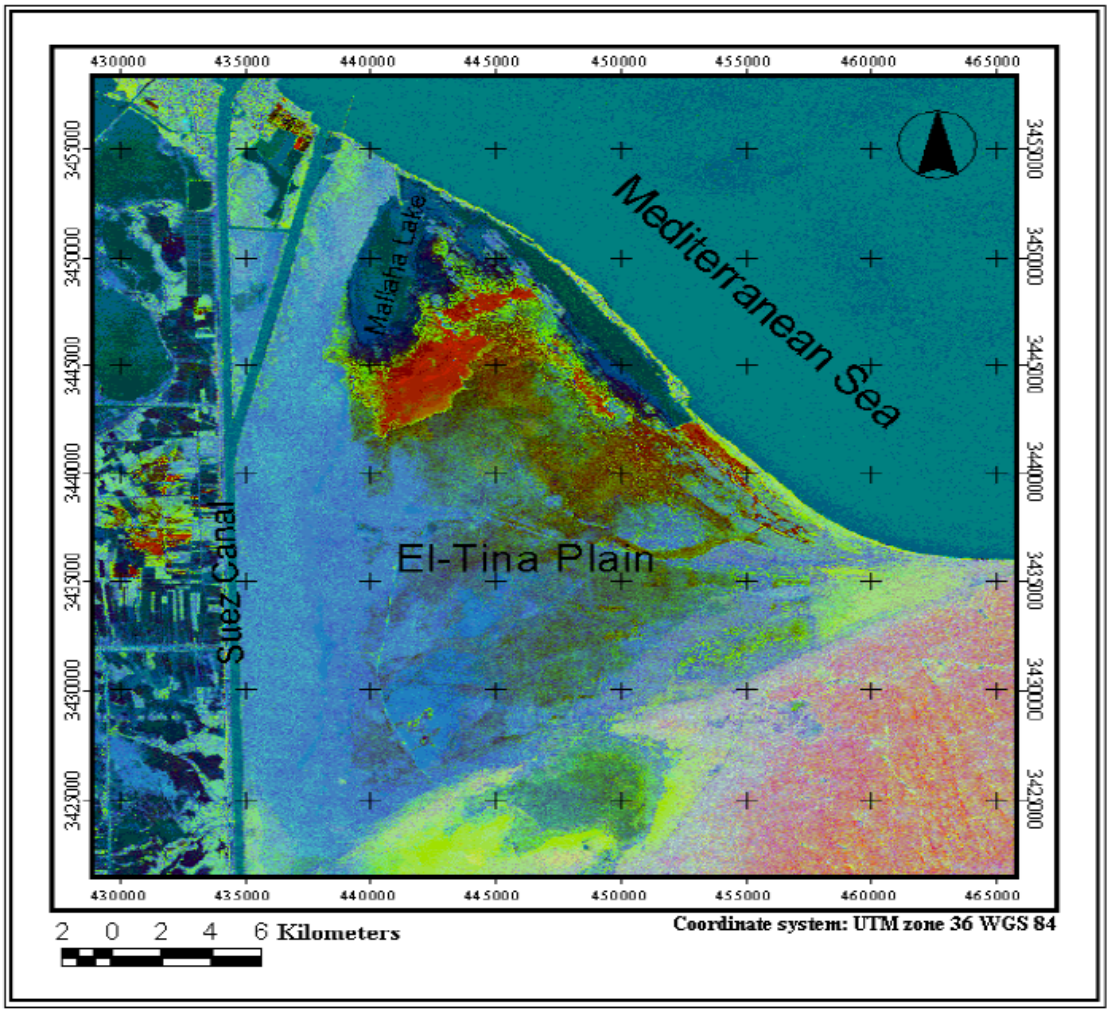


Figure (4.1) "El-Tina plain"

El-Tina plain can be divided into two distinct zones, namely, a northern strand plain and a southern delta plain. The strand plain varies in width from 1km in the east to 12.5km in the west where it covered by El-Malaha lake. It consists of bundles of very low accretions beach ridges, a few ten centimeters higher than the surroundings.

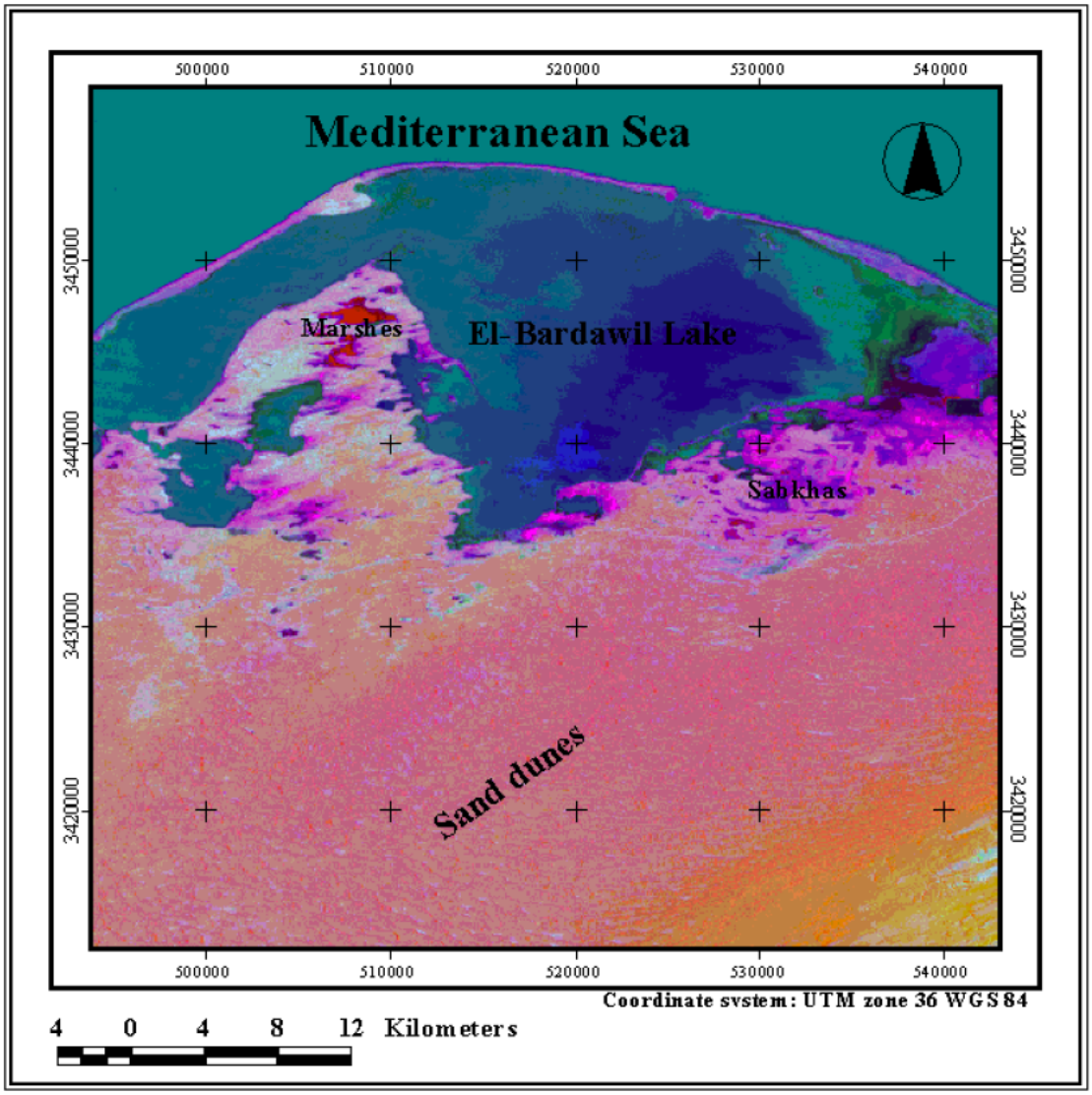
Figure (4.2) Wetland soils between sand dune and sand sheet with many shrubs growing on water table.

The ground water in the south El-Kantara Shark area is deep and the drainage is excessive in many location in these soils.

4.2.2 Morphology of the El-Bardawil, thr Bair El-Abd and the Rabaa soils.

There are many Sabkha around El-Bardawil lake. The Bardawil sabkhas can be descriped by flat sabkha and dune sabkha. The evaporation wavy surface of flat sabkha was identified at many location in the Bair El-Abd and Rabaa area.

El-Bardawil lake extends along the northern coast of the Sinai for about 80km and has a total area of about 70.000 hectares. Its maximum width is about 8km with a max. depth of about 3m. the lake is separated from the Mediterranean sea by a long curving sand barrier.

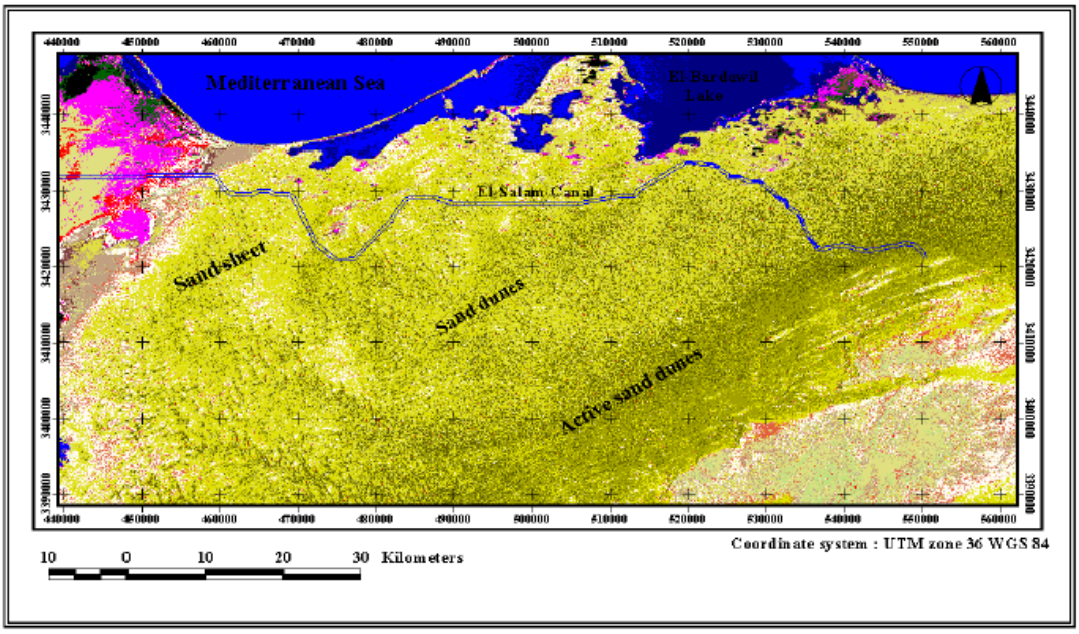


(4.3) Morphological Image of El-Bardawil lake and Bair El-Abd areas

4.2.3 Sand Sheet and Sand Dunes

The sand sheet is more or less flat and its wavy surface is sprinkled with small and large scale ripples and large scale coarse and fine sand dunes. These ripples and sand dunes have a wavelength of 5 to 200cm and 3 to 30m.

Section 4: Existing Environment



4.4 Morphological map of sand dunes, active sand dunes and sand sheet in the northern part of the Sinai peninsula

The surface is nearly flat with ripples and small sand dunes in the northwestern part, while the central and northeastern part of study area are occupied by fine texture surface with sand sheets and mounds that form conical hammocks rising 1 to 2 cm. the sand sheets are characterized by gently undulating and moderately vegetated surfaces covered with varying densities of vegetation.

4.5 Small Scale of Ripples And Small Sand Dunes

Section 4: Existing Environment

The Rabaa have large one of sand sheet area. Active sand dunes are located along the southern boundary of study areas of El-Salam canal. Mobile sand dunes occupy a considerable area especially at the northwestern and southwestern of Bair El-Abd area. Their length ranges from a few hundred meters to more than 4km, however the average length is 3km, with an average width of about 150 and 750m in wavelength.

4.6 Mobile Sand dunes covered some of the palm trees, while some palms grows within active dunes

4.7 Small canal of irrigation from the El-Salam canal partially covered by active sand dunes.

Section 4: Existing Environment

4.3. Climatic data

The climatological conditions of the northern part of Sinai play an important role in shaping the study area and in controlling the ecology of the area. These conditions include extreme aridity, long hot rainless summer periods and mild winters in which storms rarely occur. The northern part of Sinai is also characterized by a so called El-Khamasin storms or sandstorms. These are violent winds which blow intermittently over a period of 50 days during February and March (DAMES and MOOR 1983).

Generally, the prevailing climatic conditions in the north Sinai include low rainfall, high temperatures, strong wind, high evaporation and low relative humidity. The data were collected from six meteorological stations an a monthly basis during 1989-1999.

Rainfall

The maximum rainfall in the north Sinai occurs in January and February along the coastal area. The rainfall increases to the east and rapidly decreases to the south except in the Saint Catherine area in the south Sinai (high altitude). The maximum and minimum monthly data of rainfall during 1989-1999 are given in table (3-1) and the processed data are given in figure (3.8). The mean average of rainfall ranges from 25 to 118 mm y^{-1}. *Rainfall increases in eastern direction reading 244 mm* y^{-1} *in the Rafah. ATTIA (1994) reported that the annual rainfall is 73 mm at Port Said and increases up to 105 mm at El-Arish.*

Temperature

The temperatures in the north Sinai differ from one location to another according to its position from the Mediterranean Sea and the direction of winds. In winter, the monthly mean maximum and minimum temperature values are 20°C and 11°C, respectively. In summer, the maximum mean monthly temperature is 32.5°C and the lowest mean monthly 18.7°C, except during the El-Khamasin period were the temperature can reach 40°C. The mean maximum and minimum monthly temperatures during the 12 months from different

stations in the north Sinai are show in table (3.2) and figure (3.8). Figure (3.8) shows the area under consideration lies in an arid zone. Figure (3.9) shows the map of annual mean temperature in the Sinai peninsula.

Evaporation

Evaporation in the arid zones is the most affecting factor in the hydrological cycle. The evaporation data for the north Sinai are presented in table (3.1) as recorded from different meteorological stations. Figure (3.10) shows map of mean evaporation in the Sinai.

From the mean evaporation values it can be concluded that the monthly evaporation ranges from 1.5 to 10.3 mm d^{-1}. The monthly evaporation decreases during winter to 1.5 mm d^{-1} especially in December and increases to10.3 mm d^{-1} in July. Generally, the evaporation rates decrease eastward.

Wind

The northern part of the Sinai is mainly affected by northwestern winds coming from the Mediterranean Sea. However, during El-Khamasin storms (which are warm storms carry out the fine sand and dust from location to another depend on direction of the wind with generally high temperature in atmosphere) the direction of the wind changes from south to southwest.

Section 4: Existing Environment

Stations	Parameter	Jan.	Feb.	Mar	Apr.	May	June	July	Aug.	Sep.	Oct.	Nov.	Dec.	Mean
Port Said	Temp.°C	14.4	14.6	16.3	19.5	21.9	25.1	26.8	27.3	24.5	24.2	20.1	16	
	Rain mm	25.03	17.13	16.84	3.66	2.49	0	0	0	0.4	1.84	6.73	12.1	86.22
	Evap.mm.d^{-1}	2.8	2.8	2.9	3.4	3.1	3.1	3	3.1	3.3	4.5	2.8	2.3	
Rafah	Temp.°C	12.4	12.3	15	18.7	20.4	23.5	25.6	25.7	24.6	23.5	15.5	14	
	Rain mm	70.63	61.7	30.83	0.5	3.34	0.2	0	0	0	1.7	29.44	45.14	243.47
	Evap.mm.d^{-1}	3.9	4.6	5.1	7.5	8.2	9.9	10.3	9.4	8.4	6.9	4.8	3.9	
El-Arish	Temp.°C	13	13.4	15.3	18.9	21.1	24.1	26	26.2	24.8	22.6	18.4	14.4	
	Rain mm	30.88	1835	20.17	10.33	0.92	0	0	0	0	2.96	11.75	22.2	117.74
	Evap.mm.d^{-1}	1.8	1.8	1.9	2.6	2.2	2.4	2.3	1.9	1.9	2	1.9	1.5	
Ismailia	Temp.°C	13.5	14.5	17	21.4	24.2	27.2	28.7	28.6	26.6	23.8	19.2	14.9	
	Rain mm	9.01	6.23	7.05	4.03	2.11	0	0	0	0.03	0.79	5.05	8.65	42.95
	Evap.mm.d^{-1}	3.4	3.8	4.8	6.4	7	6.7	6.4	5.6	4.8	4.3	3.4	2.8	
El-Malease	Temp.°C	11	11.9	14.5	19.3	22.1	24.7	26.2	26.3	24.1	21.3	16.3	12.3	
	Rain mm	6.4	9.91	8.05	1.06	1.62	0	0	0	0	1.31	5.51	7.46	41.32
	Evap.mm.d^{-1}	3.3	3.6	4.3	6.3	6.9	7.4	6.6	5.9	4.9	3.6	3	2.5	
Faid	Temp.°C	13.9	15	17.3	21.5	24.7	27.9	29.2	29.2	27.1	24.3	19.3	15.1	
	Rain mm	6.4	3.2	4.98	2.71	0.78	0.03	0	0	0.04	0.32	1.86	4.79	25.25
	Evap.mm.d^{-1}	6.7	4.9	5.4	6.9	7	7	6.8	6.1	5.1	4.5	3.8	3.5	

Table (3.1): Main monthly Temperature, Rain , and Evaporation in the north Sinai (m/s) from some meteorological stations.

Section 4: Existing Environment

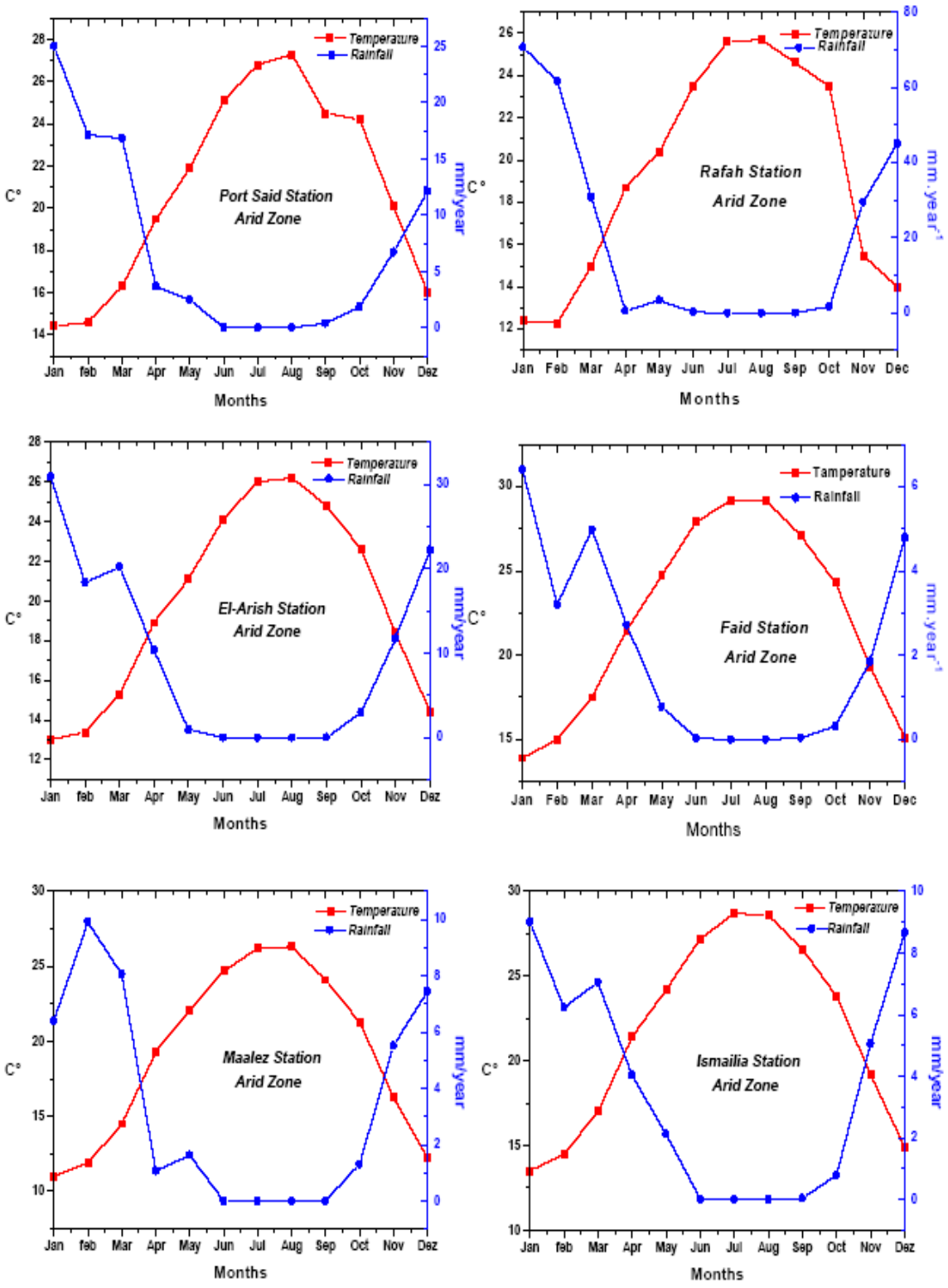


Figure (3.8)

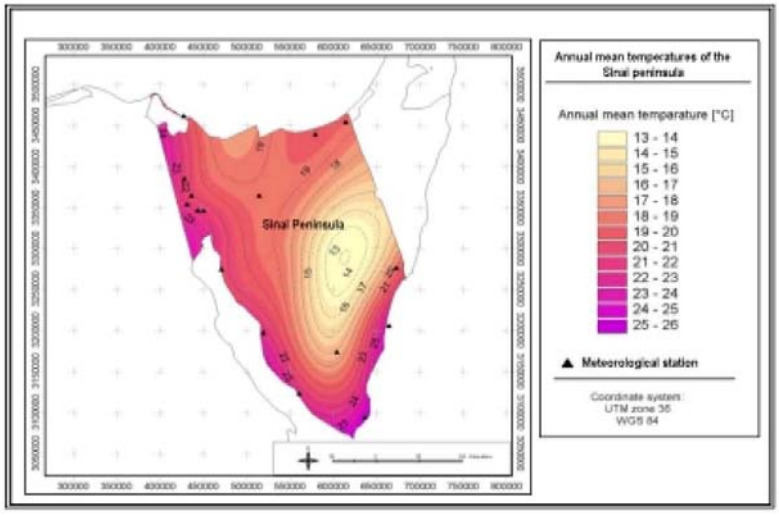


Fig 3.9 Map of annual mean temperature on the Sinai peninsula from different meteorological stations

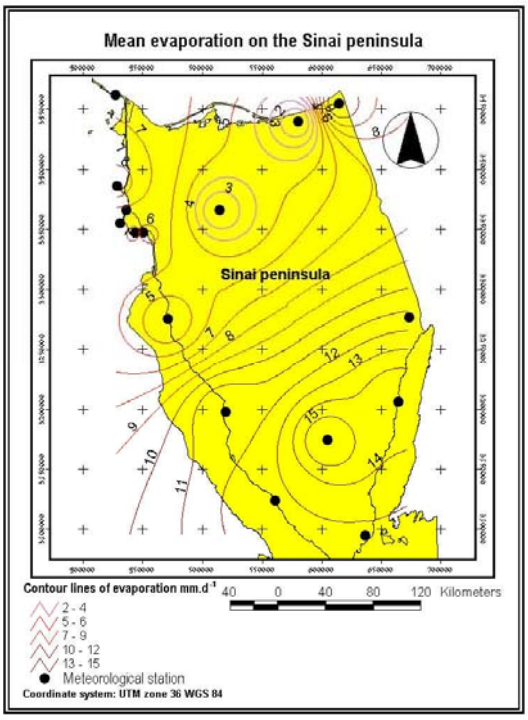


Fig 3.10 Contour line map of mean evaporation on the Sinai peninsula from different meteorological stations

The monthly wind speed in some meteorological stations ranges from 2.6 to 11.3 m/s. The wind denudes the summits and translocates the fine materials. The monthly wind speed for some of the stations at Port Said, El-Arish and Ismailia are shown in table (3.2).

Table 3.2: Main monthly wind speed in the north Sinai (m/s)from some meteorological stations.

Station	*Jan.*	*Feb.*	*Mar.*	*April*	*May*	*June*	*July*	*Aug.*	*Sep.*	*Oct.*	*Nov.*	*Dec.*
Port Said	9.3	10.0	11.3	10.4	9.4	9.0	8.4	7.4	7.4	8.0	8.3	8.4
El-Arish	7.0	7.6	8.8	8.2	7.6	7.6	7.6	6.4	6.4	5.8	5.8	5.8
Ismailia	3.5	4.0	4.7	4.1	3.8	3.2	3.8	3.5	3.0	3.2	2.6	3.2

Relative Humidity in the north Sinai reaches 73% at El-Arish during July and August. In winter, it reaches 75% in El-Arish decreasing to 68% in April and May. In summer it reaches 78%. During the El-Khamassin storms it drops to 10%. The highest values recorded in August are found between 71% and 75% in the Port Said and El-Arish respectively.

4.4 Physical and Biological Environment

Arid coastal zone of the Sinai Desert. Present, scarce water resources are rainfall (below 100 mm/year) and groundwater. Groundwater is available in limited quantities in shallow and deep aquifers and is often saline (2000-8000 ppm). The flow of the shallow aquifer is towards the north in the direction of Lake Bardawil and the coast.

The area is a rich and varied flora and fauna. Some 17 endemic plant species have been recorded in the inland desert of North Sinai. A number of mammal and reptile species occur with a limited regional distribution. The geographical position of the Sinai, a land bridge between the continents Eurasia and Africa, makes it a prime bottleneck for migratory birds. In particular the lakes of Bardawil and El Malaha (Lake Fouad) are of international conservation importance. The ecological significance of this coastal wetland is increasing due to the progressive degradation of comparable wetlands in the region. Large

numbers of Palearctic migratory birds, rest and feed there in Spring and Autumn before they continue their long journey. A total of 91 migratory waterbird species which are considered to have vulnerable populations in the Mediterranean basin frequent Lake Bardawil. Important species are Slender-billed Cull and Greater Flamingo. For broad-winged birds like birds of prey and storks the Sinai is important flyway on their yearly migration to the South.

North Sinai region has two small natural protectorates: The Zaranik and the El Ahrash - El Shamalia area. Zaranik comprises the eastern part of the Lake Bardawil lagoon.

4.5 Historic Environment and Cultural Heritage

The main archeological importance of Sinai is the wealth of information available in the area about the relation between the various world civilizations. There are no other places in Egypt or the Middle East, that has been influenced by so many varied cultures.

Throughout man's history, North Sinai has been a cultural land bridge between Asia and Africa. Numerous armies (more than 40) passed through Sinai and a continuous cultural intercourse took place. In the Middle and New Kingdom, the famous "Ways of Horus", a military and commercial road connection reinforced with forts and check posts, facilitated the economic and administrative expansion of the Egyptian empire under the pharaohs in the rest of the civilized world. The Tina Plain was a prosperous agricultural area harboring a network of irrigation and navigation canals, belonging to the oldest in the world. Also during the Persian and Classical period the area was frequently travelled and wide variety of settlements, buildings, objects and other traces were left behind of several civilizations of the Levant, Asia and Europe. This continued during the Byzantine period, the Middle Ages and the Arab period.

Hardly any systematic surveys have been made so far, except one during the Israeli occupation. Most of the unique scientific evidence, therefore, and many unknown treasures are still covered under the sands and will be lost if no measures are taken.

The population of North Sinai is mainly of Bedouin origin, although many urban inhabitants are non-Bedouin. Only a minority of the Bedouin still practice the traditional life- style, which is adapted to the desert environment, most have settled in rural communities. There is a strong local cultural consciousness under the Bedouin tribes in Sinai, which is reflected in the preservation of values and traditions and in the customary law which is still applied with the consent of the Egyptian administration. There is a growing official recognition of the uniqueness of the cultural and tribal diversity of North Sinai. This has led a.o. to the founding of an organization for the preservation of cultural heritage, an etnographic museum, and various publications on specific aspects of Bedouin culture (e.g. customary law) etc.

4.6 Socio-Economic Environment

The population numbers over 50,000 (47,000 persons 1988 figure). Most people live in Bir el Abd and Hasana district. Many have settled in the villages along the main El Qantarra - El Arish road, where there is direct access to piped water. A wide range of economic activities is found in the region, the most relevant being agriculture (both traditional rainfed agriculture and modern drip irrigation) and livestock rearing. Date trees are still important for the Bedouin farmers. Agricultural statistics are scanty; the impression is that the area under drip irrigation has increased considerably during the last 5 years. Vegetables (tomato, cucumber and melon) and fruit trees (olives) are important crops.

Lake Bardawil is one of the best fishing areas in Egypt and about 3000 fishermen and their families around the lake depend on this activity. There are

four fishery cooperatives. Recently the activities have been expanded and there is export of high-priced fish to other Mediterranean countries.

Industrial activities are limited to a local mine in Meghara and salt winning in the natural protectorate of Zaranik. Other activities in the area includes hunting (waterfowl) and bird harvesting (quail and falcon).