# Environmental problems and the alternative options in North Sinai

## An Applied Study in the environmental geography


## Summary

By studying the physical characteristics of North Sinai's environment, it is obvious that it suffers from some problems, comes from interaction between environmental physical parameters, which is exacerbated by human's negative activities.

From studying the geological properties of the study area, it was found that the Holyosinic formations were the dominant largest geological formations, accounting 5.59% from the total area of North Sinai. This was reflected on the domination of sand dune deposits and flats known as sea sands of north-western Sinai. That might be represented main constraint for development in this region.

Study area's morphology consists mainly from limestone and sandstone driven from geological era between the Jurassic and Holyosinic era. This contributed to the diversity of soil in North Sinai. Soils ranged from sandy, floodplains and salted calcareous. The study indicated that a strong correlation between the features of morphological and soil components has been found. North Sinai's soil had a very low organic matter, low clay, high proportion of salt as well as high porosity as it does not retain water for a long time. All these soil properties considered as a main problem of agricultural development in the study area. Therefore, the soil requires a good water quality for irrigation to wash salts and addition of gypsum to equalize the acidity of soil in the study area to make it more suitable for cultivation.

The current study showed that the climatic conditions in North Sinai play an active role in the emergence of many environmental problems.

Temperature is extremely high and varied from place to another. The temperature had a significant indirect impact in increasing humidity and increasing evaporation rates. The average annual evaporation in the summer, reached 3.3, 6.4, 14.4 and 12.1 $mm.day^{-1}$ for Rafah, Al-Arish, Elmagharah and Nekhel region, respectively with highest temperature value that reached 24.7, 17:00, 25.4 17, 26.6 17 and 25.7◦C for the same region, respectively. The high temperature values contribute to increase evaporation of precipitation, as well as moisture intensifying on the surfaces of sand dunes, thereby remaining loss sand, and thus can be moved by the wind. In addition, increasing temperatures cause evaporates from Sabakha and Bardawel Lake regions which increase soil and Lake salinity threatening the lake ecosystem.

Regarding the wind effect, the study showed that the dominant wind trend is the Northwest, which is consistent with the axes of dune longitudinal deployed along the international road (Kantara – Rafah) resulting in a constant threat due to encroachment sand on the road, and works to disrupt traffic. On the other hand, the study revealed that the winds of the depressions air occur in the spring, is caused by sand storms, which affect the environment of North Sinai, especially inland areas. The number of storm days in Nekhel was 16.1 days which lead to uproot the Bedouin tents, wandering goats and stopped grazing.

The available water resources in North Sinai are mainly related to quantity of rainfall. The Northern coastal plain of North Sinai had a highest rain rate. The rain rate increased in the east. The average annual rainfall in El Arish reached about 103.8 mm per year and in Rafah 304.5 mm per year. This was reflected on the availability of water resources as we head east direction.

Current study monitored many of the problems that threaten the environment of North Sinai. The coastal environment in North Sinai is

suffering from the problem of changes in the coastline as a result of the activity of erosion processes, particularly, a local impact factor and rising sea levels in the world in as a result of global warming. Also a negative contribution by Human increased the coastal change problems where the establishment of Arish Marine Port and a break-wave influence the direction of water currents and thus increase rates of sculpture. The study also found that the presence of changes in some sectors of the coast was the move back of the coast or sculpture once again by which the last one is more serious. The most affected sector extends between Alskaskh to Reisa east of El Arish, where the amount of sculpture in the period From 1987 - 2003, about 200.3 meters at a rate of 12.5 m per year. This might be due to the movement of the sea waves that driven by the dominant wind as well as straightening the coast in that region, which increases the activity of wave energy and help increase their capacity to sculpture. On the other hand, Bardawil Lake is the most regions where the amount of precipitation reached about 382.44 meters, which threatens siltation of the lake's inlets.

The study reviewed some options and alternatives to address these problems of retreating coast of North Sinai. The most important factor is to reverse the trend of heads of the break-wave to be parallel with the coastline, and modify the route of the west barrier in El-Arish Marine Port so skewed toward the east to be parallel to the direction of the dominant sea current. The current study provides a unique solution to protect the North Sinai coastline from sculpture; Transplantation of Mangrove plants from their original sites to the study area are very promising by which they helps to prove the soil and protect the beach.

The study showed serious problem of sand dunes movement on all human activities, especially the various development projects. The study also explained the problems that faced El-Salam Canal project in Bir al-Abed where sand dunes movement ranging between 4.8 m per year in the west of Bir al-Abed, and 3.9 m per year in the east of Bir al-Abed. This is

threatening the canal stream by burden with sand. Therefore the current study offered ways to stabilize sand dunes, where spraying is bitumen's suspensions and poly-acrylamide while the program of planting the best way to permanent stabilize sand dunes. The success of the planting program depending on the type of the plant such as Adr , Akrash and Alsmam.

Through the study it became clear that there are some environmental problems caused by the negative contribution by human activities including environmental pollution. Egyptian Rafah coastal area are suffering from increasing the population density of colon's bacteria which ranged from 390 and 860 cell per 100 mm of sea water. This is due to Israel's municipal disposal to Mediterranean Sea which affects the validity of the water and exposure their users of diseases.

The study monitored the current status of the palm trees in North Sinai which is a component of the tourist attractions as the aesthetic appearance and a unique figure in the beach of North Sinai. The estimated number of the missing trees till 2008 was 11955 palm trees.

The study found serious withdrawal excessive pumping of groundwater, where the rate of withdrawal from groundwater reached about 205915 m3 per day. This reflected on the water salinity, ranging from 864 ppm and 10 432 ppm. The study showed that around 80% of the water wells that were analyzed represented poor water quality for irrigation in accordance with international standards, so we must reduce the rates of withdrawal.

The study also showed that the mining activities was depleted as a result of the negative use of the human being, where the volume of exploitation of 88 thousand m 3 in 19981 up to 8922 thousand m3 in 2008.

More recently, the study assesses the environmental impacts resulting from flooding happened in January 2010. It was the most important renewal of the valley, to his youth in the area of the estuary, where the rate of sculpture increased in some places to reaches 4.5 meters above the bottom of the valley of El Arish. This could lead to environmental disaster in the Geranata region as a result of attack of sea and fall of everything and therefore all the facilities in this region may collapse if it is not feeding the beach by the sediments.

Over fishing in Bardawil Lak resuled in stopping export of the high quality fish since 2005, due to change in biota structure of the lake, and the appearance of crab, such as poor at the expense of the best types of economies such as seabream and grouper.

The study recorded the environmental risk on North Sinai from many of the problems coming through the border, such as snails that heavy crawl to the region, which threatens plant species in Rafah and Sheikh Zuwaid.

Finally, the study clearly showed that the solution of environmental problems in North Sinai must be based mainly on future development plans. To adopt such plans, it should be study the integrated scientific, followed by an integrated planning come together by the efforts of the various scientific and executive bodies. Because of the unity of the nature ecosystem, all environmental elements must be addressed together. Solving some elements but not the others, does not represent a radical solution, due to overlapping the ecosystem items and their interaction with each other.