

Acknowledgement

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Sinai Governorate in a Glance

1.1 Location and Administrative Borders

The North Sinai Governorate is located in the north eastern sector of Egypt between a longitude of 32, 34 East, and a latitude 29, 31 northward, within the following borders:

-Northern Border: a 220 km extension on Mediterranean coast from Balooza in the west to Rafah city in the east

-Western Border: A line that extends along the Mediterranean coast north to south of Mitla Ganub (Southern Mitla)

-Eastern Border: Extends from Rafah on the Mediterranean coast to Ras El-Naqab southward, which is Egypt's international eastern border (northern Taba).

Sinai officially joined the local administrative units' authorities for the first time by virtue of Presidential Decree 811/1974. In addition, Decree 84 of 1979 was issued on dividing the Sinai Peninsula into two northern and southern governorates. Accordingly, Northern Sinai governorate includes six administrative districts within its official zone, covering 82 villages, 458 affiliates as well as 11 police stations.

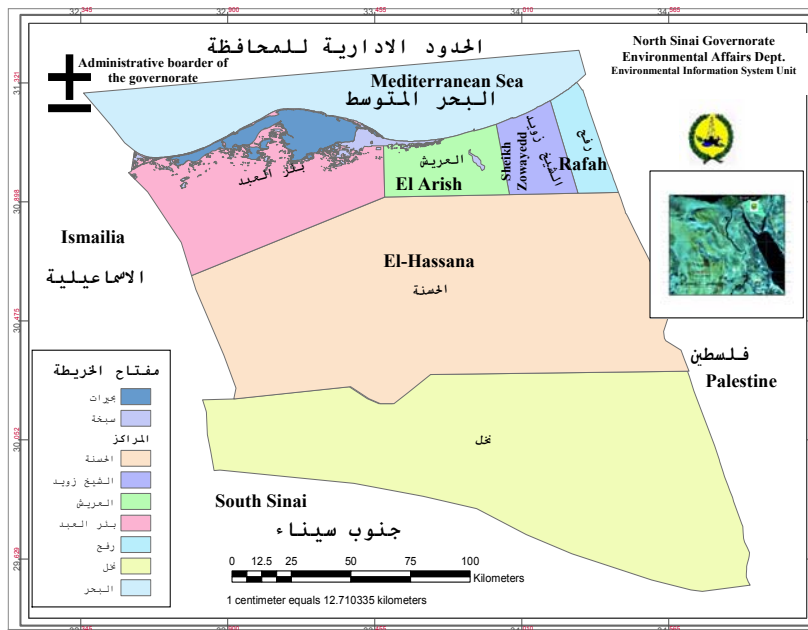


Figure (1) Organizational Chart of North Sinai Governorate

1.2 Physical and Geographical properties

1.2.1 Area

The area of North Sinai governorate is about 27,564 km² (or about 2.8% of overall area of Egypt)

1.2.2 Rainfall

The annual rainwater amounts falling over the peninsula, according to the meteorological data obtained from the weather forecasting stations in Sinai, are generally less than 200 mm in far northern zone at Rafah and El Arish, and are less than 20 mm in the lower south at the area of Ras Mohamed. Excluding from these data is the high mid southern areas (the mountain region), where the annual rainfall amounts thereon range from 50 to 150 mm. Central Sinai, known as the Hills region (Hiddab zone), is regarded as the most dry zone in the peninsula, where maximum annual rainfall amounts to about 30 mm. accordingly, rainfall cannot be solely depended upon in agricultural development purposes in these middle areas of Sinai, in comparison to other zones extending along the northern coast which can accommodate permanent cultivated fields/villages.

The minimum annual rainwater falls usually on the coastal zone, and diminishes quickly as we go inland. The average rainfall amounts range annually from 80 to 100 mm only, while this amount reaches 150 mm on the western desert coast. In addition, the annual rainfall amounts increase on the coast as we move eastward by about 80 mm and 100 mm in Rafah and Gaza respectively. The amounts of rainfall decreases whenever we move inland as it reached 50 mm at latitude 30' 30' northward and to about 25 mm in Nakhl and 20 mm in both Suez and El-Tor. Meanwhile, the amount of annual rainfall ranges on the southern heights between 50 to 75 mm.

In winter, rainwater falls in the form of sprinkles reaching its maximum amounts in the months of January and December. The amounts of rainwater falling daily may reach up to 30 mm or more. In spring, the rainfall obviously decreases in comparison to winter, but may be accompanied with thunders and flows abundantly sometimes causing torrents in the areas exposed to rainwater sliding. No rainfall is depicted in summer, while in autumn; late October and November are both characterized by strong sprinkling rainfall that may result in torrents in water sliding areas.

1.2.3 Wind

In winter, the wind is generally changeable, but is characterized by the blowing southern winds that range from moderate and light wind, that may reach a speed of 50 km/hr once or twice every month. In spring, the wind is also changeable and blows from the north and northeastern directions, plus blowing also from the southwestern direction mostly in the morning. The hot southern wind may be heavy on the advent of air depressions, causing sandstorms once or twice per month. In summer, the dominant wind direction is mainly north and northwestern.

1.2.4 Temperature

During winter, temperature degrees decrease, where the average high degree at noon reaches 20 °c, while the low degree may average to about seven degrees in the early morning, but may drop to below zero degree in high inland. In spring, the temperature degrees are changeable, where the average high degree may reach about

26 °c, and a low of about 13 °c, although the hot Khamasein wind waves may increase the temperature to above 40 °c. However, in summer, temperature degrees become moderate near the coast and increases as we move inward. The average high temperature degree may reach about 33 °c, while the low temperature degree may reach about 18 °c. Temperature degrees are almost equivalent in autumn and spring with a tendency to increase, with an average high degree of about 30 °c and an average low degree of about 15 °c. During times of hot waves of weather, temperature degrees rarely exceed 40 °c.

1.3 Population

The population in North Sinai governorate is estimated at 351,953 citizens. The percentages of population dwelling in the six districts are based on the data of 2007 Census as follows: Al-Arish (39%), Rafah (17%), Beir El Abd (16%), Sheikh Zowayedd (13%), Al Hosnah (0.9%), and Nakhl (0.6%). The urban population is estimated at 58%, rural population at 42%, while percentage of males reached 52% and females 48%.

1.4 Economic Status

1.4.1 General Description:

The average per capita share of GDP is estimated at 4287.1 dollars, equivalent to LE 6908 in 2003 (Human Development Report of 2005). North Sinai is not considered a poor governorate, as it occupied the eighth level of the 26 governorates nationwide.

The number of population within the labor power is estimated at 51.84%, while outside the labor power is estimated at 48.16%, and unemployment constituted 12.7%.

1.4.2 Agriculture

The cultivated land areas are estimated at 174,558 feddans, which constitutes 2% of total governorate area. Field crops areas reached 38,256 feddans, which constitutes 22% of total cultivated lands. This includes the fruits-cultivated lands of 96,306 feddans, constituting 55% of total cultivated lands. The area of palm trees cultivated lands reached 8,408 feddans, constituting 5% of total cultivated lands. The area of reclaimed lands reached 300,000 feddans, constituting 5% of total governorate lands. Agricultural sector manpower figures 18.1% of total governorate manpower.

1.4.3 Industry

Industrial sector manpower reached 13.1% of total manpower, working mainly in crafts workshops and intermediate industrial facilities, focused in Al Arish by 63.5% while the remaining is distributed among the other five districts.

1.4.4 Constraints Affecting Economic Status:

Several constraints negatively affect the economic capabilities of North Sinai governorate, including:

- a) The issue of governorate land ownership
- b) Canceling subsidization of some commodities
- c) Criteria for loaning credits offered by Social Fund for Development (SFD) and banks
- d) Lack of permanent water sources to be utilized in irrigation of agricultural development projects
- e) Negative impacts resulting from economic shift policies
- f) High normal increase rate of 2.68% in comparison to other nationwide governorates which is estimated at 2.04%
- g) Increased unemployment rates
- h) Increased illiteracy rates, especially among rural women

1.5 Basic Services

1.5.1 Health Care Services

Average human lifetime is a major indicator of human development. On the national level, human lifetime average in Egypt reached 70.6 years in 2004. It is noteworthy that this average has increased significantly after it was 55 years old in 1976, which reflects the improvement of health conditions. The average human lifetime in North Sinai governorate is approximately the same on the national level, as it reached 70.7 years old in 2004, compared to 53.6 years old in 1976.

In 2000, child mortality rates reached about 3.9%, and then it decreased during 2001 throughout 2003, followed by a increase during 2004 till it reached 6.1% of total infants born on the governorate level. This rate further decreased in 2005 as it reached 2.44%. Adult mortality rates decreased due to the increasing number of physicians, after there became one physician for 2204 citizens. In addition, the number of hospital beds increased to become one bed for each 6.7 individuals, in addition to a paralleled increase in the number of health care units, by virtue of which every unit serves a number of 6,205 citizens, according to the health indicators received from the Information Center

Newborn Infants

Al Arish district has the highest birth rates due to its dense population and available health care services. The districts of Al Hosnah and Nakhl are the least in terms of new born infants due to its low dense population rates.

Mortality Rates

Al Arish also has the highest mortality rates due to its dense population rates unlike Nakhl district which has the least mortality rates due to its low population density.

Easily Exposable To Diseases

Al Arish also witnesses the highest rate of infection with resilient epidemics/diseases reaching 49.5%. Next comes the city of Rafah. Infection with inkle stoma (Iscaris worms) is highly noticeable in the Beir El Abd district, while the highest rate of infection with ameba is highly noticeable in AL Arish. These infections are related to the deteriorated quality of potable water.

Health Hazards

North Sinai is a bordering zone that is subject to several health threats, of which the most important are:

- The excessive usage of pesticides and insecticides due to expansions in protected cultivation (greenhouses), and the consequential hazardous health impacts on the public due to the pollution of potable water and/or crops.
- Increasing salinity of potable water wells in Rafah and El Sheikh Zoaid
- Potential impacts due to the introduction of El Salam Canal and the reused wastewater, which must be mixed with a ratio of 1:1 of Nile waters and Agricultural wastewater, while containing salts and remnants of pesticides of all types, and the consequent impacts on the produced vegetables and fruit crops
- Dominance of environmental health threats such as tuberculosis and lishmania diseases resulting from mining operations such as working in exporting of

coal, ceramics, white sands, and quarry operations and the resulting gravel and gravelly soil.

- Potential pollution of seawater (seas and lakes) due to the oil spills leaking from passing and anchoring vessels at Al Arish harbor
- Dumping of rotten dead animals by the passing vessels /carriers (loading sheep and cows, etc)
- Existence of several pollution aspects on the borders, including:
 - a) The existence of a wastewater pond originating from the Palestinian Rafah city located immediately on the eastern borders of Egypt
 - b) The existence of about seven nuclear reactors adjacent to the Egyptian Israeli borders, namely the Israeli Daymonah reactor
 - c) The commodity transaction activities between Israel, Palestine Jordan, and Gulf countries and the potential consequences of transmission of diseases and pollution through commodity exchange. These threats necessitate conducting studies and follow up activities, in addition to developing various criteria to preserve the food environment. This is represented in food commodities and agricultural crops.

1.5.2 Education

Increasing number of students in proportion to the teachers in the districts of Al Sheikh Zoaid and Beir El Abd, accompanied with an increase in the number of girls in education in the city of Al-Arish.

The average number of students in proportionate to every primary education teacher 6.9, and is lower in the districts of Al Hasanah and Nakhl, while the average number of students for each preparatory education teacher is 5.1. In addition, the density of primary classrooms is 26.4 students, while it reached in the preparatory classrooms 25.4 students. Invalid school buildings constitute 40.1%.

Illiteracy rates in Egypt decreased from 55.4% to 39.2% during the period from 1976 to 1996, while the illiteracy rate in North Sinai, according to 1986 Census reached 48.8%, which decreased in 2006 to reach 6.4%.

1.6 Principal Utilities

Households connected to the wastewater services on the governorate level constitute 36%, while areas deprived from this service constitute 64%. Meanwhile, the governorate rural areas do not have access to any wastewater service.

Some governorate urban areas (cities/towns) receive the wastewater service through connections with the WW system and the wastewater treatment plants such as the city of Al Arish and partially the city of Beir El Abd. Other governorate cities do not include any wastewater systems, and are witnessing currently the establishment of these facilities such as the cities of Rafah and El Sheikh Zoaid, while such constructions are still pending for other cities such as Al Hasanah and Nakhel

North Sinai Governorate includes three main water sources, as follows:

- 1-Rainfall and torrential flows
- 2-Underground well waters
- 3-Transported water

The 2005 Human Development Report provided a description of the principal utilities and services at the North Sinai governorate, indicated as follows

Households receiving power supply service	94%
Households receiving telecommunications services	83%
Households receiving safe potable water supply service	90.6%
Households receiving safe wastewater services	91.3%
WW Deprived citizens	25,100 individuals
Potable Water Deprived citizens	20,500 individuals
Number of Poor Citizens	47,000 (2002)

1.7 Natural Protectorates

1.7.1 Al Zaraneeq Protectorate

Al-Zaraneeq protectorate is related to the wetland protectorates in the Mediterranean, with an area of 250 km², representing permanently or temporarily water submerged wetlands (68%) thereof, while the remaining space (32%) represents the sand dunes areas. The protectorate is located on the eastern section of Bardaweel Lake about 35 km west of Al Arish city, and 120 km far from the Suez Canal. Al-Zaraneeq was the second announced protectorate in Egypt in 1985.

Al-Zaraneeq is a major route worldwide for hundreds of thousands of rare and migrating bird species who come annually from mid and north Europe, Russia, Turkey, and Greece fleeing the harshly cold weather and seeking the warmth of Egypt's lakes. 274 aquatic bird species have been registered while seeking a space for rest and nutrition transit before resuming its journey to mid and South Africa. These species include Al Basharosh, Al Laqlaq, European fisher, Seagulls, and Al Sharshir, in addition to predatory bird species. Another eleven terrestrial wild animal species have been registered in the protectorate including the jerboa, the hedgehog, Qadi El Gabal, and Egyptian Terrestrial tortoise. In addition, 155 plant and pasturing species and other natural shrubs grow on the sands of the protectorates including Al Apt, Al Ader, Al Mitnan, Gharqad, and Saqn El Gin. The protectorate is a major habitat for the reproduction of green and big headed sea tortoise (Al Tersah).



Figure (2) Some Bird Species In Al-Zaraneeq Protectorate



Figure (3) Some Plant Species (Flora) In Al-Zaraneq Protectorate

1.7.2 Coastal Jungle Protectorate

In 1985, the coastal forest protectorate at the Egyptian city of Rafah was announced as a natural protectorate covering the area from Al-Arish El-Bahari in the west to the Egyptian Palestinian borders in the east. Due to lack of development and/or preservation programs for the protectorate, citizens were allowed to reclaim and cultivate the land by virtue of agricultural possession licenses issued thereto. Hence, the protectorate area has diminished till it reached now 6 km² in the far northeastern section of Rafah. However, recent initiatives to develop and upgrade the protectorate have started already.

The biodiversity in said forests is characterized by many wild plant species (flora), including some medical plants such as basil and Ader, and others for sandy soil stabilization, in addition to Acacia and Athel, Al Serw Al Amoudi and Lemonite Camphor. Among wild animal species (Fauna), there is the wild rabbit and fink foz, which is among the endangered species. The protectorate also includes many reptiles such as Sinai Hardoun and the bald snake, the only poisonous creature on the protectorate, Qadi El Gabal, chameleon, and lizard, which is not poisonous as rumored to be and despite its frightening appearance. In autumn, the protectorate attracts some species of immigrating birds such as falcons, hoopoe, white and yellow Abo Fasada, in addition to resident birds such as the blackbird, Hassoun, Senegalese Karawan, Qonborah, and Arabic nightingale.

2.0 Governorate Actual Environmental Profile

2.1 Introduction

The environmental profile of North Sinai governorate was issued on the form of a 300 page illustrated encyclopedia supplied with basic data, geographical maps, and an analysis and functioning of the data included in this profile according to realistic indicators that are based on the current and dominant conditions as well as on local and national policies.

This highly esteemed environmental profile, in dealing with the awareness of environmental issues, the highly stylized scientific analysis, and the economic dimension of issues, is targeted to upgrade the awareness on the part of the official executive level and the national popular level to a high standard of maturity and preparedness for the events according to the givens included in this profile. This profile included the major environmental problems that require research and study, to produce the ultimate goal of developing the governorate's Environmental Action Plan (EAP) that must include the activities and projects within a specific period of time and must cover the aspects of preserving the natural resources, and supplying potable and irrigation waters, facing the challenges of the reduced groundwater reserve production, in addition to the relative deterioration of the well water quality. Included also shall be the biggest problem of seawater entry into the groundwater reservoir in the coastal belt along the whole governorate shoreline, which hosts several governorate popular vegetable and fruit crops, which in turn had established settlements for big numbers of citizens and had changed the social life pattern from nomadic to settlement in major cities that enjoy all urban, social, and economic services as befitting the urbanization of Sinai and enhance the guarding security of the Egyptian borders. All these factors are derived from the volume of agricultural investments and its consequences represented in the available groundwater to date of developing this plan. An overview of these factors, we can understand the threats of altering the water quality, which is also reduced to the extent of threatening to deteriorate the crops and the cultivated lands.

2.2 The Main Environmental Capabilities Reviewed In the Profile:

2.2.1 Tourist Capabilities:

Sinai was honored by being a gate for the three monotheistic religions, when God Almighty has spoken to the prophet Moses, and through Sinai the Holy Family transited on their way to Egypt while fleeing from the Roman dictator Herodus. Later, Amr Ibn El Aas crossed Sinai on his way for the Islamic conquest of Egypt. Sinai has always been a terrestrial pilgrimage road for Muslim pilgrims heading to Mecca from North Africa and Arab Maghreb countries. Sinai also hosts military castles on the way such as Nakhl castle in Nakhl city, Soliman Al Qanouni in Al Arish, in addition to the ancient monuments in Al Pharama, Feloceyat in west of Al Arish, the red hills in east of Al Arish. In addition, Sinai is the Eastern Gate to Turkey and Europe. Some of these iconic features empower and qualify Sinai to serve as the biggest historical tourist destination on the religious, economic, cultural, and military levels, as a history calendar for war and peace.

The profile has further enhanced the importance of old wadis (valleys) and the mountains, being among the distinguished basic capabilities of the desert safari tourism, including mountain sightseeing and hiking. These mountains are classified

as religious mountains as Jabal El Halal, mountains with flowing springs such as Jabal Ain Qeddis and Al Godayrat, and other mountains with utmost astronomic and geological importance such as the series of Al Maghara Mountains, which constitute as a whole a universal pillar of high importance, and which requires a more in depth scientific review.

2.2.2 Medical Plants

The profile also reviewed the medical and aromatic plants, especially the flora existing on the extensive governorate lands. These plants extend to the surrounding countries under different names in Jordan, Syria, KSA, Palestine, occupied territories, Kuwait, and Qatar , where the citizens of said countries use for treating same diseases.

However, this profile has indicated that Sinai is characterized exclusively by 25 medical plant species. It is noteworthy that Sinai is away from pollution, and its strong genes are not weakened by other species of plants. This would qualify Sinai to serve as a basic pillar for genetic engineering, in addition to serving as a source of many medications and anti-germs and anti-microbes. One of the unique sights is the solely dominant type of plants in adjacent areas who are similar in soil and climate properties. One can observe vast areas only covered by Al Tamam plant, and others covered with Chamomile plant, and red onions are hiding between the cracks of Al Magharah mountain in a extending colony unlinked to heaven and to earth except through these adjacent mountainous pockets, all in a unique carnival-like settings inside these vast high-humid valleys.



Figure (4) Wadi hosting medical plants beside Ain Qeddis

2.3 Major Environmental Problems Tackled By the Profile

2.3.1 Marine Water Problems

The profile further tackled the vital importance of the preserving the sustainability of pure marine water (sea and lakes). The profile highlighted the threats to which the Bardaweel Lake, the cleanest lake in the Middle East, is exposed. These threats are mainly attributed to lack of following up of incoming and outgoing vessels/ships at the unmonitored point, that is, at the access point to the Suez Canal from the Mediterranean Sea, the matter which doubles the risks of polluting the Bardaweel Lake.

The profile also referred to the danger of dumping dead animals across the sea from transiting vessels and ships loaded with such animals. This rejected behavior has actually opened the way before a special type of pollution, represented in threats of overseas transmission of common human and animal diseases.



Figure (5) Drainage in the sea fro Palestine

2.3.2 Groundwater Problems

This profile is characterized by highlighting the threats resulting from reducing groundwater due to irrational drawing of water. The groundwater reservoir level has a proven drop to depths ranging from three to seven meters in some areas. It is noteworthy that the governorate includes almost 3,000 governmental and non-governmental wells that produce about 300,000 m³ of water on daily basis, to offset the rainfall shortage, in addition to the witnessed decrease in water pump production which approximately produces 35,000 m³ on monthly basis. On assessing the situation given the vast area of the groundwater reservoir, the results will be unfavorable. The drop will reach millions of cubic meters of water, in addition to alteration of the water quality and high salinity, which will ultimately result in the deterioration of several plant species and threatening habitats in the whole area.

2.3.3 Agricultural Environment Deterioration

Creeping Snails

Among the problems cited by the profile is the emergence of an unprecedented agricultural problem in Egypt, that is the unexpected intensive crawling of snails

across the borders climbing over plants, reaching 25 snails on a single plant, which leads to the rare drying of plants. The profile also draws high attention to a military threat due to the fact that Sinai hosts about five million mines planted in its territories, being a broad arena of wars, posing a challenge that delays development and settlement in Sinai.

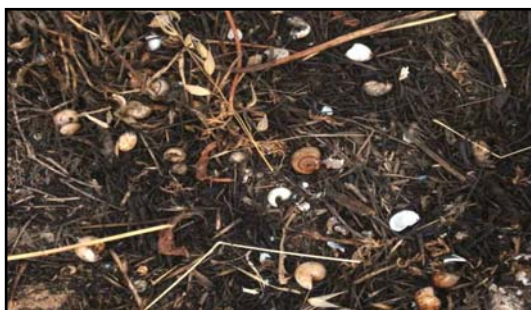


Figure (6) Wild Snails Crawling from Israel

Pollution from Pesticides

On studying the Environmental Profile, one must realize the intensive use of pesticides, insecticides, hormones, organic and chemical fertilizers, especially on the protected cultivation which saved Sinai from poverty and production shortage of agricultural crops, and has established the fundamental conditions of settlement and urban communities therein. This agriculture has totally stopped the nomadic Bedouin lifestyle turning Sinai into an area secured by civil defense as a permanent shield to development and national security. This requires that EAP focuses on the necessary protection of agricultural production capabilities to serve as a poverty-fighting pillar while preserving public health in order to standardize the usage of these components and proceed towards an integrated combating of agricultural pests, which still remains a reiterated unapplied recommendation.

Nakheel Coast Erosion

The profile also underlines the shortcomings in the integrated management of coastal areas, represented in the construction development density that has totally occupied the sea and lake shores, which has veiled the water cleanliness and postponed the tourist utilization of water and shores. The EAP must refer to activating the six rules of the integrated management of coastal areas, preservation of shores, and prohibiting the construction of any real estates that creeps illegally on the shoreline. Sinai lost 80% of its palm trees, which used to serve as a prominent feature thereof. The Cornish in Al Arish city was about to collapse due to shore erosion. Hence, the North Sinai EAP must contribute to the protection of the remaining lands that are currently exposed to deterioration with all its fauna and flora biodiversity.



Figure (7) Al-Nakheel Coast- Al Arish

2.3.4 Bardaweel Lake Pollution

Among the problems cited by the profile is the ecological imbalance in the lake environment, according to the data that indicates an alteration in the quality of fishes and crustacean species, and the emergence of new types of thorny snails, in addition to the gradual extinction of Denis fish, and the sudden appearance of Egyptian Bolti fish, a specie of fish that usually lives in rivers and fresh water.

This necessitates the importance of conducting sufficient studies and researches and recommends pilot and exemplary hands on projects to find the proper solutions and procedures to regain the natural balance of the sea and lake environment.

3.0 Environmental Action Plan (EAP)

3.1 Introduction

God has granted Sinai several mineral wealth, and quarrying and building materials that requires the existence of local industries that are based on these resources instead of exporting them as primary raw materials. Although these industries shall create many job opportunities and add to the national economy, as well as upgrading individual standard of living, it will undoubtedly have a negative impact all environmental constituents due to the industrial emissions, effluents and wastewater resulting from operation. Due to the expected impact on environment in general, these impacts should be taken into consideration based on scientific facts for the best utilization of resources and preventing any hazardous impacts on all environmental constituents within a consistent framework of maximized development and the controlled potential impacts thereof.

Due to the important natural capabilities and resources gifted to Sinai, hence the principal message or the main tasks necessitate developing the basics of activities that will improve the quality of life on the governorate territories and provide a future vision for the environmental action according to the environmental problems and issues included in the plan, and the latent capabilities that serve as strengths vs. weaknesses aroused by these problems. These problems include citizens' and government requirements and aspirations in various environmental and developmental action sectors, in order to supply urban services and scientific solutions for many environmental problems that are formed into applicable projects if finance is available especially as executive expertise is available at the governorate. The planned studies have depended on the information included in the environmental profile of the governorate, which has clearly identified the environmental issue and determined the environmental action priorities. The plan has also depended on competent reports that covered sustainable development topics. These reports were written through the collaboration of the main sectors concerned with environmental action fields of health, agriculture, Local administration units, industry, mining, education, social insurance, irrigation, water resources, in addition to potable water and coastal protection sectors.

3.2 EAP Objectives

- A) Improve environmental quality in order to upgrade the standard of living of the governorate citizens, and supply them with urban services, and in order to deal directly with local environmental issues that affect the population and their environment.
- B) Apply the planned scientific methodologies in planning, identify problems and available capabilities, and compute the strengths and weaknesses on executing giant projects and sustainable development programs in all relevant fields.
- C) Apply the principles of sustainability and consistency between development and environmental protection
- D) Provide basic principles that lead to the adoption of well studied procedures to review and evaluate prioritized initiatives that ensure the improvement of the

processes of planning, resource distribution, enhancement of service utility efficiencies, improvement of health and living conditions, and enhance the feeling of loyalty to the surrounding community and ambient environment, in addition to raising the public awareness on environmental issues.

E) Improve water quality, increase its quantity, and ensure its sustainability.

F) Attract citizens to settle and dwell in the area

G) Combat poverty by improving the living conditions of needy categories

3.3 EAP Development

The procedures of studying the local environmental plan have started by forming senior workgroups in various sectors. These workgroups included representatives of concerned authorities/sectors, the environment departments, Suez Canal University. Once formed, these groups started convening several meetings and prepare technical reports on the environmental conditions in every sector in terms of: the current conditions, issues and problems, analysis of causes, and problem solving. This was followed by identifying priorities in each sector and setting the project outlines that are capable of remediating or minimizing the impacts resulting from such problems.

Workgroups were classified based on sectors as follows:

1. Agriculture and Fish Wealth Sector
2. Integrated Water Resources and Wastewater Management Sector
3. Biodiversity and Natural Life Sector
4. Quarries, Mining and Industry Sector
5. Integrated Coastal and Tourist Development Areas Management Sector
6. Solid and Hazardous Wastes Management Sector

The sectors' meetings were preceded by a broad scale conference comprising all workgroups participants, where discussions tackled the approach in preparing the work plan and the tasks to be assigned to each group and the methodology of preparing the final report of each group. Competent experts in each concerned sector were consulted to facilitate the tasks of each workgroup and help in preparing the technical reports for groups.

This was accompanied by conducting intensive consultations on environmental issues and priorities with all community categories and beneficiaries in each sector, while focusing on poor categories or low income brackets, as well as dependence on statistics and databases available at the information center of the governorate and its various directorates. The final report shall be referred to the higher environment committee for review and approval of issues and priorities. It is noteworthy that the consultation process has highlighted many positive and negative aspects of environmental activities, especially as regards the relationship between these issues on one hand, and the poverty, settlement, and women role marginalization problem, in addition to the environmental awareness level of these categories.

3.4 EAP Principles

The Sinai EAP is targeted to create an earnest participation between all governorate local authorities through ensuring new cooperation standards, improve understanding among citizens via enhancing common responsibility towards upgrading the standard of living in consistency with nature and avoiding environmental hazards. In order to achieve sustainable development taking environmental protection as an indivisible portion of the development process, the following principles are taken into consideration under the umbrella of environmental givens and local environment elements, as well as operating under the national and global environment standards.

Principle I

The future generations shall have the same interest of the current generations, seeking equitable provision of environmental and developmental requirements for all current and future generations alike, while focusing on sustainable development that seeks to satisfy the current needs without prejudice to the future requirements.

Principle II

The governorate shall have the basic right in utilizing its natural resources according to its environmental and developmental policies, so that the activities of utilizing these resources shall cause no harm to the environment and no loads that result in any imbalances or discrepancies to the biomass and/or natural resources.

Principle III

All governorate agencies/authorities shall cooperate to preserve and protect the ecological integrity to ensure the balance of natural biodiversity inside the governorate and the natural balance between all ecosystems of fauna, flora, pastures, etc.

Principle IV

The governorate environmental affairs department is keen on conducting in-depth study and close monitoring of the environmental threats on Egypt's borders with neighboring countries.

Principle V

Activate the enforcement of Law 4/94 to set terms and conditions prior to issuance of any licensing of new projects inside the governorate except after conducting a critical study of the environmental impacts of the project(s), in order to preserve North Sinai free of pollution. According to the law, the environmental impact assessment should serve as a prerequisite for any project initiation and approval according to the applicable environmental protection laws and regulations.

Principle VI:

All forms of environmental pollution know no boundaries and respect no global or local sovereignty. Hence, the governorate plan necessitates monitoring of radioactive pollution factors in the neighboring countries, as well as full monitoring of all health hazards threatening humans and animals alike, including also monitoring water, air, and soil pollution, to detect any movement into or out of the governorate especially across the borders areas



Figure (8) International Borders

Principle VII

The governorate's geographical and climatic conditions in a semi-arid desert area require directing its maximum financial and scientific powers towards sustainable management for land, water sources and pollution remediation, and ensure this ideal functioning towards achieving the maximum profits in return for each drop of water from all sources (groundwater, surface water, rainfall, and torrents), through ensuring sound management for all land and water sources.



Figure (9) Al-Rawafaa Barrier

Principle VIII:

Information collection, saving and exchange plays a significant role in the local, national, and global environmental development issues. Therefore, the governorate depends on a basic rule in utilizing the information inclusive of environmental phenomena and development capabilities of natural wealth, especially as North Sinai is distinguished, compared to other governorates and regions, by a unique and diverse environmental formation. The governorate shall accordingly resume updating its information centers and facilitate accessibility to environmental information/data and newsletters before the popular agencies, NGOs, in order to support the scientific methodologies in environmental and developmental problem solving.

Principle IX

In planning and developing its environmental constituents, the governorate shall depend on building a dialogue with its dwellers and original population in their various environments, and shall maximize the roles of NGOs and popular associations to participate in solving the local environmental and developmental problems, in their capacity as the parties who are most aware of their local needs and the capabilities of ambient environment.



Figure (10) NGOs Conference

Principle X

The governorate shall pay high attention to preserving the population zones, and shall work on preventing the transfer of environmental hazards, in relation to the health and population, and wastewater, water and health hazards that may result from Al Salam Canal Project, and considering it to be an integrated project for socioeconomic and environmental development. The governorate shall study all affecting elements and systems for dividing the agro-industrial work, as well as relocating the industrial projects away from civil and residential areas. The governorate intends also to avoid all the hazardous environmental impacts on planning to establish this community, taking into consideration recycling and reusing of all solid, liquid and gaseous wastes resulting from the establishment of this community, as well as ensure treatment and safe disposal of poisonous and hazardous wastes and materials.



Figure (11) Al Salam Canal

Principle XI

The marine ecosystem in North Sinai governorate is unique in its cleanliness and natural beauty. Therefore, the governorate is keen on preventing pollution and on establishing marine pollution monitoring stations, as well as providing the required information to keep the area pollution free. The governorate shall also prohibit discharging any wastewater effluents onto the sea or the lakes, taking into consideration the preventive and developmental methodology in order to upgrade its marine wealth, utilize the tourist capabilities of the coastal belt with its archeological sites, natural protectorates for migrating, resident, and breeding birds. The governorate's aim is to ensure a modern planning of these sites in consistency with its rare natural assets.

Principle XII

The vastness of governorate area grants significant capabilities in terms of existing wild animals (fauna), the medically significant plant species, pastures and shrubs areas, etc. Therefore, the governorate is working with its utmost capabilities to preserve its biodiversity and ecological balance against over-fishing and over-pasturing, control the various impacts for each element, and maintain the alternative relationships between them in its natural forms. The governorate is also working on rationalizing the usage of biological resources, avoid all desertification factors, prevent the creeping sand dunes, etc.

Principle XIII

The governorate is exerting its utmost efforts successfully and for three years now in the environmental education program to ensure the sound implementation of such programs. The governorate is giving high priorities to environmental education that is targeted to empower the citizens to understand and comprehend the diverse biological, natural, social, economic, and cultural aspects, and create a patriotic sense of awareness with the significance of the environmental action. The governorate approach is to mobilize mass media, as well as trained and competent capacities to deliver lectures in schools, public seminars, professional syndicates and popular organizations by using full functional audiovisual devices such as videos, Slides on projectors, pictures and posters, international newsletters, artistic competitions between various schools, in addition to one day training camps on public cleaning, tree planting, field visits to environmental protectorates at the governorate. The main target is to create an aware generation who shall be capable of understanding, provide information and tools, skills development and ensure compliance.



Figure (12) Environmental Awareness

Principle XIV

The North Sinai area enjoys sustainable distinguished sunshine, and hence, solar energy is recommended as a significant clean energy alternative in the future. Sunshine degree is 4/5 according to the global sunshine measuring units

4.0 Environmental Priorities Profile

4.1 Potable Water

4.1.1 Background

Water is available in North Sinai governorate from the following three sources:

A) Rainfall and Torrential Flows:

The amounts of rainfall over the governorate vary due to the diversity of geographical topography and also due to the nearness or remoteness from seashore. Rainfall is dominant in winter; at rates ranging from 50 mm in the west and south, and increases on moving northward and eastward to reach its maximum to 300 mm over the city of Rafah in the high northeastern area. Rainfall may take the form of quick sprinkles on highlands in middle and south of the governorate, causing torrents that may flow into various wadis (Valleys). These waters may be used in irrigation and providing potable water after being stored in ground and stone reservoirs, or may be used directly in irrigation of cultivated lands using local technologies such as building water-trapping barriers and collectors specially designed for this purpose. The total amount of reaped rainfall waters reaches 14 million cubic meters annually.

B) Well Water

Surface wells are excavated in the northern sand dunes areas located on the east of Al Arish. In Al-Arish valley and the governorate inlands, the wells are being excavated on the groundwater reservoirs whose depth in AL Arish valley reach about 60 meters, and in southern areas may reach up to 1,800 meters according to the geological formation and the sequence water carrying levels. Most of these waters are used for irrigation of cultivated lands and domestic/household usage. These waters in Al Arish valley suffer from highly increasing salinity, low productivity, and reduced water static level in reservoirs, the matter which increases the probability of reservoir-seawater mix especially in the northern areas of Al-Arish.

It is noteworthy that Al Arish includes two natural water springs located in Al Qasima area on the eastern borders of the governorate:

- Ain Al Godayrat Spring (60m³/hour-1,500 ppm)
- Ain Qeddis Spring (1,000m³/hour-1,500 ppm)

Water from these two springs is used as a source for potable water and irrigation of cultivated lands. Water is supplied to the village of Al-Qasima from Ain AL Godayrat spring.

The General Department for Groundwater at the governorate has excavated the following ten wells:

Project Name	Costs (in LE 1000s)	Allocated Area (in feddans)	Remarks
Excavating (2) wells in Um Shayhan and Al-Magharah	1,962	80	Finalized excavation of Um Shayhan well
Excavating (2) wells in Al-Monbateh and Al-Maliz	3,183	80	Finalized excavation of Al-Maliz well
Excavating (2) wells in Ebreth and Al Gafgafah	5,031	80	
Excavating (2) wells in Al Gafgafah and Nakhl	4,876	80	
Excavating (2) wells in Al-Qasimah and Arif El-Naqah	3,094	80	Finalized excavation of Arif El Naqah well
Total (10) wells	18,146	400	(10) wells for the governorate within planned (20) wells

Table (1) Recently Excavated Wells In North Sinai Governorate

C) Transferred Water

-From Ismailia Canal

Water is pumped from Al-Ismailia Canal (Port Saied Branch) to the governorate via pipelines extending from west of canal to the treatment plant in Qantara Sharq, where water is filtered and then re-pumped to governorate urban cities in several pipelines as follows:

- A 300 mm line supplying water to Beir El-Abd area at a rate of 7,000 m³/day
- A 400 mm line supplying water to Balouza and Negilah at a rate of 10,000 m³/day
- A 700 mm line supplying water to AL-Arish city and extending via other lines to the cities of Al-Sheikh Zowayyed and Rafah, with a capacity that may reach up to 51,000 m³/day, of which a rate of 38,000 m³/day reaches Al-Arish
- A 1000 mm line that is currently under commissioning and experimental operation

It is expected that the fresh water supply service will highly improve in AL-Arish city, and reaches up to Sheikh Zoaid and Rafah, which constitutes a big step forward in both quality and quantity of water. However, the extended length of water pipelines exposes water supplies to many impacts including most importantly, the transgressions made along the pipelines as well as the recurrence of explosions or accidents resulting from the usage of heavy equipment along the route of these pipelines.

-From AL-Salam Canal

Transporting water from west to east of the Suez Canal to irrigate the cultivation of about 400,000 feddans is actually a national project that aims at attracting population to deserted areas before being cultivated with crops and plants. Of these allocated areas, North Sinai's land share reaches 275,000 feddans distributed in stages

including 70,000 feddans in Rabeiya, 86,500 feddans in Beir El-Abd, 33,500 feddans in Mizar, and Al Maydan, and 85,000 feddans in Al Serw and AL Qawarir in south Arish city. The length of the main canal is 155 km. After the construction of the pipeline route under the Suez Canal, the main canal water transited to the land of North Sinai on 26/10/1997. Water amounts to 2.3 billion m³/year.

Water resources are expected to increase from groundwater reservoirs in the future by 80 million m³/year, which helps to reclaim an area of 7,000 feddans thereon in case of re-feeding the reservoir. The optimum utilization of torrential waters may be possible at a rate of 90 million m³/year, which can be used to irrigate an area of 20,000 feddans.

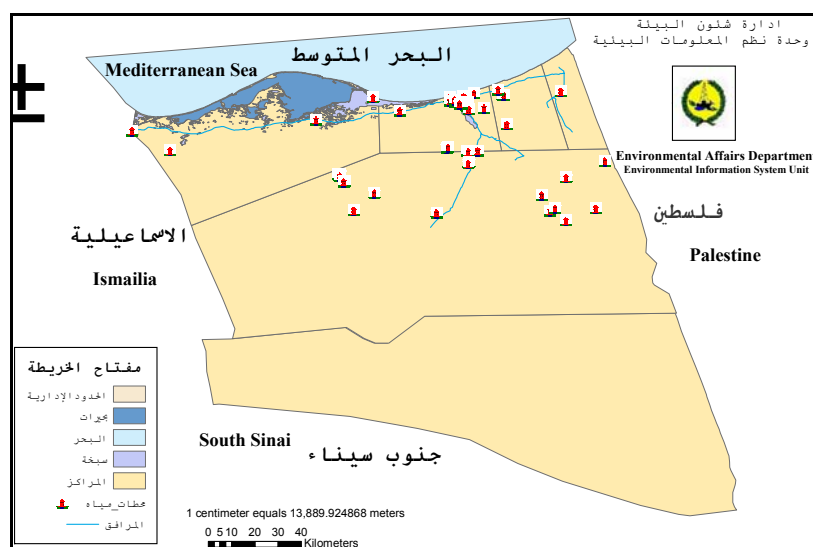


Figure (13) Water plants and pipelines in North Sinai Governorate

4.1.2 Current Conditions

To meet its water requirements, the governorate depends on two sources:

I- Groundwater:

These waters are drawn from wells, having a salinity degree, and are used for domestic/household purposes in Al-Arish. In Sheikh Zoaid and Rafah, this type of water can be used for drinking due to its minimal salinity degree. Meanwhile, in Al-Hosnah and Nakhl, well water is desalinated at specified treatment plants.

II- Freshwater:

This is potable water transferred from Qantra Sharq water plant to Al-Arish through a 700 mm pipeline, and the plant capacity is estimated at 52,000 m³/day.

Water for drinking or usage purposes is distributed over governorate cities and villages as follows:

-Al-Arish District and City

About 65,000 m³/day of River Nile water reaches Al-Arish city pumped from Qantara Sharq plant via the 700 mm pipeline, and these waters are distributed over the quarters of Al-Arish two days each week per quarter, alternatively with use water

(well waters) whose capacity is estimated at about 60,000 cubic meters. Water is transferred to some deprived areas via tanked trucks.

-Sheikh Zoaid District and City

About 6,000 m³/day of water reaches Sheikh Zoaid city on weekly basis pumped from the High Reservoir Station in Al –Arish, plus the well water estimated at 38,000 m³/day. Some villages are being supplied with water via tanked trucks.

-Rafah District and City

The Rafah city district depends on well water pumped into the system, or transferred via tanked trucks, estimated at 60,000 m³/day, since the River Nile waters did not reach this area to date.

-Beir El-Abd District and City

Beir El-Abd City and affiliated villages consume about 20,000 m³/day of the overall River Nile water treated and produced by Qantara Sharq station via pipelines (300 mm, 400 mm, and 700 mm). These waters are potable and are transferred to some villages via tanked trucks.

-Al-Hasanah District and City

Al-Hasanah city and district depends on the desalinated well water, and are transferred via tanked vehicles, where there are two desalination plants operating at a capacity of 250 m³/day, in addition to one lift up station at the airport with a capacity of 5,000 m³/day. In addition, other stations exist at Um Basis village to Wadi El Amr

-Nakhl District and City

Nakhl city and its affiliated villages depend on desalinated well water via three desalination plants operating at a capacity of about 300 m³/day transferred via tanked trucks.



Figure (14) Al-Gefgafah Desalination Plant



Figure (15) A groundwater well in middle of governorate

Name of Council	No. of LiftUp Stations	No. of Wells	No. of Desalination Plants	No. of Reservoirs	No. of Villages	No. of Population
Arish City Council	8	96	Inoperable	17	4 villages	139,009
Sheikh Zowayyed City Council	7	60	None	22	14 villages	48,111
Rafah City Council	16	60	None	25	11 villages	62,749
Beir El –Abd City Council	2	None	None	25	22 villages	56,598
Al-Hosna City Council	1	1	2	8	20 villages	33,851
Nakhl City Council	None	6 wells	3	6	10 villages	11,635
TOTAL	34	223	5	103	81	351,953

Table (2) Potable Water Supply Services in North Sinai Governorate

4.1.3 Main Problems as Prioritized

1-Increased Salinity and Reduced Level of Groundwater

The continuous digging of wells to obtain groundwater for domestic/household and agricultural purposes, especially in the areas of Wadi El Arish, Sheikh Zoaid, and Rafah, and the population need of vegetables and fruits, and seeking enhanced agriculture standards, and farmers' resort to usage of mass cultivation of vast areas with vegetables and other crops in those areas, all have necessitated the reclamation of new lands and digging several wells to provide for irrigation water. Also, the productivity of the ground reservoir became limited due to the weak water offset from rainfall, besides the changed living patterns on the part of Arish citizens who are using modern WW systems. Therefore, the three aforementioned areas suffer water imbalances due to the reduced compensating water that is feeding the ground reservoir, compared to water quantities drawn from such wells, which resulted in a significant increase in well water salinity.

Amidst increased drawing of water and lack of control measures, these practices resulted in reduced bezometric level of groundwater reservoir in Wadi El Arish, Sheikh Zoaid, and Rafah. Since these areas are close to the seashore, and as the geological formation is mostly permeable sand dunes that allow contact between seawater and groundwater reservoir, it is expected, if such conditions dominate as is the case now that the seawater will leach to offset the groundwater and surface water reservoirs. This will pose threats against the quality of groundwater used in irrigation or any other purposes due to high salinity. This will surely result in the loss of various major investments due to the expected depletion of water from wells or its increased salinity till these wells are totally out of service.

Moreover, the recurrent irrigation using highly saline water will negatively affect the quality of crops that suit this type of water. In addition, this kind of water will pose another threat represented in increasing the salinity level of agricultural soil salinity, and thus affecting its fertility.

2-Pollution of Reservoirs from WW or Use of Chemicals and Pesticides

The population in the areas of Sheikh Zoaid and Rafah dwell in residences that are remote from WW services. Therefore, citizens are establishing permeable trenches to store wastewater, and since the soil in these areas is a loose sandy soil, and as the surface water reservoir in these areas ranges in its depth from 2 to 60 meters, therefore, the leakage of wastewater to the groundwater table is a high potential. Also, the intensive use of fertilizers, pesticides, and agricultural chemicals may also leak into the groundwater, resulting in the deteriorated quality and invalidity of the water produced by these surface reservoirs either in agricultural irrigation or household purposes.

A number of water utility wells were already closed in Rafah due to their pollution with wastewater. This problem shall persist as long as the residential communities continue to be deprived from a sound and safe wastewater system, and as long as the household water supply depends on shallow wells in these areas.

3-Underutilized Rainfall and Torrential Waters

Citizens in central Sinai, Sheikh Zoaid, and Rafah collect rainfall by using special traps, which are subsurface reservoirs with side and upper openings, surrounded by a tile or cement sliding floor towards the side openings of the reservoir. After the rainfall, these openings are closed, where the upper opening is used to obtain the water required for drinking or irrigation purposes. Also, constraint barriers may be made to slowdown the movement of water to be saved, inasmuch as possible in cultivated lands or to be stored before the rocky barriers built for that purpose. The total amount of trapped rainfall water reached about 140 million m³/year which is a slight amount if compared to the rainfall rates over the governorate, for several reasons including:

- Lack of integrated systems for the best utilization of rainfall and torrential waters that accumulated before the barriers
- Lack of any accurate survey of the traps established by citizens in central Sinai or in the coastal areas in Sheikh Zoaid and Rafah
- High degrees of temperature, and the broadness of waster surface before the barriers increases evaporation rates even before these barriers, resulting in high water losses
- These rocky barriers established on the main valleys (wadis) have impeded the rainfall and torrential waters from flowing to feed the groundwater reservoirs in the northern areas, as the case in the delta of Wadi El Arish.

4-High Potable Water Losses:

Potable water is pumped from Qantara Sharq city to Al Arish then to Sheikh Zoaid and transiting Rafah along more than 200 km in various 300 /700/1000 mm diameter pipelines. These lines pass residential communities, marshes, sand dunes. Big quantities of water losses are due to:

- The explosions resulting from high water temperature in these lines
- Citizens' transgressions against these lines through illegal connections or obtaining large amounts of water from pressure neutrality points.
- Outdated water distribution systems inside cities, with many connections depending on unsafe and loose plastic hoses, which results in leakages of large

quantities of water and/or surface water interventions through these systems when pressure is reduced while lift up motorized pumps are drawing water. This ultimately results in potable water pollution with WW, especially as some areas are deprived from a sound Wastewater system.

- Citizens misuse of water either during evacuation and refilling of reservoirs, and the increase of water levels above reservoir capacity and water leakages into the ground through these reservoirs, as well as the defaults resulting from the continuous operation of lift up motorized pumps even after filling.
- Lack of water efficiency controls inside residential units and disregarding the required plumbing maintenance, which ultimately results in the wasting of big amounts of water
- Usage of potable water in irrelevant purposes such as construction or car washing, or showering street grounds in summer or planting trees and plants in home gardens
- High water losses in connections that are open continuously in public parks and green areas

5-Insufficient Benefiting from Deep Wells in Central Sinai

To supply water to deprived and remote areas in central and south Sinai, several deep wells were dug in over 1,500 m deep. High costs of these wells were cut from the State Budget in order to secure a permanent source of water at the desert communities aimed at ensuring a stable settlement for citizens in those areas. On the finalization of digging up of these wells, procedures were adopted to ensure the proper utilization of water whether in agricultural or as drinking water. For some wells, procedures were just limited to the digging of wells only or in the utilization of water and lands in agriculture only, for the following reasons:

- Distribution of lands over the local citizens dwelling in the areas adjacent to these wells, who are mainly nomadic Bedouins depending primarily on pasturing and not agriculture, which reduced the utilized areas to 60% of target areas for cultivation
- Water contains some harmful elements such as sulfur and iron, in addition to the increased salinity in the water of these wells, which results in adverse impacts on the quality of the crops that had to tolerate these rates of salinity and unneeded elements.
- Lack of sufficient financial resources required for the maintenance of these wells and maintenance of pumps, reservoirs and distribution systems
- Lack of paved roads or even dust roads to connect the nearest paved road and the locations of these wells
- Disregarding the power connection required for these wells, especially those located near the residential areas, the matter which results in increasing the costs per cubic meter of water

6- Lack of Environmental Awareness and Guidance Programs:

The limited activity of major governorate NGOs in handling the issue of sound water usage, the rarity of radio programs to deal with this problem on the local station, the disregarding of this issue on the part of religious leaders in tackling this issue, and the poor information and mass media in handling the problem in general, have resulted in a lack of awareness on the importance of preserving the water resources and the best means of usage, in addition to the diseases resulting from water pollution. Also, the

lack of guiding policies on pricing of water and linking consumption value to actual usage rates. All these shortcomings can be attributed to the following reasons:

- Lack of organized plans for awareness and preservation of water, due to the insufficient financial allocations for the relevant executive authorities concerned with water management
- Lack of pilot projects in water preservation such as rational usage of water, hygienic means of storage and defining the guiding principles for water consumption such as the recommended separation of kitchen waters from bathroom water in independent homes, to be later used in irrigation of trees
- Disregarding the financial classification of customers depending on real water consumption rates, and lack of programs required for the sound estimation of consumption.
- Poor performance of the environmental departments and their recommended role in implementing environmental awareness programs, and lack of local and/or national regulations that must oblige project owners to convene orientation sessions about the activities of their projects, and lack of bulletins, newsletters and other guidance mechanisms
- Inefficiency of mass media programs and difficulty in reaching all categories in an attractive manner on TV programs in comparison to the most watched entertainment shows

7-Inadequacy of Infrastructure and Maintenance Programs for Water Pipelines and Utilities

After the governorate has established a 100 mm pipeline and indicated its keenness on supplying water with proper quantities to the quarters of Al-Arish. Due to topographic levels discrepancies in Al Arish city, and within context of supplying other districts with potable water, the current utilities including ground and mounted reservoirs, and the additional subsidiary distribution lines, along with raising the productivity of old lines to meet the citizens' requirements, therefore, a time schedule should be developed to maintain these systems and establish new reservoirs that serve different communities and quarters. This shall be accompanied by properly allocated investments, in order to ensure the sustainable integrity of lines and its infrastructure

8-Insufficiency of Human Resources and Equipment

- Rarity of technical labor who are trained on utility maintenance and follow up
- Inadequacy of water carrier trucks and lack of any maintenance plans thereof
- Insufficient financial appropriations for well maintenance, which adversely affect performance effectiveness

9-Pollution of Groundwater Due to Border Problems

- Increased amounts of liquid wastewater in lowlands or valleys such as Wadi Gaza, where wastewater accumulates to mix with municipal wastes and medical wastes. It is noteworthy that wadi Gaza includes a large crack which facilitates leakage of these polluted effluents to the groundwater, which is directly connected to the Egyptian groundwater reservoir. It is also noteworthy that there are several valleys that interfere with Wadi El Arish that

- 4-The need to monitor and follow up the increasing salinity and the water balance in the areas of Wadi El-Arish, Sheikh Zoaid and Rafah
- 5-Raising public environmental awareness of citizens and farmers to rationalize water usage in the potable water and agricultural sectors, and linking consumption to the repayment of costs
- 6-Support water utilities and identify plans for training of workers at various technical and supervisory levels, and empowering them to practice their responsibilities
- 7-Activate the enforcement of decrees and laws governing the integrated water management

4.1.5 Institutional Support and Capacity Building

- 1- Training workgroups in the fields of water management in potable water, Irrigation, and Water researches sectors, on the most recent systems of the sustainable management of water resources
- 2-Support the water utility with machinery, equipment, tools, preventive clothing and means of transport
- 3-Provide competent training centers in all concerned agencies concerned with water to serve as a permanent clearinghouse for continuous capacity building of workers
- 4-Provide monitoring and measuring devices, analysis labs, and chlorine adding monitors in lift up stations and potable water treatment plants
- 5-Provide a clearinghouse specialized in water in every water utility and irrigation departments, provided that it includes a special corner for environment and regulations governing water management activities.
- 6-Provide a reliable direct communication system between the units in each sector to facilitate exchanging of information and expedite adopting the proper decisions in the proper timing
- 7-Prepare a MIS system to document the information related to the water utilities and the basic maps for the supply lines and other related services such as electricity, natural gas, telephones and wastewater
- 8-Establish a monitoring station to monitor the quality of Al Salam canal water, provided that the station covers the main canal and its branches, and monitors the mixing ratios on the inlets of the main canal
- 9-Establish integrated water laboratory at the governorate

4.1.6 Description of some Prioritized Projects

**Project for Increasing Potable Water Resources in extension areas
(A model project that is replicable in the areas of Beir Gerid/ Contella/ Ras El Naqab)**

Project Justifications:

- Shortage of potable water supplies and dependence on surface water wells or water transported by tanked trucks from Nakhl or Al Arish
- The incessantly increasing water transport costs from Nakhl or Al Arish in addition to the inefficiency of water trucks
- The need to provide water on permanent bases to encourage settlements and the economic growth in the region

Partners:

Governorate/ Nakhl City Council/Citizens/ Irrigation

Required Actions:

- Excavating a deep well to secure water permanently
- Installation of desalination unit to upgrade water specifications to the potable permissible limits befitting household consumption
- Establishing a dual distribution system inside the village to pump the ordinary water drawn from the well directly for normal, while the treated water from the desalination plant is pumped in the villages to provide potable clean water
- A previously dug well may be used, if any

Estimated Costs:

Digging deep well= LE 4.5 million

Install desalination unit= LE 4.0 million

Install water system= LE 0.5 million

Total Costs= LE 9.0 million

Project for establishing traps at Southeastern area of the Governorate

(Groundwater reservoirs to collect rain water)

Project Costs: LE 600,000

Goal: dependence on rainwater to provide potable water and partially provide irrigation water for some crops (expansion of planting oil trees in central and south eastern area of the governorate)

Project for Protecting Global Groundwater

Type of Project: Protecting global potable water against pollution

Project duration: one year

Project Goals:

- Stopping groundwater pollution in Rafah (Palestine), and North Sinai (Egypt) with untreated WW
- Reduce air pollution in Rafah and the international borders, and restore the tourist use of the shore
- Raise the exchangeable environmental awareness between the citizens of Palestine and the Egyptian people

- Activate the joint volunteering roles of the civil communities of Arab peoples and the NGOs
- Improve the health conditions of citizens across the international borders
- Stop the execution of the water canal on the Egyptian Palestinian borders and the Red Sea /Dead Sea canal, and Haifa Dead Sea canal

Project Activities

- Cooperate jointly with Rafah Environment Friends NGO
- Enhance the environmental and health awareness on the borders
- Create solid and permanent communication channels between the Arab NGOs
- Stop open WW in the northern cities of the Mediterranean Sea
- Treat the current liquid wastes by using EOM
- Initiate health follow up and checks by analyzing potable water to monitor hygienic standards and to ensure water is free of harmful bacteria
- International advertising via NGOs about the risks and threats resulting from Israel's intention to execute the water canals on the international borders, in addition to the proposed Red Sea /Dead Sea and Haifa/Dead Sea canals

Project Costs

Activity name	Small Grant Program Contribution
Study current condition Field visits Communications Labs and analysis for discharge ponds Labs and analysis for seawater before Rafah-Palestine Labs and analysis for seawater before Rafah- Sinai Labs and analysis for seawater before Sheikh Zowwayed Groundwater Analysis-Rafah-Palestine Groundwater Analysis-Rafah-Sinai Groundwater Analysis-South Gaza Strip Video documentation of activities	2000 500 500 1500 500 500 1000 500 1500 -----
Exchanged Communications and Visits Hosting A delegation of the Palestinian NGO Field Visits Contacting international organizations Treatment Purchase and add E 0 M Month 1 Month 2 Month 3 Re-analyzing water in WW effluent ponds-Rafah, Palestine Re-analyzing groundwater in Rafah Palestine Re-analyzing groundwater Rafah, Sinai Seawater Post-treatment Analysis	2000 1000 500 250,000 30% of substance 30% of substance 30% of substance 1500 1500 500 500
TOTAL	LE 266,000

NGO Contribution

No	Type of Activity	Costs
1	Full Time experts paid by the NGO	LE 14,400/12 months
2	Four unpaid experts volunteering to work as part timers equivalent to 4 x 500 months	LE 24,000/12 months
3	Securing transportation and field visits and providing rent car LE 2,000/month	LE 24,000/12 months
4	Documentation of activities in films and Video shooting	LE 2000
TOTAL		LE 64,400

4.2 Wastewater

4.2.1 Background

North Sinai is lucky enough among nationwide governorates by being free of industrial activities, in the sense of the word "industry- near residential areas. However, announcement has been made about a number of industrial zones to host environmentally polluting industries. Due to the lack of chemical, food, or paper industries, therefore to date the domestic household wastewater is almost free of heavy elements. The governorate has established a WW system in Al Arish and partially in Beir El Abd, in addition to WWTPs.

4.2.2 Current Conditions

A WW system is serving currently Al Arish city with its various quarters. It is a fully functional system as it includes lift up pump stations that cover the whole city despite the different ground levels in these quarters. Two WWTPs operate by oxidization ponds, one of which is located in Garada east of Al Arish city with a design capacity of 50,000 cubic meters per day, and currently the plant receives water amounts that range from 10,000 cubic meters per day to 13,000 cubic meters per day both in winter and summer consecutively



Figure (17) A WW Basin in Garada, AL Arish

The WWTP in Al Massaeid quarter was cancelled and relocated to Zarie area in the west of Al Arish city, and is operating with a design capacity of 15,000 cubic meters daily, and is currently receiving 2000 cubic meters per day.

Currently a wood forest is being planted over an area of 2000 feddans within the borders of Garada plant, including 200 feddans allocated for the Central Department for Tree Planting at the Ministry of Irrigation. The remaining shall be set for private sector investments. As for Zarie Plant, 200 feddans were allocated for the wood tree forest, and this area is under study to be increased to 2,500 feddans to absorb all the treated effluents from the plant to be used as irrigation water.



Figure (18) Wood Forests Irrigated by Treated WW Effluents from Garada Plant

IN Beir El Abd, a WW system exists for the residential quarters, and there is one WWTP which currently receives 300 cubic meters per day. Vurrently another WW system is being implemented for Sheikh Zoaid and Rafah, and is still pending. Disposal of WW effluents is made by storing in non-bedded trenches, resulting in WW leakage into the surrounding soil.

The local units in rural areas and communities are disposing of WW effluents by using the previously mentioned trenches under the residential units.

The local WW effluent rate reaches 40,000 cubic meters daily in summer, and 25,000 cubic meters per day in winter according to current consumption rates and population census

DISTRICTS	WW CAPACITY M ³ /DAY
Al Arish	40,000
Sheikh Zowwayed	0
Rafah	0
Beir El Abd	300
Al Hosna	0
Nakhl	0
TOTAL	40,300

Table (3) WW Capacity in Governorate Districts
Source: WW Utility Feb 2007

4.2.3 prioritized Problems

1-Inefficient WW Service Coverage

Al Arish city is served 100%, Beir El Abd is served by 70%. However, the remaining governorate cities and districts, villages and communities are deprived of the WW services. This results in the following:

- WW Effluent is discharged into permeable trenches, resulting in the pollution of the groundwater basin, especially as soil formation is loose sand dunes
- Scavenging these trenches is performed by the equipment of cities councils, and these waters are collected into dumb trenches, yet it was designed in a manner that permits the leakage of liquids into groundwater basins/reservoirs
- The limited capacity of trenches further aggravates the problem, in addition to the problem of relocation outside the residential area
- Lack of proper scavenging equipment, if any
- Trenches runoff and effluent leakage into the streets and the surrounding environment
- Occurrence of bad odors and spread of crawling insects

2- Underutilized WW Effluents Resulting from Treatment Plants

Three WWTPs are operating as follows: Garada, with a current capacity of 18,000 cubic meters/day, Zarie, with a current capacity of 3000 cubic meters per day, and Beir El Abd , with a current capacity of 300 cubic meters per day.

Currently, 200feddans are being cultivated in Garada plant by the Central Dept for Tree Planting, and 100 feddans at Zarie plant. These are quite minimal spaces in proportion to the treated effluents resulting from both plants, which causes several problems including:

- Increased WW effluents beyond capacity whether for agriculture or storage or any utilization
- Non benefiting from the treated effluents
- The water surplus lead to the leakage of water into the sand dunes along with the natural sliding of the area. This posed a threat to the natural gas line in south Garada plant
- Citizens have planted vegetables and fruits using WW effluents as irrigation water
- Inefficiency of WW treatment resulted in incompliance of resulting effluents with irrigation water standards
- Water accumulation around the WWTPs led to the emergence of bad odors and spread of harmful insects and flies
- Vast water surfaces attracted many migrating birds for rest or permanent dwelling, which may result in the transfer of deadly viruses

3- Lack of Environmental Awareness and Harmful Behaviors

The citizens' behavioral patterns have caused major negative impacts on the integrity of the principal WW system and on the efficiency of lift up stations, as well as on the treatment efficiency. Over-consumption of potable water and household use water, as well as citizens' evacuation of reservoirs filled with saline water, all contributed to the inflation of the WW effluents, in addition to the following problems:

- Dumping plastic bags in WW routes
- Disregarding maintenance of residential buildings
- Ignoring any reporting of any leakages and/or failures
- Breaking or burying covers of manholes, sewer lines or reservoirs
- Stealing iron covers of WW tanks
- Olive oil presses discharge their untreated liquid effluents directly on the principal WW system

4- Existence of Squatters and Inefficiency of Maintenance Programs

Because of lack of any urban vision or planning, squatters spread; this aggravated the burdens of providing the WW service to these areas. Lack of any maps or documents led to wasting time and investments in searching for the overlapping lines buried underground both between wastewater lines and telephones, water etc.

The lack of programs or investments to maintain the systems, networks, lift up stations, and treatment plants all suggested the suspension of all these utilities, for the following reasons:

- Lack of periodical maintenance of the WW System, in addition to overflowing and runoff problems
- Lack of human resources of trained workers and technicians, and lack of maintenance equipment
- Lack of financial allocations for maintenance and repair, if any
- Lack of equipment and means of transport for daily operation
- Multitudinous supervisory controlling Operation and Maintenance authorities led ultimately in delaying of solving problems on timely basis and led to the evasion of responsibilities.

4.2.4 Vision and Objectives

The governorate is exerting its utmost efforts to supply the WW services according to the following environmental requirements

- 1-Provide WW services to all rural and urban residential communities, and raise the treatment efficiency of WWTPs
- 2-Benefiting from the abundant treated WW effluents to be used as irrigation water in conformity with the applicable environmental and health laws and decrees
- 3-supporting the WW Utilities and provision of the required equipment, machinery and tools, in addition to training of labor both technically and managerially speaking to upgrade the institutional capacity
- 4-Raise the public environmental awareness by using WW effluent management approaches according to hygienic and legal criteria

4.2.5 Institutional Support and Capacity Building

- 1-Unify the supervisory and controlling authorities concerned with WW management on the governorate level, to include the responsibility for: WW network systems, Lift Up stations, Treatment plants (WWTPs), solid wastes and liquid wastes (effluents) resulting from plants
- 2-Provide training to all workers of all categories on environmental and health criteria and standards in dealing and managing WW effluents
- 3-Secure an updated communication systems and information exchanging between all the units concerned with WW systems and introduce a new WW breakdown/failures reporting system
- 4-Provide means of transportation and scavenging vehicles, mechanical cleaning, repair and maintenance equipment, in addition to preventive clothes especially for workers
- 5-Develop a system for medical examination and medical analysis on periodical basis for workers in that sector

4.2.6 Description of Some Prioritized Projects

WW Effluent Reuse Project

Re-feeding treated WW effluents to the groundwater reservoir in Delta Wadi El Arish, taking into consideration all the health and environmental specifications and the harmful bacteria and ensuring the validity of phenol salts

Problem:

The quantitative and qualitative deterioration of the groundwater reservoir in Al Arish in north Sinai, resulting in negative environmental impacts

Problem Impacts and Outcomes:

- Seawater intervention and the deterioration of the quality of groundwater reservoir
- Increased salinity of water inside the groundwater reservoir
- Increased demand on water resources
- Environmental pollution due to swamps and marshes around WWTP in Garada

Positive Impacts of the Project:

- Stopping the deterioration of the groundwater
- Agricultural expansion
- Preventing area pollution and avoiding spread of diseases and epidemics due to the accumulation of wastes and open swamps

Benefiting Agency:

Ministry of State for Environmental Affairs –Water Resources Research
Institute/Governorate/ farmers

Executing Agencies:

Governorate of North Sinai (farm owners, government controlled farms)

Participants:

Governorate population, Governorate, Water Resources Research Institute

Donor Agencies/Financiers

Italian Government

Project Duration

Three Years, Phased

Phase I: Establish third biological treatment plant

Phase II: Execute the supply and grinding pipeline network

Phase III: Digging a series of wells for feeding and monitoring the quality of groundwater reservoir

The Initial Costs Recommended for Various Phases

Phase I: Establish third biological treatment plant (LE 2.0 million)

Phase II: Execute the supply and grinding pipeline network (LE 2.0 million)

Phase III: Digging a series of wells for feeding and monitoring the quality of groundwater reservoir (LE 2.0 million)

Total Costs: LE 6.0 million

It must be taken into consideration that these phases are integral and indivisible. The overall costs are estimated according to current market prices, and any changes in rates of exchange should be considered during implementation time

Institutional Support Project for Water and Wastewater Utilities

Project Justifications

- Lack of performance upgrading programs and water and wastewater service improvements
- The need to enhance skills and capacities of water and wastewater utilities manpower
- The need to procure reliable means of transportation to meet the work requirements
- The need to procure modern and practical communication devices
- The need to support the scientific potentialities and provide measuring devices and labs instead of sending samples to nearby governorates or to Cairo for analysis
- The need to provide the utilities with water trucks for immediate response during emergencies, in cases of any water shortage, in addition to scavenging vehicles for mechanical cleaning in cases of clogging
- Lack of mechanical cleaning equipment, repair and maintenance equipment and explosive accidents in pipelines due to fluctuating pressures

Partners

Governorate/ water utilities, wastewater utilities, citizens

Required Actions

- Develop clear cut policy and program to improve services at water and wastewater utilities such as privatization of these utilities or establishing independent organizations with proper capacities
- Develop training programs to improve the knowledge and hands on training of utilities manpower
- Procure a double cabin vehicle or five tricycles for each utility
- Procure modern wireless communication devices to connect the utilities to their staff members, and to facilitate maintenance and repair, as well as response in times of emergencies
- Procure a modern water carrier truck for water utility and a scavenging vehicle provided with a pump of high capacity for the WW utility.
- Provide preventive clothing and mechanical cleaning equipment for the WW utility
- Provide measuring gauges and devices to detect any shortcomings in the water or WW specifications compliance, in order to facilitate decision making on timely basis

Estimated Costs:

- 1- Specialized training courses for water and WW staff = LE 10,000
- 2- Procure Truck/ five tricycles for Water Utility = LE 200,000

- 3- Procure Truck/ five tricycles for WW Utility = LE 200,000
 - 4- Procure Wireless communication device with accessories= LE 100,000
 - 5- Water carrier truck = LE 200,000
 - 6- Scavenging Vehicle = LE 200,000
 - 7- Procure Mechanical Cleaning Equipment= LE 10,000
 - 8- Procure measuring devices = LE 50,000
 - 9- Procure preventive clothing for WW workers = LE 10,000
-

Total Costs: LE 1,070,000

In addition to:

- 1- Building construction and equipment =LE 500,000
- 2- Equipping Conference and training classes and provide projectors = LE 100,000
- 3- Establish a clearinghouse, and procure its books and references = LE 100,000
- 4- Decoration o Building Entrance LE 20,000
- 5- Support Clearinghouse and Training center activitirs= LE 10,000

Period of Project Execution

Two years

Project sustainability:

Each agency of the partners shall assume its activities from its own budget

4.3 Agriculture

4.3.1 Background

North Sinai is considered a semi arid region, where the rainfall decreases whenever we head westward and southward. The fragile sandy soil nature of the governorate territories constitute a determinant of the type of crops cultivated therein according to the available water quantities and salinity degrees. The soil has unique characteristics represented in retaining water, which gives the chance before the ground to benefit from the wet content. North Sinai has a significantly varied climate, reflected on the soil constituents, quality of land and groundwater, which would result in a significant diversity in agricultural crops and green cover

4.3.2 Current Conditions

Wadi El Arish is famous for growing olives. Rafah and Sheikh Zoaid areas are distinguished by planting apricots, grapes, mango, and vegetables. Al Arish coastal area and Beir El Abd are famous for palm trees. The North Sinai valleys (wadis) are famous also for their pasturing and medical plants.

Central Sinai requires financial appropriations to trap and collect rainwater and benefit from torrential flows, as well as extraction of groundwater to support agriculture and settlement. Six traps was established for this purpose, and another 16 wells were dug at Al Hosna district, from which will be useful for 128 families living over an area of 427.5 feddans. Also seven wells were dug in Nakhel district from which 27 families will be beneficiaries over an area of 97 feddans.

Most recently, agricultural patterns and land use have witnessed a development, as the number of minor producers has increased significantly, and also the agricultural productivity increased as well. These activities are mainly located on the coastal areas where the groundwater level is high.

In the sand dunes areas, agricultural depends on wells, where reclaimed lands reached 300,000 feddans. In the valleys, the seasonal Bedouin groups start planting of watermelons over vast areas depending on rainwater and water transported by tractors and surface torrential waters.

However, in most recent years, there was a recession in the areas of cultivated vegetables and fruits due to the disappearance of organic fertilizers necessary for agriculture, and the hiked prices of plastics and metallic greenhouses. The bird flu combating procedures has also led to the disappearance of organic fertilizers (poultry wastes) due to the closure of a big number of poultry farms and prohibiting entry of any poultry wastes from other nearby governorates. The major target of agricultural development plans must be providing organic fertilizers alternatives from green wastes through making kilns and expanding the breeding of cattle and sheep.

In Rafah and Sheikh Zoaid, fruits orchards are common depending on rainwater, as well as the cultivation of barley and grains in clayey soil lands.

The total cultivated areas in North Sinai governorate reached 174,558 feddans (over 2% of governorate total area, distributed as follows:

Total area cultivated	Field crops	Fruits	Vegetables	Palm Trees	Watermelons
174,558 feddans	38,256 Concentrated in Rafah, Sheikh Zoaid, and Beir El Abd	96,306 on top of which comes olives and apricots	8,725	8,408	22,863

Table (4) Crop distribution in North Sinai

Palm trees in the governorate faces a major problem represented in its deterioration because of the old aged trees in existence, and lack of expert farmers for this type of cultivation, in addition to the fact that citizens are deliberately removing those old trees to give way before urban development projects, and also due to the death of many trees due to shore erosion and other coastal projects such as the steam power station construction project

Agricultural Sector Accomplishments within Past Five Years

- 1- Introducing River Nile waters to North Sinai via Al-Salam canal
- 2- Allocating an area of 5000 feddans to be distributed among 1000 persons
- 3- Increasing cultivated areas at the governorate to 200,000 feddans, in comparison to 1982 when the cultivated area was only 34,000 feddans
- 4- Establishing eight agricultural guidance centers to serve farmers
- 5- Establish an agricultural cultural unit at the Governorate Agricultural Directorate
- 6- Establish a queen bee breeding station to serve the community and upgrade the production of honey
- 7- A sum of LE 12.0 million has been allocated in loans from the Social Fund for Development to serve the Agricultural Sector in animal husbandry and agricultural development fields
- 8- Establishing a fruit nurseries unit at the governorate to provide 100,000 olive, apricots and citrus fruits trees annually
- 9- Establishing (20) olive oil presses with a capacity of 50 kg/hr ro 4.0 tons/hr to serve an olive-cultivated area of 15,000 feddans

4.3.3 Prioritized Problems

The priorities were arranged as follows:

- 1- Altered quality of groundwater and surface water along the cultivated belt parallel to the sea in north of the governorate, due to the increasing salinity degree in these waters, posing a threat to the existing green areas and crops
- 2- Invalidity of AL Salam canal waters for irrigation of vegetables and fruits crops due to the constituents of the canal waters (agricultural drain waters)

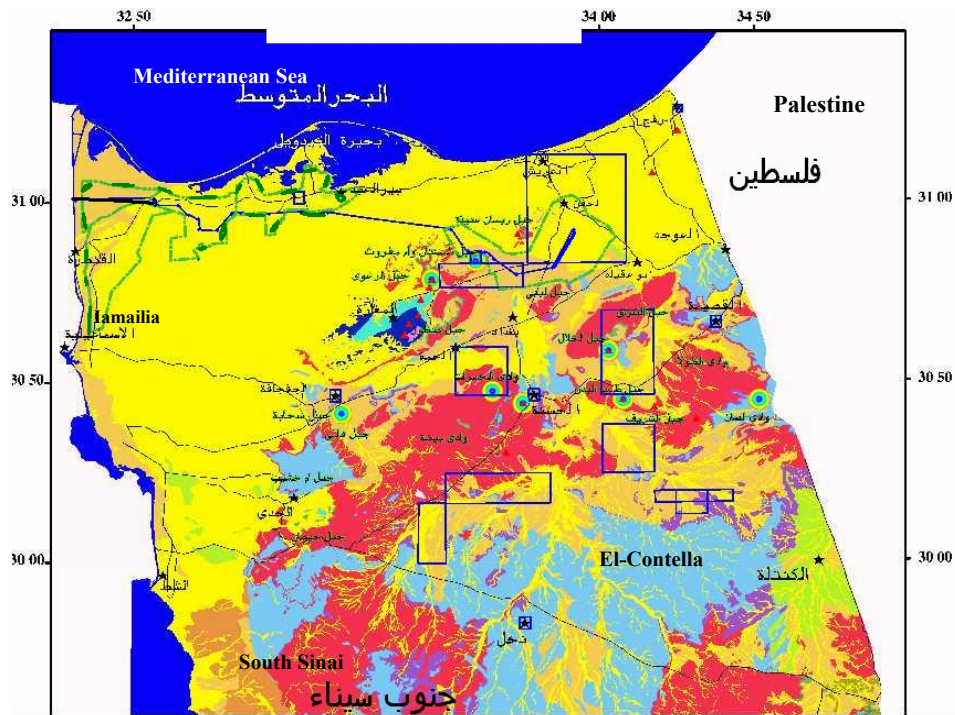


Figure (19) Al Salam Canal Route

- 3- Irresponsible application of pesticides of all kinds, in addition to the hormones and chemical fertilizers used for quick maturity of fruits and doubling its size.
- 4- Reduced level of groundwater in Wadi El Arish, and the leakage and mixture of seawater with groundwater in Rafah and Sheikh Zoaid
- 5- Increased prices of groundwater for irrigation purposes in central Sinai. Well costs about LE 2.0 million. Well water also contains high concentrations of iron in the south and sulfur in the east
- 6- Deterioration of pastures and the green areas of medical plants because of the drought and land reclamation, and the pasturing load in the western and central areas
- 7- Deterioration of palm trees due to shore erosion, urban development, the recession in agriculture services, and the reduced economic value of dates
- 8- The spread of creeping snails across the Egyptian borders along six kilometers and a depth of 1.5 km and a density of 5: 25 snail/plant
- 9- Emergence of new types of agricultural pests that are hard to fight posing threats to two major crops (olive and palms)
- 10- The recurrence of crises resulting from lack of chemical fertilizers, in addition to the crises of the disappearance of organic fertilizers
- 11- Increased rates of pollution due to the excessive use of pesticides leaking into the wells, especially in Rafah, Sheikh Zoaid due to the raised surface water
- 12- Epidemic spread of flies in Beir El Abd, Rafah, Sheikh Zoaid due to the stored of municipal fertilizers prepared or agriculture

4.3.4 Vision and Objectives

The future of agriculture in North Sinai depends on provision of capacities and reclamation of vast areas of arable lands that may reach to 150 million feddans and achieve the best optimum benefits from the expertise and skills of governorate population.

The governorate encourages digging more deep wells in central Sinai for the settlement of more citizens, who should be supplied with urban services

The governorate considers the necessity of using rainwater and torrential flows in the best possible manner, by upgrading the traps and rocky barriers and the ground reservoirs of all types for this purpose.

The governorate provides the requirements and inputs for seasonal cultivation such as providing seeds with subsidized prices, especially grain and barley

The governorate highly considers the upgrading of water quality especially the groundwater reservoir especially in Wadi EL Arish, Rafah and Sheikh Zoaid, and the impact of such water on the quality of crops and the exchangeable relation between the groundwater and the sewerage in coastal zones

The governorate is keen on preserving its wild plants (flora) of all kinds, with its purity away from chemical fertilizers

The governorate also appreciated the exerted efforts for the reclamation of 275,000 feddans to be irrigated by the waters of Al Salam Canal; however, the governorate is critically anxious about the environmental and health impacts that may result from the quality of canal's water, as well as the impacts on the population and their cultural and social heritage

4.3.5 Institutional Support and Capacity Building

- 1-Train workers on information and transfer of knowledge and studies through agricultural guidance at the directorate
- 2-Train workers on using the tissue transplant devices especially to increase the palm trees and the endangered species
- 3-Support the establishment of specialized labs for producing the seedlings and hybridize new breeds that is suitable for the local environment
- 4-Encourage programs and courses for producing new breed of pesticides and drought combating
- 5-Provide proper means of transport to cover various areas within the administrative authority of the agricultural departments at the governorate

4.3.6 Description of Some Prioritized Projects

Project for Protecting Roads and Salam Canal against the Sweeping Sand Dunes and Establishment of Plant Nurseries

Project Data:

- The governorate includes paved roads that extend in length to 2,221 km

-300,000 feddans were reclaimed with self initiated efforts and popular sharing that resulted in a production boom on the level of vegetables and fruits crops. This breakthrough has helped in increasing the income levels, which has been reflected on the provision of services (health care, housing, social relationships, community culture) through the sharing of men, women and youth. Hence, all these gains must be protected against the creeping sands over roads and reclaimed lands by fighting back desertification

Job opportunities to be provided by the project

	Males	Females	
In Plant Nursery	48	32	permanent jobs
Tree Planting	200	48	temporary jobs

Main Target

Fighting back desertification, protecting the infrastructure including roads and cultivated lands, in addition to minimize climatic changes

Specified Objectives

- Protect public roads by cultivating specific types of Acacia trees
- Protect newly reclaimed lands in various governorate districts
- Minimize climatic changes
- Provide job opportunities for youths and increasing women income

Project Description:

The project depends on biological combating approaches against sand creeping over the governorate, by planting drought-tolerating plants, and establishes plant nurseries in all districts and ensures a limited water source through the usage of tractors and trailers for partial irrigation of plants especially during very hot weather, besides utilizing seasonal rainfall to continue growing these plants

Project Components

- Four tractors and four trailers
- Establish four plant nurseries in Rafah, Shiekh Zoaid, Beir El Abd, and Al Arish
- Irrigation requirements
 - a) Sprinkle irrigation source (main and subsidiary hoses and valves)
 - b) Pump motor
 - c) Water Tank (built by cement bricks and reinforced concrete)

Project Activities

- Provide water source for the plant nursery
- Ensure proper soil for seedlings
- Provide a suitable number of plastic bags for cultivation
- Cultivation
- Irrigation, weed combating, and protecting nursery plants against high hot weather, by building canopies from palm tree and green wastes to ensure shadow by 50%

Project Outputs:

- Produce Acacia seedlings in proper quantities that suit volume of project work
- Train workers, students, and youths on agriculture, planting and plant caring
- Planting trees on both sides of roads in desertification endangered areas
- Utilize rainwater by building traps and barriers
- Produce decorative plants and put them for sale with fruit and olive trees at subsidized prices

Indicators for Project Success:

- Continued wind blows and sand creeping
- Produce nursery plants at low costs
- Sell decorative and fruit trees to recover project costs
- Train governorate youths on breeding more trees

Operation requirements

Type of requirement	costs
Nursery Land	-
Built Fence	1000
Water reservoir	4000
Ground Trap/reservoir to store rainwater	40,000
Irrigation system hoses 2" + 1" + 1/2"	5000
Motor with 4 horse power	3000
Tractor with trailer	100,000
Full time one year worker	10,000
Full time female worker	5,000
Purchase of bags	10,000
Agricultural equipment	7,000
Miscellaneous expenses	3,000
Fertilizers and rented loader	12,000
TOTAL	200,000

Total Costs for establishing four plant nurseries:

4 x 200,000= LE 800,000

Other Projects

Project on Benefiting from Palm tree Products in making chairs, tables, in addition to cattle and poultry fodders from dates' seed, manufacturing agwa from fruits of palm trees, all using modern technologies. The project costs are estimated at LE 1,850,000

Project for protecting medical plants and replanting the endangered flora, at costs amounting to LE 650,000 to establish plant nurseries

Project for bio, chemical, and mechanical combating of the crawling snails across the Egyptian east borders at LE 250,000

Integrated Pest Combat project in AL Arish, Shiekh Zoaid, Rafah, and Beir El Abd at LE 2,000,000

Project for Reducing Flies in Beir El Abd and Sheikh Zoaid LE 400,000

Project for development and Increasing Palm Trees in the governorate, by establishing nurseries to produce new disease-free palm trees (costs LE 1,000,000)

Project for producing improved seedlings and local hybridized plants (costs LE 500,000)

Project for supporting Agricultural Cooperative Societies, to provide plastics, seedlings, and fertilizers, to be distributed among farmers (costs LE 3,000,000)

4.4 Fish Wealth

4.4.1 Background

The governorate land overlooks a vast sector of the Mediterranean sea (extending along 200 km), and includes Bardaweel Lake in the northwestern edge. The lake area is about 200 km². This area is suitable for fishing. It is noteworthy that the fishing output from the sea in 2007 reached 2335 tons and from the lake reached 729 tons. The fish species for which the governorate is famous includes denis, bouri, Dahban, lute, Qarous, in addition to lobster and crustacean, which are healthy seafood due to the purity of the lake waters, and that is why these species are exported fresh to Europe

Out of 5000 fishermen working in the governorate, 3000 are working in the lake alone. These fishermen are working under the care of five NGOs, Al Arish, AL Sahil, Al Salam, 6th October, and Bardaweel Societies. These societies are concerned with providing technical and social services to fishermen. Six anchorages were established to serve the fishing units, and are provided with jetties, walkways, canopies and utilities to market the fish products, including the provision of storage, cooling, preservation, packaging and transporting equipment

4.4.2 Current Conditions

The fishing process is subject to direct supervision of the General Organization for Fish Wealth, according to the fishing law No 124 f 1983, which organizes the fishing process technically and geographically. Fishing is technically by identifying the legal ways applied, and the diameters of nets. Geographically fishing is organized by banning fishing in specific places for periods ranging from 4 to 6 months in order to give the opportunity for young fish to grow.

During the past five years, regulations were issued to ban fishing in the lake for 4 to 6 months according to evaluated environmental burdens of fishing on the lake and the quality of water (salinity). Other regulations also were issued to limit the number of boats and fishermen heading to the lake to protect the growth of fish. In 2003/2004 the fish output from the lake reached 5550 tons, of which 750,000 tons were exported, which has been suspended in the following years

year	2004	2005	2006	2007	Measuring Unit
No of Boats	227	227	230	238	boat
No of Fishermen	1300	1400	1571	1400	fisherman
Annual Product	1376 tons	1069 tons	4838 tons	2335 tons	ton

Table (4) Volume of Fishing from the sea
Source: General Organization for Fish Wealth

No of Boats	1229
No of Fishermen	3200
Overall Annual Production	4729

Table (5) Volume of Fishing from the Lake

Source: General Organization for Fish Wealth

Year	Overall Production in tons	Luxury Exports
2003	3325	486
2004	2227	266
2005	3534	Export was suspended in 2005 to 2007 to satisfy local market needs
2006	4142	
2007	4729	

Table (6) Bardaweel Lake Product of Fish

Source: General Organization for Fish Wealth, 2007

4.4.3 Prioritized Problems

A) Problems related to the Lake

Problem priorities were arranged as follows:

1- Siltation of Bays in Bardaweel Lake

This siltation or sedimentation takes place due to the water currents and sea waves, which results in sand sedimentation in the water route of the bays. These sedimentations reduces the amount of water entering into the lake, and consequently leads to an increase in the degree of salinity due to evaporation, which results in the increase in the output of the Bouri fish at the expense of exportable fish species (denis). The annual sedimentation rates on the bays 1 and 2 are estimated at 330,000 m²/year. In order to solve this problem, the bays were scavenged in 1986, where an approximate amount of 4 million cubic meters of sand was removed.

2- Emergence of new marine creatures that impedes lake development such as the thorny snails

4.4.5 Description of Some Prioritized Projects

Jelly Fish Combating Project

Target:

- Protect the environment from harmful jelly fishes
- Protect tourists, guests from skin inflammation

Beneficiaries

Governorate citizens/seaside holiday makers/Chalets/tourist resorts/Youths

Project Work Plan

- Assigning 150 young men in groups from the youth camps
- Divide them into groups and distribute them among holiday spots, and granting them fishing tools and a specified uniform
- Test youth competence in swimming and catching jelly fish
- Designate spots on the beach where caught jelly fish are destroyed
- The City council shall transport the jelly fishes into safe disposal sites
- The program shall include organizing seminars for environmental awareness
- The Health Directorate shall be responsible for medical supervision

Costs:

Cost of the three groups for three months =LE 90,000
(LE 20* 50 Youths* 30 days) * 3 months

Costs for manufacturing fishing tools: 70 * LE 30= LE 2,100

Purchase of Vinegar and medical substances = LE 2,000

T-Shirts and gloves (150* 40) = LE 6,000

Educational materials, bulletins and competitions= LE 2,000

Transportation Allowance = LE 3,000

Miscellaneous Expenses = LE 3,000

Transportations = LE 9,000

Overall Costs = LE 117,100

-Project for Supplying Bardaweel Lake Management with two large launches to prevent catching mother fishes from bays

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Costs: LE 300,000

4.6.2 Current Conditions

1-Heavy Industries Zone

Located in east of Bagdad village of Al-Hasana at a total area of 4,480 km².

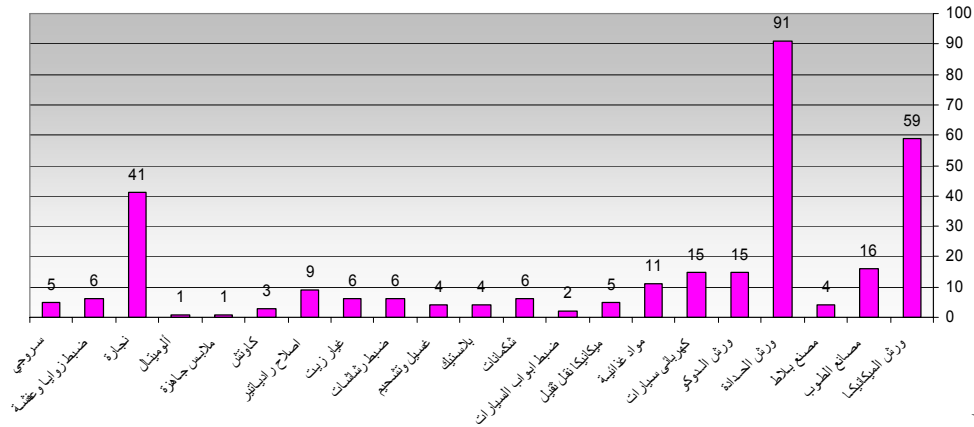
Currently, activities to be established in the area are being selected, including two highly polished glass factories, two marble manufacturing facilities, one Aluminum and copper rolls manufacturing facilities, and one crystals manufacturing facility for solar cells units, in addition to the already allocated industrial facilities including the white and grey cement factory and the paper bags factory.

2-Medium Industries Zone

Located in Beir El-Abd and currently this area is being prepared and connected to utilities, within context of the ongoing selection of proper industries including Brick manufacturing facilities, Plastics factories, Textiles factories, Food Processing industries.

3-Craft Industries Zone

Located in the area of Al-Massaeid (Western Suburb of Al-Arish), over an area of one square kilometer as a selected zone into which the workshops of Al Arish city will be relocated, in addition to establishing other industrial facilities such as brick and tile manufacturing facilities. The workshops owners have reserved 310 land plots to relocate their workshops outside the residential areas (91 ironwork workshops, 59 automotive mechanics workshops, 41 carpentry workshops, and 15 car coating workshops).



Figure

(21) No. of Workshops Reserved in Industrial Zone

4-Smart Industries Zone:

This is a recommended industrial zone for electronics and minute industries over an area of two kilometers in east of Al-Arish airport, and it is noteworthy that these are non-polluting industries.

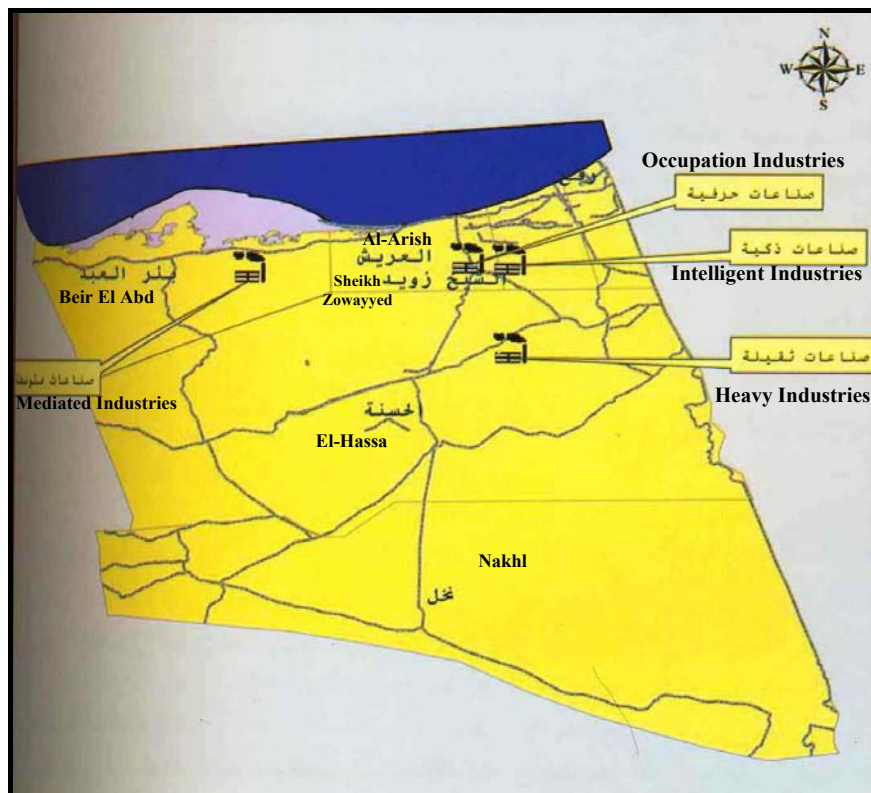


Figure (22) Industrial Zones at Governorate

Activity	Governmental			Public			Private		
	Males	Females	Total	Males	Females	Total	Males	Females	Total
Transformational Industries	-	-	-	-	-	-	653	15	668
Services	9,348	1,624	10,972	11	5	16	782	180	962
Building and Construction	-	-	-	114	-	114	12	-	12
TOTAL	25,305	10,878	36,183	1,406	107				

Table (8) Number of Manpower in Governorate
Source: Manpower Directorate, 2007)

Item	No. of Projects	Production Value	Investment Costs	No. of workers	Payroll
Coal extraction	1	16,840	394,512	843	8,372
Food Products and Cigarettes	19	99,134	59,732	404	1,393
Wood products and Upholstery	10	638	233	30	52
Paper, Paper Products, Printing and Publishing	4	30,157	11,586	74	642
Basic Chemical Industries	5	1,114	685	14	37
Building materials, ceramics, china and thermal industries	8	501,420	919,397	495	15,193
Engineering and Electrical-Electronic Industries	9	2,133	828	26	53
Total	56	651,436	1,386,973	1,886	15,742

Table (9) Numbers of Registered Industrial Facilities
Source: General Organization for Industrialization, 2007

Districts	No. of Workshops	Relative Importance	No. of Workers	Relative Importance
Al-Arish	480	62.8%	821	63.5%
Rafah	100	13%	187	14.5%
Sheikh Zowayyed	102	13.4%	140	10.8%
Beir El Abd	75	9.8%	127	9.8%
Al-Hosna	1	0.2%	1	0.1%
Nakhl	6	0.8%	17	1.3%
TOTAL	764	100%	1,293	100%

Table (10) List of Crafts Workshops and its Total Number of Workers According to Governorate Districts
(Source: Crafts Industries Department, 2007)

Beir El Abd

Al-Arish

Rafah

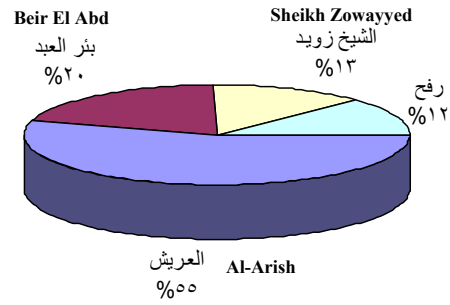


Figure (23) Distribution of Industries in Governorate Districts

Item	No. of Workshops	Relative Importance	No. of Activity Labor	Relative Importance
Spinning and Weaving	13	1.7%	13	1%
Food Processing	7	0.9%	10	0.8%
Paper, Printing, and Publishing	5	0.7%	6	0.5%
Mining Raw Materials	16	2.1%	29	2.2%[
Personal Services	329	43.1%	467	36.0%
Wood Industries	105	13.7%	194	15%
Chemical Products	9	1.2%	18	1.4%
Metallurgical Industries	173	22.6%	268	20.7%
Miscellaneous Industries	100	13.1%	278	21.5%
Basic Metals	7	0.9%	10	0.8%
TOTAL	764	100%	1,293	100%

Table (11) List of Crafts Workshops and its Total Number of Workers According to Activity
(Source: Crafts Industries Department, 2007)

Item	Al-Arish	Rafah	Sheikh Zowayyed	Al-Hosna	Beir El-Abd	TOTAL
Cement Brick factories	33	8	9	1	4	55
Clayey brick factories	1	-	-	-	-	1
Tile factories	10	-	4	1	6	21
Textiles factories	3	-	-	-	-	3
Plastics factories	6	3	1	-	-	10
Marble blocks cutting factories	1	-	-	1	-	2
Tricot and ready-made clothes	2	-	-	2	-	4
Olive presses	11	1	-	1	2	15
Grain grinder	2	4	2	-	-	8
Animal fodder factory	2	-	-	-	4	6
Batteries manufacturing facility	1	-	-	-	-	1
Poultry breeding lab	1	2	1	-	2	6
Juice and jam processing factory	-	1	-	-	-	1
Sweets factory	2	-	1	-	2	5
Dairy products	2	-	-	-	-	2
Plastic bags factory	2	-	-	-	1	3
Ice making factories	1	-	-	-	2	3
Cement manufacturing facilities	-	-	-	2	-	2
Salt processing facility	-	-	-	-	6	6
Paper bags factory	-	-	-	1	-	1
Total	81	19	18	9	29	155

Table (12) List of Industrial Facilities in North Sinai
Source: Cities Councils, 2007)

4.5 Mining

4.5.1 Background

God has granted North Sinai a multitude of mineral wealth, quarrying raw materials, and construction materials that necessitate the existence of local industries that depend on these resources instead of exporting them as primary raw materials. Although these industries will provide many job opportunities and shall add to the national economy and improve the individuals' living conditions, yet it will undoubtedly affect all environmental constituents due to the emissions, industrial wastewater, and domestic wastewater resulting from the operation of these industries. Therefore it is necessary to take this into consideration according to a sound planning to utilize resources, and preventing impacts on other environmental constituents in consistency between development and its maximized outcomes on one hand and the potential impacts and means to confront them on the other hand.

Raw construction and paving materials are available (gravely soil, dolomite, gravel, sand) in large quantities and reserves, which has, and still is, contributing to the urbanization of Sinai in various fields. Also available are basic raw materials required for cement manufacturing (limestone, clay, gypsum). Limestone is available in the areas of Gabal Lobna, Gabal El Halal, and AL Maghara in large reserves that are estimated at 800 million tons, and with a purity as high as 95%, which is unsurpassed worldwide. Clay exists in Gabal Al Maghara, Gabal Lobna, and Gabal El Halal and in reserves estimated at 18.5 million tons, and contains also a high rate of alumina therein. Gypsum is available in Al Roda and Masfaq, in reserves that reach up to 2 million tons. As these raw materials are of high quality, this resulted in producing cement of the highest possible quality which has distinguished specifications according to all standards of raw cement properties.

In addition to the mining treasures available in central Sinai, the North Sinai coast has its mining treasures too, in addition to the touristic capabilities, such as black sands that exist in Al Arish coast in reserves estimated at 4.1 million tons, and also contains many heavy elements that are used in radioactive, paints, iron, and ceramic industries, Gypsum also exists in AL Roda and Masfaq, in addition to sulfur existing in east of Al-Arish in reserves estimated at 20 million tons.

The governorate had supported producing salts from Salinas as being a great wealth, as production averaged 1.3 million tons annually. The extending governorate shores overlooking the Mediterranean from Port Fouad in the west to Rafah in the east enjoys the sunshine throughout the year, as well as a proper soil that is remote from various sources of pollution (industrial, agricultural, wastewater). This has granted the governorate all the capabilities required for the formation of solar Salinas that depend upon evaporation in salt precipitation.

North Sinai is characterized by containing various natural raw materials which can be used in new industries that form the cornerstone for the mining industry introduced in many areas enjoying a variety of soil formation (from fragile sandy in the north to the sedimentary rocks in the south and southwestern areas)

Mining Accomplishments in the Past Five Years:

- 1- Upgrading Salinas by supplying clean and renewable water from Bardaweel Lake, and establishing concentration and precipitation basins, and spaces

ford/effluents discharge. The main aim is to ensure the production of reliable salt that is efficient through treatment, washing and refining to produce salt of the highest quality.

- 2- Upgrading four Salinas and establishing edible salt producing factory in each swamp. All these factories obtained the industrial registration from the Ministry of Industry to produce high quality edible salt with a production capacity that reaches 500,000tons annually. These salinas are (Al-Agra, Al-Safeya, Al-Roda, Al-Qaterat), in addition to Sabikah swamp with a production capacity of 800,000 tons annually. Hence, the total output of the salinas of the governorate is 1,3 million tons annually, and considered among the purest types of salt, that is also exported to many world countries via Al Arish harbor.
- 3- A committee of experts representing various authorities (at the Ministry of Trade and Industry, The General Authority for Mineral Wealth, Industrial Control Authority, and Chemistry Authority) to follow up the upgrading efforts in those salinas, sampling and analyzing the produced salt at the Chemistry Authority laboratories, and the central labs of the Ministry of Health. The relevant lab reports indicated that "the Salinas in North Sinai are natural and are upgraded according to the requirements set forth by the Geological Survey Authority (Mineral Wealth Authority), and that the raw salt produced from these Salinas is valid as edible salt. The results of the analysis indicated that the samples are free of food poisoning microbes and any other health hazardous microbes. The reports also confirmed that the salt produced is compliant with the Egyptian Standard Specifications, as sodium chloride ranged from 98.5 to 99%, and that the rate of health hazardous elements, soluble and insoluble substances are below permissible levels.
- 4- Establishing a salt washing and refining factory
- 5- Planning for the quarries sites required for the manufacturing of cement, gypsum, and limestone in central Sinai, in the following industrial facilities:
 - Armed Forces Cement Factory
 - North Sinai Cement Factory
 - Gypsum and Limestone Factory

No	Mining Resource	Reserves	Location	Uses	Studies Conducted
1	Marble and decorative Stones	9.5 million cubic meter	Gabal Yalq, Gabal AL Monshareh Al-Maghara Al-Khatmeya	Coating walls and floors, decorations, statues, ornaments, mosaic tiles	Study by Jimo for Gypsum and Marble in 1983 Study by General Co for Mineral Wealth 1983
2	Limestone	800 million tons	Gabal Lubna, Al Halal, Risan Eniza, Al-Monsharih, West of Gabal Lubna, AL Maghara, AL Gefgafa, Um Shiha	Cement industry Chemical industry Fertilizers Paints Building and road construction works	Study by the General Authority for geological survey 1985
3	Clay	18.5 million	Gabal Al Maghara Risan Eineiza Al Hosna Gabal Al Halal Al Borook	Cement industry Well digging Oil refining Ceramics Clayey bricks manufacturing	Study by the General Authority for Geological Survey in the areas of Al-Maghara and Risan Eineiza 1985
4	Aljadbis	2.0 million tons	Around Bardaweel marsh in Al Roda and Masfaq	Agricultural Purposes Cement Industry Building and Construction	Study by the General Authority for Geological Survey in the areas of Al-Roda and Masfaq 1983
5	Yellow sand (normal)	High reserves	Plateaus and valleys (wadis in North and Central Sinai	Building and construction purposes	A Study about sandy bricks-Al Arish area 1983. The General Organization for Urban Planning and Housing Researches
6	Marl	0.5 million tons	South of Gabal Halal and west Gabal Al Qasima	In cement industries	
7	Dolomite	High reserves	Around the edges of Gabal Al Maghara, Gabal Halal, Risan Eineiza	In building and construction works, Road construction, Harbor	

No	Mining Resource	Reserves	Location	Uses	Studies Conducted
				anchorages	
8	Gravelly soil	High reserves	Around valleys in central Sinai and around Gabal Lubna	In road constructions	
9	White sands	27 million tons (silica reaches up to 99.3%)	Gabal Al Monshareh, Wadi Filly, Gabalk Yalq, Gabal Al Halal, Gabal Manzour	Glass and crystal manufacturing, ceramics, pure silicon, electric conductors, crystal, optical fibers, filters, lenses	A study by the General Authority for Geological Survey . Gabal Al Monshareh, Wadi Filly 1985, other areas under study
10	Black sands	4.1 million tons	Along northern coast of Al Arish , area 18 m ² Romanah area 18 km ²	Manufacturing aeroplanes bodies and engines, ceramics vitrification	A study by the General Authority for Geological Survey in April 1996
11	Sodium Chloride (Edible salt)	Annual Production Capacity of salinas is more than 700,000 tons/year	Around Bardaweel lake in Al Rodasalina (Al Roda, Al Agra, Al Safya, Al Qatrat, Sabika salina)	In edible salt, food industries, chemical industries, Excavation of oil wells	
12	Coal	52 million tons in geological reserves Confirmed 27 million tons	Al-Maghara area	Coke manufacturing necessary for Iron and Steel and power generation industries	
13	Sulfur	20 million tons	Area between Al Arish and Rafah (Dekla)	In Chemical Industries	A study by the General Authority for Geological Survey in the areas of Al-

Table (6) Mining Wealth Sources at Governorate

Year	1981	1999	2005	2006	Measurement Unit
No. of quarries	5	89	61	80	Quarry
Scope of utilization	88	1,835	4,922	2.9	1000 cubic meters
No. of Salinas	--	5	6	6	Salina

Scope of utilization	--	325	635	1.3	1000 cubic meters
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Table (7) Increased Number of Quarries and Salinas in Governorate
(Source: Information Center, Quarries Project, Quarries Dept. 2007)



Figure (20) a Geological Map for the Governorate

4.5.2 Current Conditions

Marble is a major raw material in North Sinai governorate and it is distinguished with its quality types (Felto El-Hassa, Trista, Sina Rose, Sina White, Pochino), which are equivalent to the best types of Italian and international standing. The reserves of these raw materials are estimated at 9.5 million tons and exist in the area of Yalq Mountain and Al Magharah. Marble is currently being exported to several world countries such as China and Italy.

White sand (glass sand) is dominant in the governorate with reserves up to 27 million tons, and is characterized by its 99.5% purity. This type of sand is used in manufacturing glass, crystal, ceramics, and white cement manufacturing. Large quantities of this sand are exported to Turkey through Al-Arish harbor. White sand is available in the areas of Al-Monsharih and Wadi Um hadb. Wadi Um Saied, Wadi Filly in Yalq mountain, Wadi Um Manmzur in Al-Maghara and Wadi Al Hazira in Gabal el Halal mountain.

Coal is available in Gabal El-Maghara area, with reserves up to 52 million tons, and is being exported to several Arab and foreign countries.

4.5.3 Prioritized Problems

Prioritized problems were arranged as follows:

1. The private sector is accuses of over-utilization of mining resources, mainly raw marble and construction materials.
2. Usage of explosives in extraction of marble results in the accumulation of exploded fragments on the roads leading to the quarries. This may result in the deterioration of the natural resources areas and the deterioration of marble reserves in proportion to the actual product by 1:8. This is attributed to using machinery and equipment that cause the wasting and breaking of raws and quarry materials. The solution to this problem is represented in systematical using of waste reduction technologies such as the wire saw and the big diameter circular cutters, and thermal cutters in quarrying processes.
3. Dispersion of quarrying materials during extraction and manufacturing results in polluting ambient air. This is attributed to using improperly unequipped trucks causing the scattering of quarried materials during transporting, loading, and exporting processes. The solution is represented in issuing a binding legislation for all concerned authorities to minimize the volume of blown air during the processes of quarrying, transporting, loading and exporting.
4. Take into c0onsideration the necessity of conducting an environmental impact assessment (EIA) for the processes of franchising the utilization and operation of quarries and quarrying processes that may result in the deterioration of the biodiversity elements at the franchised sites. These impacts may cause the deterioration of Sidi Hemeid forests in Al-Magharah, and the destruction of pine forests in the marble extraction sites. It is noteworthy that there is lack of cooperation and coordination between the Quarries Department and the Environment departments on determining the quarrying sites and their utilization requirements. This problem can be solved by issuing legislation at EEAA departments to facilitate and ensure coordination with the Quarries department for the

selection of quarrying materials sites and terms and conditions for relevant operation and utilization. The EIA requirements must be a binding procedure imposed on the quarries owners and operators before permitting them to operate these quarries. All piles and stored stock must be removed from the land surface in closed mining sites, and backfilling all the excavated holes, and restore the land back to its normal status.

5. Exporting primary raw materials is considered a high loss of these resources. Manufacturing these wastes shall ensure job opportunities and create sources of income, in addition to supporting settlement programs for desert Bedouin communities. Therefore, it is necessary to construct industrial facilities in extraction sites and provide infrastructure, roads and energy.
6. Lack of any environmental impact studies resulting from the closure of Al Maghara quarry, and the disposal of the quarry liquid waste stored in highlands and are scavenged by torrential rain waters as they flow through the valleys and cultivated lands. To date, no EIA was conducted to detect the impacts of these wastes on soil, plant and groundwater.
7. Benefiting from natural gas are limited to energy alternative uses in houses, cars and private sector factories although natural gas is available at economic prices at the governorate. This problem can be solved by establishing supply stations and natural gas systems, and generalize its usage in houses and industrial facilities.
8. Lack of any scientific approach applied for safe disposal of liquid wastes resulting from the process of producing edible salt from the salinas located along the seashore, and lack of any EIA for the production of salt, recycling liquid wastes, and means to benefit from. The recommended solution is represented in establishing a unit for treatment and recycling of liquid wastes and means to benefit from.
9. Inadequate benefiting from the remaining components of chemical salts contained in Salinas
10. Underutilization of the following:
 - A) Raw limestone and gypsum estimated at 800 million tons and gypsum at 2 million tons at the governorate
 - B) Raw sulfurs which estimated at about 20 million tons
 - C) Raw cement is available at high reserves (limestone: 800 million tons, clay: 18.5 million tons, Gypsum: 2 million tons)
 - D) Glass sand exists in high purity rates and in reserves estimated at 27 million tons that are exported as raw materials despite the availability of inexpensive manpower and manufacturing capabilities
 - E) Availability of black sand at AL Arish coast and Rommanah in reserves estimated at 4.1 million tons, including heavy elements that are suitable for many industries (Iron, Paints, Ceramics, Radioactive elements, Plane body manufacturing , electrical appliances)
 - F) Availability of various types of raw construction and paving materials (gravel soil, dolomite, gravel, sand) in large quantities and reserves which are used for purposes of construction, pavement, and protection of shores and harbor decks.

This problem can be solved through putting these resources before investors who must be given some privileges, while exporting these construction

materials to coastal governorates via Al Arish harbor, being highly inexpensive means of transport.

4.5.4 Vision and Objectives

1. Provide franchise rights to use all quarry products in return for repayment of the fees according to the provisions of Law 86/1956
- 2-Continuous increase of revenues through the utilization of natural resources
- 3-Meet the requirements of the local market and achieve and exportable surplus
- 4-Create a stable development in central Sinai
- 5-Create more employment opportunities
- 6-Provide all facilities to all industrial and mining investors
- 7-Maximize scope of research and excavation studies on various raw materials in mountains, hills and valleys (wadis)
- 8-Apply modern Computer-aided technologies (such as AutoCAD, GIS)

4.5.5 Institutional Support and Capacity Building

- 1-Train quarry workers on the mechanism of using modern technologies of metal extraction, use and safety precautions for manufacturing thereof
- 2-Supply modern equipment to quarry product utilization sectors for the extraction and manufacturing of raw materials without wasting of resources
- 3-Provide appropriate means of transportation to monitor and follow up the processes of transport, loading and manufacturing according to the prioritized sustainable utilization of resources

4.6 Industry

4.6.1 Background

North Sinai is distinguished by its rich natural raw material treasures that are used in new industries that form the cornerstone of mining industries in various areas that enjoy a broad diversity in soil formation, ranging from fragile sands in the north to the sedimentary and conflagrated rocks in the south and southwest areas. North Sinai is covered by vast areas of white sand in the northern, northeastern, and southern areas of the governorate.

This diversity is represented in white sands used in manufacturing glass, silicon slides, and various electronics, which are directly exported via Al Arish harbor, in addition to varied types of marble, and raw cement which is freely exported through Arish harbor. These diverse treasures include also coal, natural gas and phosphates. Cement is the only raw material to be utilized to date, where the ordinary "black" and white cement industries are established, plus extracting the raw marble. Sustainable development programs may be introduced to evade many losses in this important natural resource. In addition, the establishment of direct industries depending on these raw materials will result in achieving economic profits that can have its positive consequences in combating unemployment and poverty in desert communities.

However, the lack of water necessary for industrial processes whether for product formation or washing or human uses still constitutes a major obstacle that impeded the establishment of various industries. Hence comes the importance of water transfer from its sources to required destinations via pipelines and pumps

Industrial zones were allocated for heavy industries in central Sinai at a total area of 4,480 km², in which phase I start with 34 km², in addition to medium scale industries zone and crafts industries zone.

Heavy Industries Zone in Central Sinai

Prime Minister Decree No. 2 of 1996 was issued for allocating an area of 4,480 km² for the Heavy Industries Zone. Based on this allocated area, the General Authority for Urban Planning of Suez Canal has planned the layout of the following areas:

- 4 km² for cement industries
- 20 km² for metallurgic and mining industries (south Bagdad village)
- 10 km² (south of Bagdad-Ismailia)

Project Execution Status:

1- Implementation started already for four cement industries sector projects, these are:

- Portland cement factory
- White cement factory
- Cement packaging bags factory
- Stone breaking and grinding factory

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5- Under construction currently are four projects of the cement industries sector and two projects of the mining industries sector, these are:

A) Cement Industries Sector Factories

- Sinai grey cement factory, 2nd line
- Sinai white cement factory, 2nd line
- North Sinai Sons Factory for Grey Cement
- Armed Forces cement factory

B) Mining Industries Sector Factories

- Armed Forces cement factory
- Gypsum factory

3) Approval has been obtained on the establishment of five projects affiliated to the cement industries sector and eight projects affiliated to the mining industries sector, these are:

A) Cement Industries Sector Factories

- Ready Made Constructions Factory (SAMA)
- Construction Materials Factory (SAMA)
- Concrete Pipelines Factory (SAMA)
- Cement brick factory (SAMA)
- Integrated Auto Tile Factory (HOWAYDA)

B) Mining Industries Sector Factories

- Metallurgic Supplies Factory (FAYYAD)
- Al Mesreya Factory for Marble Cutting and Manufacturing
- Tiba Factory for Marble and Granite
- Al Mesreya Al Dawleya Marble Factory (Al Morsi9)
- Tahoon (al Shorouq) for Silicon Ingots
- Friends Stone for Marble
- Al-Hosna Marble Factory (Ahmed Haggag)
- Friends Stone for Glass and Crystal

Status of Land Allocation at Zone

A) Cement Industries Sector

(4 km²): the whole area was occupied by seven factories

Required Action: Planning a new cement industries zone within the borders of heavy industries area

B) Metallurgic and Mining Industries Sector:

(20 km²): South Bagdad: lands were allocated for ten factories. Applications are presented for 10 factories and procedures are currently underway

Required Action: Detailed planning for this sector to identify the routes of inland roads and the routings of power cables supply according to the power distribution

panel and the industrial activities divisions, in addition to the routings of the remaining utilities (water, industrial wastewater, domestic wastewater), taking into account the already reserved sector projects

Status of Mining Sector Infrastructure:

I-Electricity:

- The area was connected to a 220 KVA from Beir El Abd Transformers station with a capacity of 20 megawatt
- The governorate has allocated an area of 50 x 50 m within the zone allocated for the metallurgic and mining industries in south Bagdad for the Electricity Company to construct the power distribution panel from the adjacent transformer

II-Water:

- A water reservoir with a capacity of 1,200 cubic meter along a distance of seven kilometers

Required Action: Continue connection of water pipeline of a 300 mm diameter of the cement industries sector up to the metallurgic and mining industries sector in Bagdad.

- a) Required establishment and execution of a 1000 mm pipeline (Ismailia, Al-Tassa, Al -Gefgafa, Bagdad), along with excavating a series of wells in Abou Egaila and extend a water pipeline to the metallurgic and mining sector.
- b) Required establishment of ground and mounted reservoirs with a suitable capacity inside the sector

III-Natural Gas

- A natural gas pipeline has been connected extending from Al-Arish to the cement industries sector as a first phase
- Required Actions:
 - A) Continue extending the natural gas line to the metallurgic and mining industries sector in Bagdad

IV-Roads

- The General Authority for Urban Planning at the Ministry of Housing and Utilities (Region III, Ismailia) has planned the layout for the zone allocated for the Metallurgic and Mining Industries Sector. Detailed planning is still pending.
- Required Action:
 - A) Expediting the development of the detailed planning of the area in order to compute costs for the establishment of inland road system

4.6.3 Prioritized Problems:

The priorities of problems were arranged as follows:

1-Incomplete infrastructure at the industrial zones especially the occupational area (water, wastewater, electricity, roads, and telephones)

2-Lack of solid waste management system inside industrial zones

3-Lack of a reliable liquid waste treatment system for the olive presses and the liquid waste treatment units in industrial zones

4-Distribution of workshops and small scale industries in an unorganized way results in future environmental and industrial safety problems.

5- Urban areas creeping over the occupational industries zone

4.6.4 Vision and Objectives

1. The governorate considers that all-development programs, especially in industry, should cope and be consistent with environmental protection procedures, through adopting the cleaner production concepts and imposing the use of natural gas as a source of energy.
2. The governorate affirms the necessity that the licensing of the environmentally-polluting facilities in the industrial zones, and in agreement with facility owners, that the polluter must comply with repaying the costs of removing the hazards that afflict the environment and/or the community.
3. Activate the enforcement of Law 4/1994 by rejecting the licensing/re-licensing of industries and activities that use outdated and environmentally polluting technologies. These facilities/activities must introduce modern clean technologies that are compliant with the legally permissible limits and standards of global environmental ISO systems.
- 4 The governorate confirms its keenness on the sustainability of environmental resources, and highlights the need to manufacture natural resources and not only export them.
5. Reduce the pollution resulting from industrial sources to a minimum through introducing updated technologies
6. Reduce the spread of industrial activities inside the residential areas
7. Ensure safe disposal of industrial wastes
8. Adopt and apply industrial pollution controls through the following:
 - Activate the enforcement of Law 4/94 and the Ministerial Committee decree No. 3/13 by confirming that polluting industries are not licensed or established inside city cordons
 - Adopt the policy of reducing emissions from industrial facilities and apply maintenance procedures, identify production inputs and type and volume of raw materials, and disposal of rejected raw materials and non-manufactured parts before having access to industrial zones
 - Establish minor industrial zones supported with water and power supply utilities and WW systems to accommodate development projects at the governorate, and relocate the occupational workshops to industrial zones outside the urban residential cordons on the whole governorate level.

-From the current conditions of the existing manufacturing processes, it was realized that the amount of water that enters into these processes exceed 920 m³/day. Moreover, the discharged water amount does not exceed 200 m³/day. The used water are collected in an internal network to receive primary treatment and are used in cultivation of trees and décor plants inside and surrounding the facilities, the matter which would increase the green cover and support the biodiversity in the area.

-Issue new licenses for the industrial facilities located in the specified industrial zones.

4.6.5 Profiles of some Priority Projects
WWTP Project at the New Industrial Zones
Project costs are estimated at about LE 250,000

Industrial Emissions Monitoring Project

-Establish a sampling lab

-Costs of construction and payroll shall be at expense of beneficiaries from the industrial zones

Project costs are estimated at

Equipment and supplies	= LE 70,000
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Training of sampling labor	= LE 50,000
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Total	=LE 75,000
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Project for Relocation of Small Scale Industries from Urban Areas to Industrial Zone

Objective:

Reduce Pollution Sources and Disturbing Noises Resulting from the operation of 700 small scale industrial facilities/workshops

Finance:

Phase I: LE 125,000 in costs of Environmental Impact Assessment

Phase II: LE 500,000 in costs of the new equipment required for facilities owners while the Governorate shall provide the land and utilities

TOTAL: LE 5,125,000

Industrial Zone Forestation Project

Objective:

- Improvement of air and environmental quality
- Protecting the zone from the crawling sand dunes
- Provision of job opportunities for sons of industrial zone workers

Beneficiaries:

Industrial zone labor, citizens dwelling in the surrounding areas (Al Dahisha Al Qebeleya)

Project Estimated Costs

Purchase of nursery shrubs of Serw, Camphor, Casernes, Acacia trees	= LE 13,000
Payroll of excavation and cultivation labor	= LE 20,000
Payroll of supervisors	= LE 21,000
Expenses for transporting of workers and supervisors	=LE 3,000
Fertilizers for tree planting	= LE 4,000
A three year maintenance and care term for trees	= LE 36,000
Total Amount	=LE 107,000

Recommended:

Sprinkling Irrigation- Tree planting -Fertilizers

4-7 Solid Wastes Management

4-7-1 General Background

North Sinai population is 351953 capita distributed on six markazs (Arish – Beer el-Abd – Sheikh Zoaid – Rafah – el-Hassana – Nakhl) producing around 177 tons daily of solid wastes. Arish markaz produces 90 tons/ day Sheikh Zoaid 30 tons/ day, Rafah markaz produces 30 tons/ day, Beer el-Abd markaz produces 25 tons/ day and el-Hassana and Nakhl markazs produce 2 tons/ day. Solid wastes vary according to activities which produce these wastes. Household solid wastes are 177 tons/ day, where 60% of it is collected and the rest is accumulated on roads side. Agro wastes are 25000 tons/ year, yet it does not represent a problem, as citizens use it in many purposes. Factories wastes are 700 tons/ year, construction and demolition wastes are 3400 tons/ year, out of which big quantity is accumulated in residential areas. Slaughterhouses wastes are 55 kg/ day. Solid wastes consist of 40% organic materials, 32% plastics, 2.05% glass, 1.5% metals, 15% paper, 6.45 dust and sand, 3 % others (wood, rubber, cloths) and crop wastes.

Solid wastes management is inefficient, as there are many negative aspects related to collection, transportation and final disposal, which adversely affects the public health and spread of diseases and epidemics for humans due to insects, rodents and microbes breeding. Also, there are economic effects, as the spread of disease result is decreasing the national production and increasing the cost of treating citizens. In addition, there are social effects due to human feeling of depression and anxious due to wastes accumulation, besides other negative impacts of similar risks like air, soil, and water pollution as well as sight pollution.

Due to the multidimensional and overlapping solid wastes problem, these wastes must be reduced to the lowest limit possible and its use must be optimized through recycling and safe disposal of the rest to keep the environment clean and to protect human health.

4-7-2 Current situation

Solid wastes are collected by a specialized company in Arish and Sheikh Zoaid markazs. This company collects 60% of the wastes. In other markazs, local units collect the wastes and transport it to dumpsites, despite their limited resources.

Arish markaz

Daily quantity of wastes is 90 tons, where a private company collects it. Workers in this company is 250 workers, number of cars are 13 trucks. Solid wastes workers are 6 (environment improvement department). Wastes are transported to the dumpsite through Arish - Taweel road. Dumpsite area (needs rehabilitation) is 2500 square meters. Opposite to the dumpsite, there is a composting factory of 135m² x 135m² of area. It was manufactured by military factories and established by local unit. It has 5 tractors with trailers, 2 loaders, 1 sorting line, and 2 compactors. Such equipment is working at 50-60% of its capacity. The factory is not working now, as it is offered for sale to the private sector. There is site assigned to establish new sanitary landfill, complying with environmental requirements.



Figure (24) Arish waste recycling factory

Sheikh Zoiaad Markaz

A private company collects and transports solid wastes. The company has 60 workers and has 1 vehicle, 4 trucks. Workers in wastes department are 5 (environment improvement department). Wastes are transported to the dumpsite (needs rehabilitation) of 15000m² of area, surrounded by wire fences next to Shelak village. A new sanitary landfill site was proposed next to Shelak village.



Figure (25) Solid wastes collection in Shiekh Zoaid markaz

Rafah Markaz:

Local unit collects solid wastes and transports it to the dumpsite, southeast the city, (needs rehabilitation) of 10000m² of area. Workers in wastes collection are 17 and vehicles are 3 in good condition. Workers in wastes department are 3 (environment improvement department). A new sanitary landfill site complying with environmental requirements was proposed.

Beer el-Abd Markaz:

Local unit collects solid wastes and transports it to the dumpsite, south the city, (needs rehabilitation). Workers in wastes collection are 8 and only one worker is working in wastes department, which has 1 tipping truck working at 85% of its capacity. The area of the dumpsite is 2500m² southeast the city.

El Hassana Markaz:

Local unit collects solid wastes. Workers in wastes collection are 17 and only one worker is working in wastes department, which has 1 agro tractor with trailer to collect the wastes and transport it to the dumpsite north to el-Hassana – Nakhl road. The area of the dumpsite is 400m² and it needs rehabilitation. A new sanitary landfill site was proposed south the city.

Nakhl Markaz:

Local unit collects solid wastes and transports it to the dumpsite, southeast the city, of 2 km² of area. The same site was proposed to set up a landfill. Workers in solid wastes collection are 18 and only one worker is managing wastes collection. The local unit has one agro tractor with trailer and two tipping trucks.

The current situation of solid wastes management in the governorate can be summarized as follows:

Statement/ markaz	Arish	Sheikh Zoaid	Rafah	Beer el- Abd	El- Hassana	Nakhl
Waste quantity ton/day	90	30	30	25	1	1
Management system	Private	Private	Local unit			
Workers in wastes management	6	5	3	1	1	1
Solid wastes workers	250	60	17	8	17	18
Equipment	13 trucks (3/4) 1 tractor loader and	4 trucks (3/4) 1 Iveco truck	3 trucks	3 trucks and 1 tractor with trailer	Agro tractor with trailer	Agro tractor with trailer

Statement/ markaz	Arish	Sheikh Zoaid	Rafah	Beer el- Abd	El- Hassana	Nakhl
	trailer					
Dumpsite						
Area	2500m ²	15000m ²	10000m ²	2500m ²	400m ²	2 km ²
Location	Arish – Taweel road	Next to the Shelak	Southeas t the city	South the city	South the city	Southeast the city
Rehabilitation	Needs rehabilitati on	Needs rehabilitatio n	Needs rehabilita tion	Needs rehabilit ation	Needs rehabilit ation	Needs rehabilitati on
Composting factory	Available	None	None	None	None	None
Landfill	Proposed site opposite waste recycling factory	Proposed site on Shelak road	Proposed site on the road	Propose d	Propose d site south the city	Proposed site on the current site

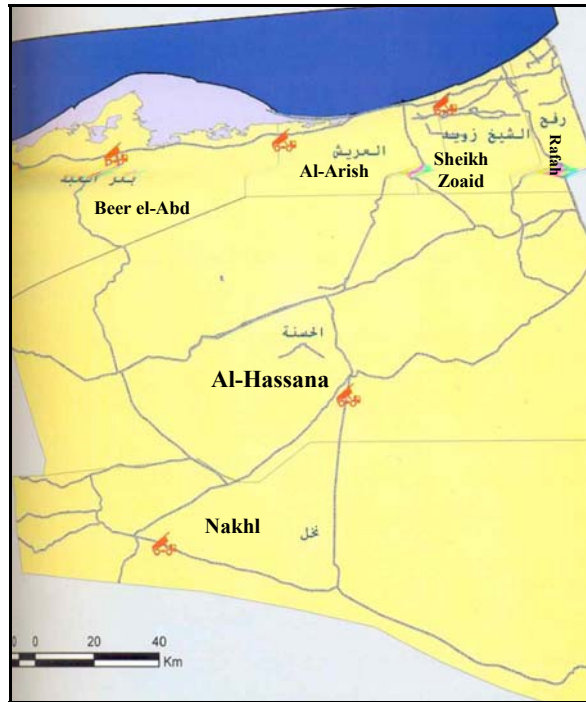


Figure (26) dumpsites locations in the governorate

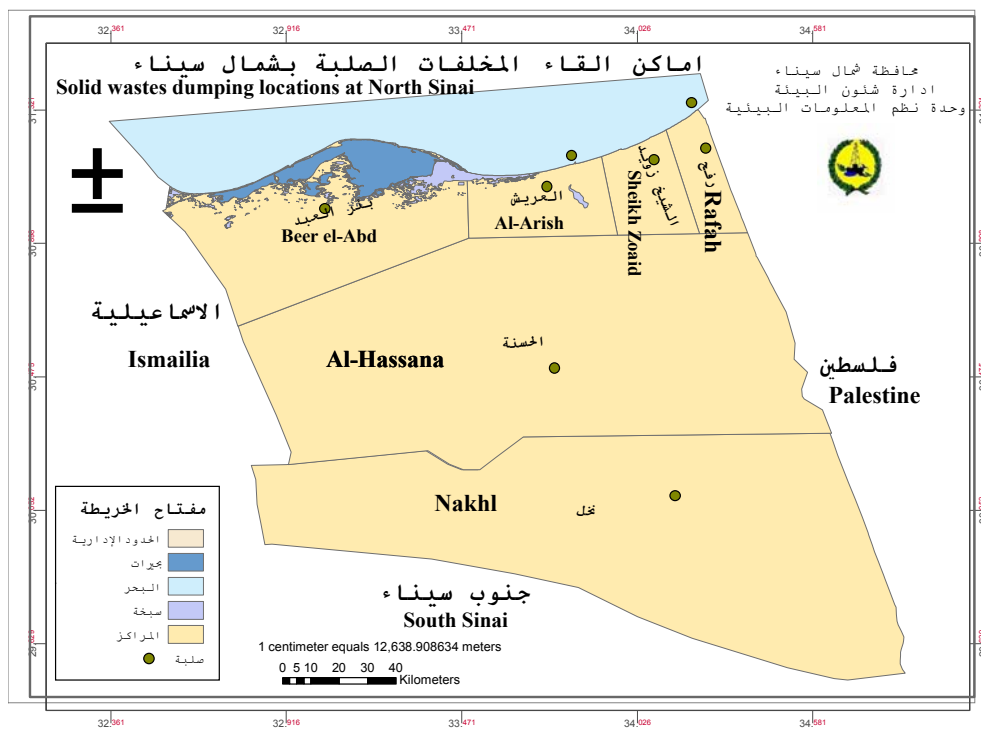


Figure (27) Solid wastes dumping locations in the governorate

4-7-3 Problems as per priority

Priorities are arranged as the following:

- Lack of landfills to receive wastes in governorate markazs.
- Lack of dumpsites rehabilitation.
- Little heavy load equipment like loaders and tipping vehicles.
- Few wastes containers to receive household wastes, which force people to dump it in the streets.
- Low allocations for solid wastes.
- Low efficiency and few numbers of the wastes transportation vehicles
- Little workers in the field of wastes collection and transportation besides changing workers from time to time.
- Bedouins are sorting wastes and collecting organic materials to feed their animals and throwing the wastes in the streets to be scattered by the air.
- Some people sort wastes inside the residential areas.
- Low profile by citizens towards waste collectors.
- Lack of social care for the workers of waste collection and their low incomes let them sort wastes and sell it.
- Lack of maintenance for wastes transportation equipment and limitation of its number.
- Laws, legislations and decrees related to environment are not enforced, especially concerning preventing sheep grazing, breeding, and raising inside the residential areas.
- Lack of environmental public awareness programs on the necessity of safe disposal of the wastes.

4-7-4 Vision and goals

Applying integrated solid wastes management program aiming at the following:

1. Setting up solid wastes management program ensuring wastes sustainable management.
2. Providing financial and institutional support for solid wastes management.
3. Improving the efficiency of solid wastes collection and transportation means by replacing, renovation and maintaining of collection and transportation equipment.
4. Segregating hazard healthcare wastes from household solid wastes at source.
5. Providing job opportunities for fresh graduates.
6. Promoting the awareness of citizens and solid wastes collection workers.
7. Setting up fixed and effective system to collect solid wastes fees from residential areas and private facilities.

4-7-5 Institutional support and capacity building

- 1- Training of workers on improving wastes collection, general health and environmental requirements of the public dumpsites and training on safe disposal of wastes and its recycling and reuse.
- 2- Improving the technology of waste recycling and supplying the governorate with enough equipment for wastes transportation,

and handling and establishing and rehabilitation of public dumpsites according to health and environmental requirements.

- 3- Activating environmental and health awareness programs to reduce wastes and rationalizing the use according to needs to avoid increasing of wastes either from food processing, industrial or commercial operations.

4-7-6 Description of some priority projects:

Rehabilitation of public dumpsites:

- North Sinai has 6 public dumpsites not complying with the environmental requirements, which result in scattering of solid wastes, especially plastics outside the dumpsite. Also the solid wastes are sorted in the site, in addition to self ignition.

Project goals:

- Improving safe final disposal of solid wastes.
- Tighten the control of wastes ignition and air pollution.
- Eliminating the problems of insects and rodent breeding.
- Protecting the health and safety of the residents nearby the dumpsites.
- Protecting the health and safety of workers in the dumpsites and its visitors.
- Providing job opportunities for young graduates.

Project justifications:

- Safe disposal of daily generated wastes (177 tons), especially unrecyclable wastes.
- Controlling wastes sorting inside residential areas.
- Large number of unemployed young graduates.

Project return:

- Protecting the environment from air, water, and soil pollution by solid wastes.
- Decreasing the number of insects and rodents.
- Providing job opportunities for young graduates and mitigating unemployment.

Project activities:

- Building fence around the dumpsite.
- Forestation around the dumpsite with suitable trees.
- Providing firefighting equipment.
- Establishing suitable office for supervisors next to the entrance of the dumpsite to monitor solid wastes vehicles movement in and out the dumpsite.
- Providing the dumpsite with basic utilities like electricity, water, etc.
- Designing and building internal suitable access roads in the dumpsite (to move from one cell to another).
- Mitigating and controlling insects and rodents breeding.
- Establishing garage inside or outside the site to maintain the site equipment.
- Establishing controlled storehouse to store spare parts and greasing tools.
- Training of workers on dumpsite operations and management.

- Daily cover of wastes by dust or idle material like sand to prevent self ignition, mitigate birds and rodents and fight rain water from leaking to wastes.
- Providing protection gear for the workers in the dumpsite, including masks, glasses and gloves.
- Providing necessary registers (equipment maintenance register, daily operations register, environmental registers, personnel register, and financial register).

Cost:

As dumpsites areas at the governorate level are varying as well as the quantities of solid wastes transported to these dumpsites, its costs also vary.

Dumpsite	Rehabilitation cost (LE million)
Arish markaz	1.5
Beer el-Abd markaz	1
Sheikh Zoaid markaz	0.75
Rafah markaz	0.75
Hassana markaz	0.75
Nakhl markaz	0.75
Total	5.5

Establishing landfill in Arish markaz:

Despite the importance of landfills in cities, yet there is no a landfill at the governorate level, despite the identification of six locations for landfills establishing in the governorate at one landfill per markaz.

Project goals:

- Safe disposal of hazard medical wastes and unrecyclable solid wastes.
- Prevent storing wastes in open areas exposed to rains, animals, insects, and rodents.
- Prevent leakage of hazard wastes decomposition liquids to the soil.
- Protecting the environment from pollution.
- Protecting citizens from diseases and epidemics.
- Safe disposal of empty pesticides containers, expired pesticides, chemicals containers and heavy and radiating metals.
- Using methane gas produced by organic wastes decomposition.
- Containing large quantities of wastes over fifty years.

Need for the project:

- Lack of landfills in the governorate.
- Large quantity of solid and hazard wastes.
- Big number of unemployed young graduates.

Project return:

- Safe disposal of different hazard wastes.
- Safe disposal of unrecyclable solid wastes.
- Providing job opportunities for fresh graduates.
- Protecting residents from diseases infections and spread of insects.
- Providing energy alternative sources (methane gas).

Required works for constructions and preparations:

- Identifying the area of establishing the first cell to start preparing it.
- Start up excavation works to reach the required depth as per landfill design.
- Leveling and covering landfill bottom with isolation materials and preparing slopes to protect the cell.
- Identifying artisan wells locations assigned for monitoring groundwater and start up digging them out.
- Building the internal access roads leading to the cell.
- Identifying the internal network of wastes leachate and gases network.
- Establishing wastes leachate treatment plant.
- Building cells for special wastes like slaughterhouses wastes and ashes of hazard medical wastes incineration.

Landfill operations works:

- Transporting rejects of treatment plants, resulting from waste sorting and organic materials rejects resulting from daily decomposition processes to the landfill (if wastes treatment units are available).
- Receiving wastes in the landfill, weighting them and registering its data, including quality, source, and transportation means.
- Placing wastes in prepared cells on multi layer soil as per technical specs. The height of the layer in the cell shall not exceed 4 meters and its width shall not exceed 100m. It should be covered with dust with 15cm thickness at least.
- Daily cover shall be provided at the end of the working day in the landfill.
- Completing the wastes liquid and gases networks.
- Taking samples from the groundwater and testing them and monitoring gas emissions regularly.
- Treating the leachate of waste decomposition.

Cost:

One million pounds.

Establishing solid wastes recycling units in the governorate markazs:

There is a composting plant in Arish markaz. Due to solid wastes generation in the other markazs of the governorate at 25-30 tons in Sheikh Zoaid, Rafah, and Beer el-Abd markazs, this needs to establish waste recycling unit in each markaz.

Project goals:

- Recycling big portion of generated solid wastes and using it.
- Reducing the wastes quantities that require safe disposal to facilitate its transportation to big sanitary landfill in Arish markaz.
- Providing job opportunities for young graduates.
- Controlling the solid wastes sorting inside the residential areas.

- Preventing self ignition of wastes and protecting the environment against pollution.
- Mitigating insects and rodents breeding.
- Providing organic fertilizers with big quantities to increase the fertility of agro soils.

Project justifications:

- Utilizing big quantities of daily generated solid wastes.
- Protecting the environment from pollution with solid wastes.
- Big numbers of unemployed graduates.
- Sever need for organic fertilizers and reducing the use of chemical fertilizers.
- Protecting the public health and preventing insects and rodents.

Project return:

- Recycling of big portion of solid wastes and gaining financial return.
- Employing number of graduates and mitigating unemployment.
- Protecting the environment form solid wastes pollution and preventing self ignition.
- Reducing unrecyclable wastes that need to be transported to the landfill.
- Providing composts to increase the fertility of the soil.
- Decrease the quantity of used chemical fertilizers.

Project activities:

- Selecting a piece of land next to the dumpsite of each markaz.
- Providing the necessary equipment (reception area – sorting station – compressor – turning equipment – loader – spraying unit – buildings – constructions).
- Building fence around the site (wires or bricks).
- Forestation around the recycling unit.
- Establishing administration office and equipment storehouse.

Cost:

10 million pounds.

Providing social and health care for the workers of solid wastes:

Number of workers in the field of solid wastes collection and transportation is about 350 workers. This number is increasing due to the expansion in the field of solid wastes management. Due to the lack of social and health care for those workers and their instability, they are subject to change from time to time. Also the low environmental and health awareness of those workers, they are exposed to catch diseases.

Project goals:

- Training and promoting the awareness of workers on risks of solid wastes collection.
- Providing protection gear to protect the workers of solid wastes collection and transportation.

- Promoting the public awareness on the importance of those workers and helping them doing their work.
- Increasing the workers income and promoting their educational and social levels.

Project justifications:

- Promoting the awareness of the workers in the field of solid wastes.
- Promoting the awareness of citizens of the great role of waste collectors to keep the environment clean and to protect public health.
- Some solid wastes workers sort the wastes and sell recyclable wastes inside residential areas.
- Protecting workers against infectious diseases.

Project return:

- Providing well aware and trained workers in the field of solid wastes collection.
- Promoting the public awareness of the risk of wastes accumulation.
- Transporting all solid wastes to the waste factory and not sorting and selling it inside the residential areas.
- Wastes collectors to have good health.

Project activities:

- Promoting the awareness of the workers in the field of solid wastes.
- Providing protection gear to protect the workers of solid wastes collection and transportation.
- Conducting number of seminars to educate and train the workers to protect their health from exposing to diseases.
- Promoting citizens awareness to sort hazard medical wastes from household solid wastes.
- Conducting regular medical check up for the workers.

Cost:

Item	Unit cost (LE)	Total
Public awareness seminars	1000	12000
Workers training and education		70000
Workers protection gear		70000
Handouts		8000
Trainers allocations and bonuses		4000
Total		164000

Fighting flies and mosquitoes in the villages of Beer el-Abd markaz:

Organic fertilizers transported from other governorates are stockpiled next to farms near villages. This results in spreading flies and mosquitoes heavily, especially in summer. This phenomenon also affects tourism resorts. This problem spreads diseases transferred by flies and mosquitoes and reduces citizens' visits to Rommana and Beer el-Abd beaches.

Project goals:

- Mitigating flies and mosquitoes breeding on compost.
- Reducing infectious diseases, especially among children.
- Increasing compost value as soil fertilizer.
- Mitigating the epidemic impact of disease communicators from the area to other areas in the governorate.
- Restoring tourism activity to Rommana and Beer el-Abd beaches.

Project justifications:

- Farmers ongoing need to stockpile the transported compost to use it (in summer and winter), and keeping them for long times on the farms edges.
- Existence of tourism assets (Rommana and Beer el-Abd beaches).
- Big number of unemployed graduates.

Project return:

- Decrease the number of flies and mosquitoes in the villages of Beer el-Abd markaz.
- Decreasing the number of infected people, especially children.
- Producing high quality compost.
- Ideal use of Rommana and Beer el-Abd beaches to receive visitors.

Project activities:

- Listing targeted compost stockpiling sites.
- Establishing storing units to store the compost according to scientific standards.
- Storing the current compost in storage units.
- Carrying out the necessary works to produce compost.
- Covering the storage units with plastic.

Project cost:

Activity	Cost (LE)
Identifying flies areas in villages and the basic breeding elements -	4000
Handouts and video tapes to educate citizens on the reasons of spreading - of flies and the protection methods and the importance of storage units	5000

Developing 5 pilot models (2 storage units per village) according to - medical and scientific standards	25000
administrative expenses and allocations and cost of making competition - between villages to select the key villages in fighting flies and mosquitoes	5000
- conducting 5 awareness seminars, one for each village	
Total	44000

4-8 Medical wastes management

4-8-1 General background

These are the hazard healthcare wastes produced by healthcare facilities (hospitals – clinics – labs – healthcare centers, etc). These facilities produce infectious biological wastes, chemical wastes, exploding wastes, and radiology wastes. They produce 380 tons of wastes annually. Only 90 tons are collected and disposed safely annually. Healthcare Directorate manages the collection and disposal of such wastes. These wastes are disposed by incineration in the Chest hospital incinerator, or by shredding and sterilization in the shredding unit in Arish public hospital. These wastes are collected from governmental hospitals in Beer elAbd, Rafah, and Sheikh Zoaid markazs by a vehicle (not complying with environmental requirements) assigned by health directorate to collect and dispose these wastes.

4-8-2 Current situation

Health directorate is managing the hazard wastes system, as it has assigned a vehicle (not complying with environmental requirements) to transport hazard medical wastes from the hospitals of Beer elAbd, Rafah, and Sheikh Zoaid markazs to the hospital incinerator. Number of private clinics and hospitals are committed to make a contract with Arish public hospital for safe disposal of their hazard medical wastes through the shredding and sterilization machine in the hospital against small financial amount every month. Yet, this system is not going well; as such medical facilities have no safe transportation means to transport such hazard wastes.

Currently, 380 tons of hazard medical wastes are produced annually, out of which 90 tons only are collected and safely disposed by incineration or by shredding and sterilization, which means that there are 290 tons/ year of infectious hazard wastes need to be disposed. In many cases, such hazard wastes are disposed with normal solid wastes, which endanger waste collectors life due to disease communication. Medical facilities in the governorate are 450 facilities including public and private hospitals, private clinics, pharmacies, labs and radiology centers, and family planning clinics. This number is increasing, which means an increase of hazard medical wastes

and consequently increases the problem. Therefore, we should take all necessary measures for safe disposal of such hazard wastes to protect citizens' health.

Achievements over 5 years:

- Establishing shredding and sterilization unit for hazard medical wastes in Arish public hospital to receive medical wastes of hospitals and clinics contracted with the hospital to dispose their wastes against limited financial amount per month.



Figure (28) hazard wastes store in Arish hospital

- Establishing special storing room for hazard wastes (not complying with environmental requirements) for each hospital until disposing them by incineration in the chest hospital incinerator or shredding and sterilization unit.



Figure (29) Chest hospital incinerator

- Making contracts with private clinics and hospitals as well as governmental hospitals to commit to dispose their wastes in safe ways.
- Assign a vehicle “complying with environmental requirements” from health directorate and equip it to transport hazard medical wastes from the hospitals of Sheikh Zoaid, Rafah, and Beer el-Abd.
- Providing plastic bags in different color for hospitals to segregate hazard medical wastes from normal solid wastes and providing safety boxes to keep needles of the syringes until safe disposal.



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Figure (30) medical wastes sorting at source

- An incinerator is being supplied by health ministry to install it in Sheikh Zoaid hospital to serve Rafah and Sheikh Zoaid markazs.
- Committees are formed in each hospital at the governorate level to segregate hazard wastes from solid wastes at source (different hospital wards).

4-8-3 problems according to its priority:

Problems priorities were classified as follows:

- Insufficient number of incinerators or shredders and serialization machines.
- Lack of landfills complying with environmental requirements of Law 4, 1994 for safe disposal of incineration residue.
- Lack of equipped vehicles to transport hazard medical wastes to the disposal sites.
- Lack of awareness of the workers of hazard wastes collection, transportation and disposal.
- Lack of public awareness on the importance of segregating hazard wastes from household wastes.
- Non commitment to segregate hazard medical wastes from solid wastes in the medical facilities.
- Hazard wastes are disposed in some cases with normal solid wastes.
- No responsible authority is identified for hazard medical wastes management in each medical facility.

4-8-4 Vision and goals:

- Applying integrated hazard medical wastes management system to ensure the sustainability of safe disposal of all hazard medical wastes.
- Providing financial and institutional support for hazard medical wastes management.
- Segregating hazard medical wastes from household solid wastes.

- Providing safe transportation means to transport hazard medical wastes to its safe disposal sites.
- Enforce all medical facilities to contract a safe disposal facility of wastes and developing effective system to collect fees on regular basis.
- Promoting awareness of workers of hazard wastes collection.

4-8-5 Institutional support and capacity building:

- 1- Training of workers, supervisors, and staff of city councils to supervise landfills, and training of wastes collectors on the healthy method of safe collection and handling and final disposal of such wastes.
- 2- Providing protection gear including clothes, masks, shoes, etc.
- 3- Providing suitable collection tools inside the healthcare facilities according to sanitary standards, including clean and sealed containers manufactured from stainless steel and providing equipped vehicles to transport wastes to incinerators and landfills.
- 4- Providing sterilization machines and incinerators and establishing and rehabilitating landfills according to necessary requirements for safe disposal.
- 5- Promoting public awareness on sanitary and safe handling of hazard medical wastes.

4-8-6 Description of some priority projects:

Safe disposal of hazard medical wastes:

Generated hazard medical wastes quantity is 380 tons annually, out of which 90 tons are collected and disposed by health directorate. The project shall concern of hazard medical wastes collection, transportation, and treatment (by incineration, shredding, sterilization and safe disposal) and protecting citizens and the environment from the risks of such wastes, as they communicate blood disease.

Project goals:

- 1- Safe disposal of hazard medical wastes.
- 2- Protecting citizens from the risks of such wastes, as they are loaded with microbes and viruses and blood diseases.
- 3- Preventing wastes scavengers of solid wastes inside residential areas from having these wastes, especially plastic materials.
- 4- Providing job opportunities for young graduates.
- 5- Protecting the environment from microbes and viruses and all infectious diseases communicated through blood.
- 6- Preventing the disposal of hazard medical wastes with solid and normal wastes and protecting the waste collectors from diseases.

Project justifications:

- All medical facilities in the governorate produce 380 tons of hazard wastes every year.
- Weak available human and financial resources for disposing all hazard wastes of medical facilities, as only 90 tons are safely disposed.
- Most of hazard wastes are disposed through unsafe methods, which result in the following:
 - a- Exposing wastes scavengers to health risks and infectious diseases.
 - b- Exposing the environment to viruses, microbes, etc.

- c- Exposing the compost of recycling factory on mixing these wastes with normal wastes to pollution of soil and plants, which in turn are transported to man, animal, and plants.
- There is big number of unemployed young graduates.
- Low performance of some workers in hospitals and other medical facilities, citizens, and physicians regarding the risks of disposing hazard wastes with solid wastes.

Project return:

- Protecting citizens from infectious diseases and epidemics.
- Saving huge money spent on medicines, part of which is purchase by hard currency from abroad.
- Protecting hazard wastes collectors from infectious diseases.
- Fighting unemployment by providing job opportunities.
- Producing compost from composting factories.
- Protecting the environment from microbes, viruses and biological pollution.

Project activities:

- Providing 5 incinerators.
- Purchasing 6 vehicles of special specs to transport wastes from generation places to final safe disposal sites and incinerators.
- Building store room with special specs to store hazard medical wastes.
- Establishing garage for vehicles overnight parking and equipment maintenance next to the incinerator.
- Establishing organizational structure for management, work procedures and book keeping.
- Providing protection gear or workers of hazard wastes collection and transportation.
- Providing a bunch of necessary registers to control work progress and workers commitment.
- Hiring a group of young graduates and educating them on the risks of hazard medical wastes.
- Contracting medical facilities that produce hazard medical wastes Public and private hospitals – private clinics – pharmacies – analyzing labs – radiology labs – healthcare units and centers).
- Promoting the awareness of citizens and workers in the field of wastes and hazard wastes on the risks of disposing hazard wastes with solid wastes.

Project cost:

No.	Activity	No.	Unit cost	Total cost
1	Purchasing incinerators	5	300000	1500000
2	Purchasing vehicles	6	300000	1800000

No.	Activity	No.	Unit cost	Total cost
3	Buildings, facilities and equipment	6	200000	1200000
4	Manpower	50	300	18000
5	Awareness seminars	50	500	25000
6	Protection gear	50	400	20000
7	Offices for management and supervision	1	2000	2000
8	Registers and administrative tools		1000	1000
Total			804200	4566000

Segregating healthcare wastes from household wastes

Hazard medical wastes are risky for public health as they contain microbes and diseases, which expose citizens' lives to danger or catching diseases, especially in light of low awareness of citizens and workers in the field of solid wastes collection on the risks of hazard medical wastes and the importance of segregating it from normal wastes at source.

Project goals:

- Promoting public awareness on hazard medical waste risks.
- Protecting the workers of solid wastes collection from exposure to hazard wastes.
- Providing jobs for young graduates in the field of collecting hazard wastes from houses.
- Increasing the efficiency of hazard wastes collection and transportation and reducing catching infectious diseases.
- Producing compost from recycled solid wastes free of healthcare wastes.

Need to the project:

- Risks of disposing hazard medical wastes with household solid wastes.

- Big numbers of unemployed young graduates.
- Low awareness of the workers in the field of solid wastes collection regarding the hazard medical wastes.
- Low public awareness on hazard medical wastes and the importance of segregating them from normal solid wastes.

Project justification:

- Existence of NGOs concerned in this field of work.
- Good follow up of the governorate EMU.
- Existence of an incinerator and shredding and sterilization unit in the fever and Arish public hospital.

Project return:

- Segregating hazard medical wastes from household wastes in bags with different colors.
- Safe disposal of hazard medical wastes.
- Providing jobs for young graduates.
- Protecting workers of solid wastes collection, transporting and sorting from catching diseases.

Project activities:

- Providing quantities of adequate plastic bags with different colors to segregate hazard medical wastes from solid wastes.
- Providing number of small adequate vehicles to transport these hazard wastes from its generation places to safe disposal places.
- Distributing colored bags on citizens (3 districts).
- Conducting number of seminars in cooperation with health affairs to educate citizens.
- Training and educating workers in this field of the risks of hazard medical wastes.
- Conducting field trips with district officials to follow up citizens' response to project implementation.
- Displaying photos of the risks of mixing hazard medical wastes with household wastes and its impact on producing compost.

Costs:

Activity	Unit cost (LE)	Total cost (LE1000)
Purchasing 2000 kg of colored bags. -	15.00	30.000
Purchasing 3 motorcycles with special - boxes.	18.000	54.000

12 seminars -	1000	12.000
Handouts -		4.000
Fuel -	150/ month	5.400
Wages + management (5 workers) -	300	18.000
Protection gear -	200	1000
Total		124.200

4-9 Biodiversity

4-9-1 General background

Sinai is unique in many distinguished elements that qualify it to form a unique system of many natural environments in the world due to its unique location which links Asia with Africa, not far from Europe. Therefore, it has marine and coastal environment, in addition to deserts and valleys environment. This geographical wide range resulted in temperature and rainfall diversity. This is reflected by the existed types of plants and animals, which forms the basis of our natural heritage that deserves protection against risks to keep it for us and for our coming generations. This diversity led to rich biodiversity, as the area is among key flora areas in Egypt because of the number of plants it has (almost 1000 types in north and south). Among these plants, there are plants of nutrition value, or good for grazing, or containing special chemical substances good for leather industry. Also, there are medical plants of pharmaceutical specifications. Sinai also has 60 types of endemic plants, which are not evidently available in other places in the world. As for wild animals, North Sinai has many mammals like Fink fox, Gazelle, wild rabbit. There are also reptiles like Monitor and Blue Mountain Judge. Also, thousands of birds of different kinds cross Sinai during its immigration from Europe and Asia to middle and southeast Africa. North Sinai is among key routes of bird immigration like: quail, and white pelican. So, Bardaweel Lake and surrounding was declared a wet land of international importance in regard with immigrant water birds according to RAMSAR Agreement concerning protecting and maintaining wetlands, signed in Ramsar city in Iran in February 2, 1971. Middle Sinai area has different kinds of birds and animals like Habbari, Shenar, and mountain goat. These animals attract fans of wild hunting, which endanger the stability of wild life and biodiversity. Also the trade of wild animals and reptiles endanger the wild life and its species.

To protect the biodiversity and environmental balance, two areas were declared natural protectorates (National Parks) in North Sinai that are Zaranik Protectorate, east part of Bardaweel Lake, and the costal Jungle in Rafah city. Besides, there are another three locations under study to be declared protectorates in the future that are Kaseema, Wadi el-Garafi, and Maghara. This is in addition to Egyptian desert bank

of plants genes in the desert research center in Sheikh Zoaid. Key goal of this center is to protect the biodiversity of plants in Sinai and preserving its genetic origins as well as breeding and keeping the endanger kinds.

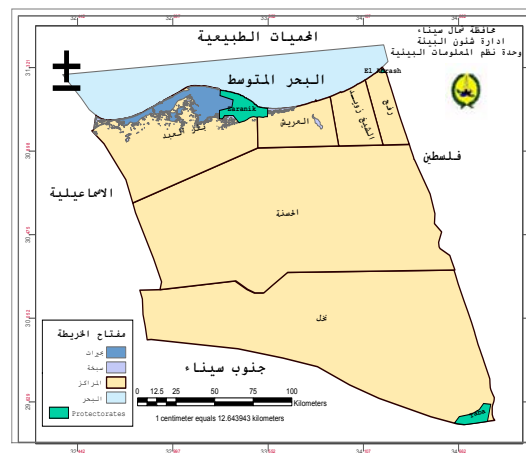


Figure (31) Proposed Protectorates in the Governorate

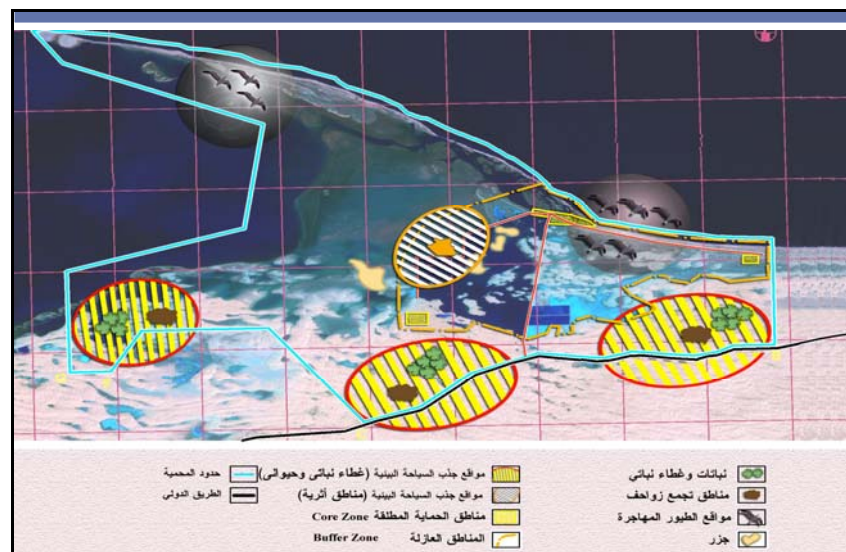


Figure (32) Biodiversity in Zaraneek Protectorate

4-9-2 Current situation

There are few Protectorates in North Sinai. Despite the two protectorates of Zaranik and Jungle, yet there are other rich biodiversity areas that need to be declared as natural protectorates to protect its species from distinction. Therefore, the State Ministry of Environment must be addressed to declare the three proposed areas of Kaseema, Maghara and Grafi as National Parks.

Despite that the Jungle area is declared as natural protectorate, yet it need help to solve its many problems like illegal grazing, bird hunting, dumping garbage inside

and adjacent to the protectorate, and general neglect. Therefore, coordination must take place with Central Department for Nature Protection in EEAA to solve these problems and integrate projects of natural resources development and management, as well as institutional support and capacity building for its staff.

Despite Zaranik Protectorate efforts to achieve integrated management plan of the protectorate through implementing monitoring and controlling programs, monitoring program for all protectorate components, and environmental awareness and eco tourism programs. Yet there are still some negative aspects like illegal hunting and grazing, in addition to the increased number of marine crow and its negative impact on fish production. So, alternative income sources for local residents must be searched to support the efforts of preventing illegal hunting and protecting natural graze areas as an element of sustainable development system that protects the natural resources and improving socioeconomic conditions of local residents. Also coordination must take place with Fishery Wealth Authority regarding the use of best methods to fight marine crow.

Recently, a new trade has emerged (worms' trade), which means for Bedouins reptiles like snakes, lizard, chameleon, and monitor. This trade has contractors or suppliers. For new money source, some Bedouins spend day and night to hunt the required kinds of worms and sell them to the supplier to export them illegally to Gulf area and other places to extract serums and substances that used in medicines or to use its leather in different purposes. Therefore, a monitoring mechanism must be developed to monitor and prevent the hunting of these reptiles and wild animal and birds to keep the biodiversity stability and balance, as balance simply means the existence of a group of creatures, each one depends on the other in its life. If one creature disappeared, the other shall be affected in certain. So, jobs must be provided for middle Sinai people through a vital ongoing project like traditional crafts for Bedouin woman and employing environmental rangers from Bedouins with reasonable monthly salary either from the governorate or Ministry of Environment or other donor agency to use them as a link with the governorate and to report any violations in the protectorates to protect the biodiversity of North Sinai.

Due to the fact that some delegations from neighborhood countries are hunting wild animals and birds under cover of desert tourism, using modern and equipped vehicles, which destroys wild plants and greenery and affects the biodiversity. Therefore, all necessary measures must be taken to protect the remaining balance of natural heritage, which about to be finished.

Aggressions on marine turtles either by destroying its environment or stealing its eggs, or hunting them are among key problems of biodiversity, as the coast of Mediterranean sea in North Sinai is a key area for marine turtles landing, especially green and big head turtles, which were monitored along the coast. All kinds of marine turtles are endangered species all over the world, so they all are listed in category (1) attached to (CITES) International Agreement, which ban the trading in endangered species. Decrease in the number of these turtles result in increase of jellyfish, which means a lot of problems for fishermen and summer visitors using the beaches. This affects negatively the tourism and summer seasons in the area. So, biological fighting should be considered by protecting marine turtles and its environment, as jellyfish is its favorite meal. Therefore, a decree shall be issued by

the governorate to ban aggressions on sea turtles, either by hunting, stealing eggs, or destroying its environment and must be enforced in cooperation with Borders Guards.

There is no documented scientific evident on kinds and numbers of animals to count on to follow up and monitor the places of these animals, especially in the middle area of Sinai. Therefore, an academic entity should be assigned to conduct such documentation like Suez Canal University, Sinai University or Desert Research Center.

Sever dryness due to rare rainfalls in some areas result in destroying greenery and disability of many animals and birds to get their food or water necessary for their life. Therefore, an initiative shall be adopted to transfer seeds of such plants and breeding them in better environment.

Illegal grazing and cutting woods and using the greenery cover as fuel and building cottages are existed as there are no other alternatives. Therefore, there must be alternatives to protect these plants and herbs by involving local residents in protecting biodiversity through prodding income-generating projects and mechanisms to prevent illegal grazing and cutting woods like solar or gas ovens and promoting the awareness of the importance of this wealth, because who does not know the value of the thing he owns, can not protect it.

Non sound implementation of the requirements of quail hunting season and hunting other endangered birds during crow hunting like Mera'a bird. Therefore, new tight legislations must be issued and enforced under the supervision of EMU in complete coordination with Boarder Guard and City Councils.

There is clear disorder in biological balance in Bardaweel Lake due to decreasing number of shrimps and Denis fish as well as appearing Bolti fish as fresh water species and its accommodation with the Lake environment.

Snails have appeared in the bottom of the Lake and they eat fine species, which are the food of the existed fish. They also adversely affect the economic income of fishermen, as they tear their nets.

4-7 Solid Wastes Management

4-7-1 General Background

North Sinai population is 351953 capita distributed on six markazs (Arish – Beer el-Abd – Sheihk Zoaid – Rafah – el-Hassana – Nakhl) producing around 177 tons daily of solid wastes. Arish markaz produces 90 tons/ day Sheikh Zoaid 30 tons/ day, Rafah markaz produces 30 tons/ day, Beer el-Abd markaz produces 25 tons/ day and el-Hassana and Nakhl markazs produce 2 tons/ day. Solid wastes vary according to activities which produce these wastes. Household solid wastes are 177 tons/ day, where 60% of it is collected and the rest is accumulated on rods side. Agro wastes are 25000 tons/ year, yet it does not represent a problem, as citizens use it in many purposes. Factories wastes are 700 tons/ year, construction and demolition wastes are 3400 tons/ year, out of which big quantity is accumulated in residential areas. Slaughterhouses wastes are 55 kg/ day. Solid wastes consist of 40% organic materials, 32% plastics, 2.05% glass, 1.5% metals, 15% paper, 6.45 dust and sand, 3 % others (wood, rubber, cloths) and crop wastes.

Solid wastes management is inefficient, as there are many negative aspects related to collection, transportation and final disposal, which adversely affects the public health and spread of diseases and epidemics for humans due to insects, rodents and microbes breeding. Also, there are economic effects, as the spread of disease result is decreasing the national production and increasing the cost of treating citizens. In addition, there are social effects due to human feeling of depression and anxious due to wastes accumulation, besides other negative impacts of similar risks like air, soil, and water pollution as well as sight pollution.

Due to the multidimensional and overlapping solid wastes problem, these wastes must be reduced to the lowest limit possible and its use must be optimized through recycling and safe disposal of the rest to keep the environment clean and to protect human health.

4-7-2 Current situation

Solid wastes are collected by a specialized company in Arish and Sheikh Zoaid markazs. This company collects 60% of the wastes. In other markazs, local units collect the wastes and transport it to dumpsites, despite their limited resources.

Arish markaz

Daily quantity of wastes is 90 tons, where a private company collects it. Workers in this company is 250 workers, number of cars are 13 trucks. Solid wastes workers are 6 (environment improvement department). Wastes are transported to the dumpsite through Arish - Taweel road. Dumpsite area (needs rehabilitation) is 2500 square meters. Opposite to the dumpsite, there is a composting factory of 135m² x 135m² of area. It was manufactured by military factories and established by local unit. It has 5 tractors with trailers, 2 loaders, 1 sorting line, and 2 compactors. Such equipment is working at 50-60% of its capacity. The factory is not working now, as it is offered for sale to the private sector. There is site assigned to establish new sanitary landfill, complying with environmental requirements.

Figure (24) Arish waste recycling factory

Sheikh Zoiad Markaz

A private company collects and transports solid wastes. The company has 60 workers and has 1 vehicle, 4 trucks. Workers in wastes department are 5 (environment improvement department). Wastes are transported to the dumpsite (needs rehabilitation) of 15000m² of area, surrounded by wire fences next to Shelak village. A new sanitary landfill site was proposed next to Shelak village.

Figure (25) Solid wastes collection in Shiekh Zoaid markaz

Rafah Markaz:

Local unit collects solid wastes and transports it to the dumpsite, southeast the city, (needs rehabilitation) of 10000m² of area. Workers in wastes collection are 17 and vehicles are 3 in good condition. Workers in wastes department are 3 (environment improvement department). A new sanitary landfill site complying with environmental requirements was proposed.

Beer el-Abd Markaz:

Local unit collects solid wastes and transports it to the dumpsite, south the city, (needs rehabilitation). Workers in wastes collection are 8 and only one worker is working in wastes department, which has 1 tipping truck working at 85% of its capacity. The area of the dumpsite is 2500m² southeast the city.

El Hassana Markaz:

Local unit collects solid wastes. Workers in wastes collection are 17 and only one worker is working in wastes department, which has 1 agro tractor with trailer to collect the wastes and transport it to the dumpsite north to el-Hassana – Nakhl road. The area of the dumpsite is 400m² and it needs rehabilitation. A new sanitary landfill site was proposed south the city.

Nakhl Markaz:

Local unit collects solid wastes and transports it to the dumpsite, southeast the city, of 2 km² of area. The same site was proposed to set up a landfill. Workers in solid wastes collection are 18 and only one worker is managing wastes collection. The local unit has one agro tractor with trailer and two tipping trucks.

The current situation of solid wastes management in the governorate can be summarized as follows:

Statement/ markaz	Arish	Sheikh Zoaid	Rafah	Beer el- Abd	El- Hassana	Nakhl
Waste quantity ton/day	90	30	30	25	1	1
Management system	Private	Private	Local unit			
Workers in wastes management	6	5	3	1	1	1
Solid wastes	250	60	17	8	17	18

Statement/ markaz	Arish	Sheikh Zoaid	Rafah	Beer el- Abd	El- Hassana	Nakhl
workers						
Equipment	13 trucks (3/4) 1 tractor loader and trailer	4 trucks (3/4) 1 Iveco truck	3 trucks	3 trucks and 1 tractor with trailer	Agro tractor with trailer	Agro tractor with trailer
Dumpsite Area	2500m ²	15000m ²	10000m ²	2500m ²	400m ²	2 km ²
Location	Arish – Taweel road	Next to the Shelak	Southeas t the city	South the city	South the city	Southeast the city
Rehabilitation	Needs rehabilitati on	Needs rehabilitatio n	Needs rehabilita tion	Needs rehabilit ation	Needs rehabilit ation	Needs rehabilitati on
Composting factory	Available	None	None	None	None	None
Landfill	Proposed site opposite waste recycling	Proposed site on Shelak road	Proposed site on the road	Propose d	Propose d site south the city	Proposed site on the current site

Statement/ markaz	Arish	Sheikh Zoaid	Rafah	Beer el- Abd	El- Hassana	Nakhl
	factory					

Figure (26) dumpsites locations in the governorate

Figure (27) Solid wastes dumping locations in the governorate

4-9-3 Problems as per priority

Priorities are arranged as the following:

- Lack of landfills to receive wastes in governorate markazs.
- Lack of dumpsites rehabilitation.
- Little heavy load equipment like loaders and tipping vehicles.
- Few wastes containers to receive household wastes, which force people to dump it in the streets.
- Low allocations for solid wastes.
- Low efficiency and few numbers of the wastes transportation vehicles
- Little workers in the field of wastes collection and transportation besides changing workers from time to time.
- Bedouins are sorting wastes and collecting organic materials to feed their animals and throwing the wastes in the streets to be scattered by the air.
- Some people sort wastes inside the residential areas.
- Low profile by citizens towards waste collectors.
- Lack of social care for the workers of waste collection and their low incomes let them sort wastes and sell it.
- Lack of maintenance for wastes transportation equipment and limitation of its number.
- Laws, legislations and decrees related to environment are not enforced, especially concerning preventing sheep grazing, breeding, and raising inside the residential areas.
- Lack of environmental public awareness programs on the necessity of safe disposal of the wastes.

4-9-4 Vision and goals

Applying integrated solid wastes management program aiming at the following:

8. Setting up solid wastes management program ensuring wastes sustainable management.
9. Providing financial and institutional support for solid wastes management.

10. Improving the efficiency of solid wastes collection and transportation means by replacing, renovation and maintaining of collection and transportation equipment.
11. Segregating hazard healthcare wastes from household solid wastes at source.
12. Providing job opportunities for fresh graduates.
13. Promoting the awareness of citizens and solid wastes collection workers.
14. Setting up fixed and effective system to collect solid wastes fees from residential areas and private facilities.

4-9-5 Institutional support and capacity building

- 1- Training of workers on improving wastes collection, general health and environmental requirements of the public dumpsites and training on safe disposal of wastes and its recycling and reuse.
- 2- Improving the technology of waste recycling and supplying the governorate with enough equipment for wastes transportation, and handling and establishing and rehabilitation of public dumpsites according to health and environmental requirements.
- 3- Activating environmental and health awareness programs to reduce wastes and rationalizing the use according to needs to avoid encresing of wastes either from food processing, industrial or commercial operations.

4-9-6 Description of some priority projects:

Rehabilitation of public dumpsites:

- North Sinai has 6 public dumpsites not complying with the environmental requirements, which result in scattering of solid wastes, especially plastics outside the dumpsite. Also the solid wastes are sorted in the site, in addition to self ignition.

Project goals:

- Improving safe final disposal of solid wastes.
- Tighten the control of wastes ignition and air pollution.
- Eliminating the problems of insects and rodent breeding.
- Protecting the health and safety of the residents nearby the dumpsites.
- Protecting the health and safety of workers in the dumpsites and its visitors.
- Providing job opportunities for young graduates.

Project justifications:

- Safe disposal of daily generated wastes (177 tons), especially unrecyclable wastes.
- Controlling wastes sorting inside residential areas.
- Large number of unemployed young graduates.

Project return:

- Protecting the environment from air, water, and soil pollution by solid wastes.
- Decreasing the number of insects and rodents.

- Providing job opportunities for young graduates and mitigating unemployment.

Project activities:

- Building fence around the dumpsite.
- Forestation around the dumpsite with suitable trees.
- Providing firefighting equipment.
- Establishing suitable office for supervisors next to the entrance of the dumpsite to monitor solid wastes vehicles movement in and out the dumpsite.
- Providing the dumpsite with basic utilities like electricity, water, etc.
- Designing and building internal suitable access roads in the dumpsite (to move from one cell to another).
- Mitigating and controlling insects and rodents breeding.
- Establishing garage inside or outside the site to maintain the site equipment.
- Establishing controlled storehouse to store spare parts and greasing tools.
- Training of workers on dumpsite operations and management.
- Daily cover of wastes by dust or idle material like sand to prevent self ignition, mitigate birds and rodents and fight rain water from leaking to wastes.
- Providing protection gear for the workers in the dumpsite, including masks, glasses and gloves.
- Providing necessary registers (equipment maintenance register, daily operations register, environmental registers, personnel register, and financial register).

Cost:

As dumpsites areas at the governorate level are varying as well as the quantities of solid wastes transported to these dumpsites, its costs also vary.

Dumpsite	Rehabilitation cost (LE million)
Arish markaz	1.5
Beer el-Abd markaz	1
Sheikh Zoaid markaz	0.75
Rafah markaz	0.75
Hassana markaz	0.75
Nakhl markaz	0.75
Total	5.5

Establishing landfill in Arish markaz:

Despite the importance of landfills in cities, yet there is no a landfill at the governorate level, despite the identification of six locations for landfills establishing in the governorate at one landfill per markaz.

Project goals:

- Safe disposal of hazard medical wastes and unrecyclable solid wastes.

- Prevent storing wastes in open areas exposed to rains, animals, insects, and rodents.
- Prevent leakage of hazard wastes decomposition liquids to the soil.
- Protecting the environment from pollution.
- Protecting citizens from diseases and epidemics.
- Safe disposal of empty pesticides containers, expired pesticides, chemicals containers and heavy and radiating metals.
- Using methane gas produced by organic wastes decomposition.
- Containing large quantities of wastes over fifty years.

Need for the project:

- Lack of landfills in the governorate.
- Large quantity of solid and hazard wastes.
- Big number of unemployed young graduates.

Project return:

- Safe disposal of different hazard wastes.
- Safe disposal of unrecyclable solid wastes.
- Providing job opportunities for fresh graduates.
- Protecting residents from diseases infections and spread of insects.
- Providing energy alternative sources (methane gas).

Required works for constructions and preparations:

- Identifying the area of establishing the first cell to start preparing it.
- Start up excavation works to reach the required depth as per landfill design.
- Leveling and covering landfill bottom with isolation materials and preparing slopes to protect the cell.
- Identifying artisan wells locations assigned for monitoring groundwater and start up digging them out.
- Building the internal access roads leading to the cell.
- Identifying the internal network of wastes leachate and gases network.
- Establishing wastes leachate treatment plant.
- Building cells for special wastes like slaughterhouses wastes and ashes of hazard medical wastes incineration.

Landfill operations works:

- Transporting rejects of treatment plants, resulting from waste sorting and organic materials rejects resulting from daily decomposition processes to the landfill (if wastes treatment units are available).
- Receiving wastes in the landfill, weighting them and registering its data, including quality, source, and transportation means.
- Placing wastes in prepared cells on multi layer soil as per technical specs. The height of the layer in the cell shall not exceed 4 meters and its width shall not exceed 100m. It should be covered with dust with 15cm thickness at least.
- Daily cover shall be provided at the end of the working day in the landfill.
- Completing the wastes liquid and gases networks.
- Taking samples from the groundwater and testing them and monitoring gas emissions regularly.

- Treating the leachate of waste decomposition.

Cost:

One million pounds.

Establishing solid wastes recycling units in the governorate markazs:

There is a composting plant in Arish markaz. Due to solid wastes generation in the other markazs of the governorate at 25-30 tons in Sheikh Zoaid, Rafah, and Beer el-Abd markazs, this needs to establish waste recycling unit in each markaz.

Project goals:

- Recycling big portion of generated solid wastes and using it.
- Reducing the wastes quantities that require safe disposal to facilitate its transportation to big sanitary landfill in Arish markaz.
- Providing job opportunities for young graduates.
- Controlling the solid wastes sorting inside the residential areas.
- Preventing self ignition of wastes and protecting the environment against pollution.
- Mitigating insects and rodents breeding.
- Providing organic fertilizers with big quantities to increase the fertility of agro soils.

Project justifications:

- Utilizing big quantities of daily generated solid wastes.
- Protecting the environment from pollution with solid wastes.
- Big numbers of unemployed graduates.
- Sever need for organic fertilizers and reducing the use of chemical fertilizers.
- Protecting the public health and preventing insects and rodents.

Project return:

- Recycling of big portion of solid wastes and gaining financial return.
- Employing number of graduates and mitigating unemployment.
- Protecting the environment from solid wastes pollution and preventing self ignition.
- Reducing unrecyclable wastes that need to be transported to the landfill.
- Providing composts to increase the fertility of the soil.
- Decrease the quantity of used chemical fertilizers.

Project activities:

- Selecting a piece of land next to the dumpsite of each markaz.
- Providing the necessary equipment (reception area – sorting station – compressor – turning equipment – loader – spraying unit – buildings – constructions).
- Building fence around the site (wires or bricks).
- Forestation around the recycling unit.
- Establishing administration office and equipment storehouse.

Cost:

10 million pounds.

Providing social and health care for the workers of solid wastes:

Number of workers in the field of solid wastes collection and transportation is about 350 workers. This number is increasing due to the expansion in the field of solid wastes management. Due to the lack of social and health care for those workers and their instability, they are subject to change from time to time. Also the low environmental and health awareness of those workers, they are exposed to catch diseases.

Project goals:

- Training and promoting the awareness of workers on risks of solid wastes collection.
- Providing protection gear to protect the workers of solid wastes collection and transportation.
- Promoting the public awareness on the importance of those workers and helping them doing their work.
- Increasing the workers income and promoting their educational and social levels.

Project justifications:

- Promoting the awareness of the workers in the field of solid wastes.
- Promoting the awareness of citizens of the great role of waste collectors to keep the environment clean and to protect public health.
- Some solid wastes workers sort the wastes and sell recyclable wastes inside residential areas.
- Protecting workers against infectious diseases.

Project return:

- Providing well aware and trained workers in the field of solid wastes collection.
- Promoting the public awareness of the risk of wastes accumulation.
- Transporting all solid wastes to the waste factory and not sorting and selling it inside the residential areas.
- Wastes collectors to have good health.

Project activities:

- Promoting the awareness of the workers in the field of solid wastes.
- Providing protection gear to protect the workers of solid wastes collection and transportation.
- Conducting number of seminars to educate and train the workers to protect their health from exposing to diseases.
- Promoting citizens awareness to sort hazard medical wastes from household solid wastes.
- Conducting regular medical check up for the workers.

Cost:

Item	Unit cost (LE)	Total
Public awareness seminars	1000	12000
Workers training and education		70000
Workers protection gear		70000
Handouts		8000
Trainers allocations and bonuses		4000
Total		164000

Fighting flies and mosquitoes in the villages of Beer el-Abd markaz:

Organic fertilizers transported from other governorates are stockpiled next to farms near villages. This results in spreading flies and mosquitoes heavily, especially in summer. This phenomenon also affects tourism resorts. This problem spreads diseases transferred by flies and mosquitoes and reduces citizens' visits to Rommana and Beer el-Abd beaches.

Project goals:

- Mitigating flies and mosquitoes breeding on compost.
- Reducing infectious diseases, especially among children.
- Increasing compost value as soil fertilizer.
- Mitigating the epidemic impact of disease communicators from the area to other areas in the governorate.
- Restoring tourism activity to Rommana and Beer el-Abd beaches.

Project justifications:

- Farmers ongoing need to stockpile the transported compost to use it (in summer and winter), and keeping them for long times on the farms edges.
- Existence of tourism assets (Rommana and Beer el-Abd beaches).
- Big number of unemployed graduates.

Project return:

- Decrease the number of flies and mosquitoes in the villages of Beer el-Abd markaz.
- Decreasing the number of infected people, especially children.
- Producing high quality compost.
- Ideal use of Rommana and Beer el-Abd beaches to receive visitors.

Project activities:

- Listing targeted compost stockpiling sites.
- Establishing storing units to store the compost according to scientific standards.

- Storing the current compost in storage units.
- Carrying out the necessary works to produce compost.
- Covering the storage units with plastic.

Project cost:

Activity	Cost (LE)
Identifying flies areas in villages and the basic breeding elements -	4000
Handouts and video tapes to educate citizens on the reasons of spreading - of flies and the protection methods and the importance of storage units	5000
Developing 5 pilot models (2 storage units per village) according to - medical and scientific standards	25000
administrative expenses and allocations and cost of making competition - between villages to select the key villages in fighting flies and mosquitoes	5000
- conducting 5 awareness seminars, one for each village	
Total	44000

4-10 Medical wastes management

4-8-1 General background

These are the hazard healthcare wastes produced by healthcare facilities (hospitals – clinics – labs – healthcare centers, etc). These facilities produce infectious biological wastes, chemical wastes, exploding wastes, and radiology wastes. They produce 380 tons of wastes annually. Only 90 tons are collected and disposed safely annually. Healthcare Directorate manages the collection and disposal of such wastes. These wastes are disposed by incineration in the Chest hospital incinerator, or by shredding and sterilization in the shredding unit in Arish public hospital. These wastes are collected from governmental hospitals in Beer elAbd, Rafah, and Sheikh Zoaid markazs by a vehicle (not complying with environmental requirements) assigned by health directorate to collect and dispose these wastes.

4-8-2 Current situation

Health directorate is managing the hazard wastes system, as it has assigned a vehicle (not complying with environmental requirements) to transport hazard medical wastes from the hospitals of Beer elAbd, Rafah, and Sheikh Zoaid markazs to the hospital

incinerator. Number of private clinics and hospitals are committed to make a contract with Arish public hospital for safe disposal of their hazard medical wastes through the shredding and sterilization machine in the hospital against small financial amount every month. Yet, this system is not going well; as such medical facilities have no safe transportation means to transport such hazard wastes.

Currently, 380 tons of hazard medical wastes are produced annually, out of which 90 tons only are collected and safely disposed by incineration or by shredding and sterilization, which means that there are 290 tons/ year of infectious hazard wastes need to be disposed. In many cases, such hazard wastes are disposed with normal solid wastes, which endanger waste collectors life due to disease communication. Medical facilities in the governorate are 450 facilities including public and private hospitals, private clinics, pharmacies, labs and radiology centers, and family planning clinics. This number is increasing, which means an increase of hazard medical wastes and consequently increases the problem. Therefore, we should take all necessary measures for safe disposal of such hazard wastes to protect citizens' health.

Achievements over 5 years:

- Establishing shredding and sterilization unit for hazard medical wastes in Arish public hospital to receive medical wastes of hospitals and clinics contracted with the hospital to dispose their wastes against limited financial amount per month.

Figure (28) hazard wastes store in Arish hospital

- Establishing special storing room for hazard wastes (not complying with environmental requirements) for each hospital until disposing them by incineration in the chest hospital incinerator or shredding and sterilization unit.

Figure (29) Chest hospital incinerator

- Making contracts with private clinics and hospitals as well as governmental hospitals to commit to dispose their wastes in safe ways.
- Assign a vehicle "complying with environmental requirements" from health directorate and equip it to transport hazard medical wastes from the hospitals of Sheikh Zoaid, Rafah, and Beer el-Abd.
- Providing plastic bags in different color for hospitals to segregate hazard medical wastes from normal solid wastes and providing safety boxes to keep needles of the syringes until safe disposal.

Figure (30) medical wastes sorting at source

- An incinerator is being supplied by health ministry to install it in Sheikh Zoaid hospital to serve Rafah and Sheikh Zoaid markazs.
- Committees are formed in each hospital at the governorate level to segregate hazard wastes from solid wastes at source (different hospital wards).

4-8-3 problems according to its priority:

Problems priorities were classified as follows:

- Insufficient number of incinerators or shredders and serialization machines.
- Lack of landfills complying with environmental requirements of Law 4, 1994 for safe disposal of incineration residue.
- Lack of equipped vehicles to transport hazard medical wastes to the disposal sites.
- Lack of awareness of the workers of hazard wastes collection, transportation and disposal.
- Lack of public awareness on the importance of segregating hazard wastes from household wastes.
- Non commitment to segregate hazard medical wastes from solid wastes in the medical facilities.
- Hazard wastes are disposed in some cases with normal solid wastes.
- No responsible authority is identified for hazard medical wastes management in each medical facility.

4-8-4 Vision and goals:

- Applying integrated hazard medical wastes management system to ensure the sustainability of safe disposal of all hazard medical wastes.
- Providing financial and institutional support for hazard medical wastes management.
- Segregating hazard medical wastes from household solid wastes.
- Providing safe transportation means to transport hazard medical wastes to its safe disposal sites.
- Enforce all medical facilities to contract a safe disposal facility of wastes and developing effective system to collect fees on regular basis.
- Promoting awareness of workers of hazard wastes collection.

4-10-5 Institutional support and capacity building:

- 6- Training of workers, supervisors, and staff of city councils to supervise landfills, and training of wastes collectors on the healthy method of safe collection and handling and final disposal of such wastes.
- 7- Providing protection gear including clothes, masks, shoes, etc.
- 8- Providing suitable collection tools inside the healthcare facilities according to sanitary standards, including clean and sealed containers manufactured from stainless steel and providing equipped vehicles to transport wastes to incinerators and landfills.
- 9- Providing sterilization machines and incinerators and establishing and rehabilitating landfills according to necessary requirements for safe disposal.
- 10- Promoting public awareness on sanitary and safe handling of hazard medical wastes.

4-10-6 Description of some priority projects:

Safe disposal of hazard medical wastes:

Generated hazard medical wastes quantity is 380 tons annually, out of which 90 tons are collected and disposed by health directorate. The project shall concern of hazard medical wastes collection, transportation, and treatment (by incineration, shredding,

sterilization and safe disposal) and protecting citizens and the environment from the risks of such wastes, as they communicate blood disease.

Project goals:

- 7- Safe disposal of hazard medical wastes.
- 8- Protecting citizens from the risks of such wastes, as they are loaded with microbes and viruses and blood diseases.
- 9- Preventing wastes scavengers of solid wastes inside residential areas from having these wastes, especially plastic materials.
- 10- Providing job opportunities for young graduates.
- 11- Protecting the environment from microbes and viruses and all infectious diseases communicated through blood.
- 12- Preventing the disposal of hazard medical wastes with solid and normal wastes and protecting the waste collectors from diseases.

Project justifications:

- All medical facilities in the governorate produce 380 tons of hazard wastes every year.
- Weak available human and financial resources for disposing all hazard wastes of medical facilities, as only 90 tons are safely disposed.
- Most of hazard wastes are disposed through unsafe methods, which result in the following:
 - d- Exposing wastes scavengers to health risks and infectious diseases.
 - e- Exposing the environment to viruses, microbes, etc.
 - f- Exposing the compost of recycling factory on mixing these wastes with normal wastes to pollution of soil and plants, which in turn are transported to man, animal, and plants.
- There is big number of unemployed young graduates.
- Low performance of some workers in hospitals and other medical facilities, citizens, and physicians regarding the risks of disposing hazard wastes with solid wastes.

Project return:

- Protecting citizens from infectious diseases and epidemics.
- Saving huge money spent on medicines, part of which is purchased by hard currency from abroad.
- Protecting hazard wastes collectors from infectious diseases.
- Fighting unemployment by providing job opportunities.
- Producing compost from composting factories.
- Protecting the environment from microbes, viruses and biological pollution.

Project activities:

- Providing 5 incinerators.
- Purchasing 6 vehicles of special specs to transport wastes from generation places to final safe disposal sites and incinerators.
- Building store room with special specs to store hazard medical wastes.
- Establishing garage for vehicles overnight parking and equipment maintenance next to the incinerator.

- Establishing organizational structure for management, work procedures and book keeping.
- Providing protection gear or workers of hazard wastes collection and transportation.
- Providing a bunch of necessary registers to control work progress and workers commitment.
- Hiring a group of young graduates and educating them on the risks of hazard medical wastes.
- Contracting medical facilities that produce hazard medical wastes Public and private hospitals – private clinics – pharmacies – analyzing labs – radiology labs – healthcare units and centers).
- Promoting the awareness of citizens and workers in the field of wastes and hazard wastes on the risks of disposing hazard wastes with solid wastes.

Project cost:

No.	Activity	No.	Unit cost	Total cost
1	Purchasing incinerators	5	300000	1500000
2	Purchasing vehicles	6	300000	1800000
3	Buildings, facilities and equipment	6	200000	1200000
4	Manpower	50	300	18000
5	Awareness seminars	50	500	25000
6	Protection gear	50	400	20000
7	Offices for management and supervision	1	2000	2000
8	Registers and administrative tools		1000	1000
Total			804200	4566000

Segregating healthcare wastes from household wastes

Hazard medical wastes are risky for public health as they contain microbes and diseases, which expose citizens' lives to danger or catching diseases, especially in light of low awareness of citizens and workers in the field of solid wastes collection on the risks of hazard medical wastes and the importance of segregating it from normal wastes at source.

Project goals:

- Promoting public awareness on hazard medical waste risks.
- Protecting the workers of solid wastes collection from exposure to hazard wastes.
- Providing jobs for young graduates in the field of collecting hazard wastes from houses.
- Increasing the efficiency of hazard wastes collection and transportation and reducing catching infectious diseases.
- Producing compost from recycled solid wastes free of healthcare wastes.

Need to the project:

- Risks of disposing hazard medical wastes with household solid wastes.
- Big numbers of unemployed young graduates.
- Low awareness of the workers in the field of solid wastes collection regarding the hazard medical wastes.
- Low public awareness on hazard medical wastes and the importance of segregating them from normal solid wastes.

Project justification:

- Existence of NGOs concerned in this field of work.
- Good follow up of the governorate EMU.
- Existence of an incinerator and shredding and sterilization unit in the fever and Arish public hospital.

Project return:

- Segregating hazard medical wastes from household wastes in bags with different colors.
- Safe disposal of hazard medical wastes.
- Providing jobs for young graduates.
- Protecting workers of solid wastes collection, transporting and sorting from catching diseases.

Project activities:

- Providing quantities of adequate plastic bags with different colors to segregate hazard medical wastes from solid wastes.
- Providing number of small adequate vehicles to transport these hazard wastes from its generation places to safe disposal places.
- Distributing colored bags on citizens (3 districts).
- Conducting number of seminars in cooperation with health affairs to educate citizens.

- Training and educating workers in this field of the risks of hazard medical wastes.
- Conducting field trips with district officials to follow up citizens' response to project implementation.
- Displaying photos of the risks of mixing hazard medical wastes with household wastes and its impact on producing compost.

Costs:

Activity	Unit cost (LE)	Total cost (LE1000)
Purchasing 2000 kg of colored bags. -	15.00	30.000
Purchasing 3 motorcycles with special boxes. -	18.000	54.000
12 seminars -	1000	12.000
Handouts -		4.000
Fuel -	150/ month	5.400
Wages + management (5 workers) -	300	18.000
Protection gear -	200	1000
Total		124.200

4-11 Biodiversity

4-9-1 General background

Sinai is unique in many distinguished elements that qualify it to form a unique system of many natural environments in the world due to its unique location which links Asia with Africa, not far from Europe. Therefore, it has marine and coastal environment, in addition to deserts and valleys environment. This geographical wide range resulted in temperature and rainfall diversity. This is reflected by the existed types of plants and animals, which forms the basis of our natural heritage that deserves protection against risks to keep it for us and for our coming generations. This diversity led to rich biodiversity, as the area is among key flora areas in Egypt because of the number of plants it has (almost 1000 types in north and south). Among these plants, there are plants of nutrition value, or good for grazing, or containing special chemical

substances good for leather industry. Also, there are medical plants of pharmaceutical specifications. Sinai also has 60 types of endemic plants, which are not evidently available in other places in the world. As for wild animals, North Sinai has many mammals like Fink fox, Gazelle, wild rabbit. There are also reptiles like Monitor and Blue Mountain Judge. Also, thousands of birds of different kinds cross Sinai during its immigration from Europe and Asia to middle and southeast Africa. North Sinai is among key routes of bird immigration like: quail, and white pelican. So, Bardaweel Lake and surrounding was declared a wet land of international importance in regard with immigrant water birds according to RAMSAR Agreement concerning protecting and maintaining wetlands, signed in Ramsar city in Iran in February 2, 1971. Middle Sinai area has different kinds of birds and animals like Habbari, Shenar, and mountain goat. These animals attract fans of wild hunting, which endanger the stability of wild life and biodiversity. Also the trade of wild animals and reptiles endanger the wild life and its species.

To protect the biodiversity and environmental balance, two areas were declared natural protectorates (National Parks) in North Sinai that are Zaranik Protectorate, east part of Bardaweel Lake, and the costal Jungle in Rafah city. Besides, there are another three locations under study to be declared protectorates in the future that are Kaseema, Wadi el-Garafi, and Maghara. This is in addition to Egyptian desert bank of plants genes in the desert research center in Sheikh Zoaid. Key goal of this center is to protect the biodiversity of plants in Sinai and preserving its genetic origins as well as breeding and keeping the endanger kinds.

Figure (31) Proposed Protectorates in the Governorate

Figure (32) Biodiversity in Zaraneek Protectorate

4-9-2 Current situation

There are few Protectorates in North Sinai. Despite the two protectorates of Zaranik and Jungle, yet there are other rich biodiversity areas that need to be declared as natural protectorates to protect its species from distinction. Therefore, the State Ministry of Environment must be addressed to declare the three proposed areas of Kaseema, Maghara and Grafi as National Parks.

Despite that the Jungle area is declared as natural protectorate, yet it need help to solve its many problems like illegal grazing, bird hunting, dumping garbage inside and adjacent to the protectorate, and general neglect. Therefore, coordination must take place with Central Department for Nature Protection in EEAA to solve these problems and integrate projects of natural resources development and management, as well as institutional support and capacity building for its staff.

Despite Zaranik Protectorate efforts to achieve integrated management plan of the protectorate through implementing monitoring and controlling programs, monitoring program for all protectorate components, and environmental awareness and eco tourism programs. Yet there are still some negative aspects like illegal hunting and grazing, in addition to the increased number of marine crow and its negative impact on fish production. So, alternative income sources for local residents must be searched to support the efforts of preventing illegal hunting and protecting natural

graze areas as an element of sustainable development system that protects the natural resources and improving socioeconomic conditions of local residents. Also coordination must take place with Fishery Wealth Authority regarding the use of best methods to fight marine crow.

Recently, a new trade has emerged (worms' trade), which means for Bedouins reptiles like snakes, lizard, chameleon, and monitor. This trade has contractors or suppliers. For new money source, some Bedouins spend day and night to hunt the required kinds of worms and sell them to the supplier to export them illegally to Gulf area and other places to extract serums and substances that used in medicines or to use its leather in different purposes. Therefore, a monitoring mechanism must be developed to monitor and prevent the hunting of these reptiles and wild animal and birds to keep the biodiversity stability and balance, as balance simply means the existence of a group of creatures, each one depends on the other in its life. If one creature disappeared, the other shall be affected in certain. So, jobs must be provided for middle Sinai people through a vital ongoing project like traditional crafts for Bedouin woman and employing environmental rangers from Bedouins with reasonable monthly salary either from the governorate or Ministry of Environment or other donor agency to use them as a link with the governorate and to report any violations in the protectorates to protect the biodiversity of North Sinai.

Due to the fact that some delegations from neighborhood countries are hunting wild animals and birds under cover of desert tourism, using modern and equipped vehicles, which destroys wild plants and greenery and affects the biodiversity. Therefore, all necessary measures must be taken to protect the remaining balance of natural heritage, which about to be finished.

Aggressions on marine turtles either by destroying its environment or stealing its eggs, or hunting them are among key problems of biodiversity, as the coast of Mediterranean sea in North Sinai is a key area for marine turtles landing, especially green and big head turtles, which were monitored along the coast. All kinds of marine turtles are endangered species all over the world, so they all are listed in category (1) attached to (CITES) International Agreement, which ban the trading in endangered species. Decrease in the number of these turtles result in increase of jellyfish, which means a lot of problems for fishermen and summer visitors using the beaches. This affects negatively the tourism and summer seasons in the area. So, biological fighting should be considered by protecting marine turtles and its environment, as jellyfish is its favorite meal. Therefore, a decree shall be issued by the governorate to ban aggressions on sea turtles, either by hunting, stealing eggs, or destroying its environment and must be enforced in cooperation with Borders Guards.

There is no documented scientific evident on kinds and numbers of animals to count on to follow up and monitor the places of these animals, especially in the middle area of Sinai. Therefore, an academic entity should be assigned to conduct such documentation like Suez Canal University, Sinai University or Desert Research Center.

Sever dryness due to rare rainfalls in some areas result in destroying greenery and disability of many animals and birds to get their food or water necessary for their life.

Therefore, an initiative shall be adopted to transfer seeds of such plants and breeding them in better environment.

Illegal grazing and cutting woods and using the greenery cover as fuel and building cottages are existed as there are no other alternatives. Therefore, there must be alternatives to protect these plants and herbs by involving local residents in protecting biodiversity through prodding income-generating projects and mechanisms to prevent illegal grazing and cutting woods like solar or gas ovens and promoting the awareness of the importance of this wealth, because who does not know the value of the thing he owns, can not protect it.

Non sound implementation of the requirements of quail hunting season and hunting other endangered birds during crow hunting like Mera'a bird. Therefore, new tight legislations must be issued and enforced under the supervision of EMU in complete coordination with Boarder Guard and City Councils.

There is clear disorder in biological balance in Bardaweel Lake due to decreasing number of shrimps and Denis fish as well as appearing Bolti fish as fresh water species and its accommodation with the Lake environment.

Snails have appeared in the bottom of the Lake and they eat fine species, which are the food of the existed fish. They also adversely affect the economic income of fishermen, as they tear their nets.

Achievements in the field of biodiversity over the past five years:

- 1- The project of maintaining eco systems and coastal areas in the Mediterranean Sea Basin was launched in the beginning of year 2000, which aims at protecting the biodiversity in the area, funded by World Environmental Utility in Zaranik Protectorate and its wetlands in North Sinai governorate.
- 2- Environmental Protection Association in North Sinai has participated in the NGOs Forum for the protection and development of Egypt's natural heritage in 2004, with Local Community Association in Daba'a in Marsa Matrouh Governorate, Environmental Pioneers Association in Alexandria, Development and Environment Association in Ismailia, and Agro Research Center in West Alexandria. All participated to document the biodiversity in Egypt as national wealth that must be protected and to solve the problems that may result in its deterioration.
- 3- North Sinai Governorate together with the active CDAs is confronting illegal hunting campaigns in middle Sinai, which resulted in declaring North Sinai no hunting zone.
- 4- Environmental Protection Association issued the first real encyclopedia for natural wild plants in Sinai and working on increasing these pants in 2002.
- 5- Solving number of Jungle Protectorate problems, like fixing iron signs of the protectorate borders pursuant to the Decree no. 3379, 1996 based on the survey done by Geological Survey Authority.
- 6- Spreading environmental awareness regarding biodiversity, either among school students or in the Reading for All Festival, or in Youth Centers, or in Tourism resorts, or in local radio station and North Sinai newspaper.

- 7- Finishing the Environmental Profile of North Sinai, this aims at reducing the existed or future negative aspects and optimizing the use of natural resources, including biodiversity.

4-9-3 Problems according to priority

Problems priorities were arranged as follows:

1- Little number of protectorates in North Sinai:

Despite the existence of two natural protectorates in the governorate that are Zaranik and Jungle, yet there are areas rich in biodiversity and needs to be declared natural protectorates to protect their species from distinction, therefore it is a must to address State ministry of Environment to accelerate the declaration of the three proposed areas of Kaseema, Maghara and Grafi natural protectorates.

2- Existence of many problems in Jungle Protectorate:

Despite that the Jungle area is declared as natural protectorate, yet it need help to solve its many problems like illegal grazing, bird hunting, dumping garbage inside and adjacent to the protectorate, and general neglect. Therefore, coordination must take place with Central Department for Nature Protection in EEAA to solve these problems and integrate projects of natural resources development and management, as well as institutional support and capacity building for its staff.

3- Negative Aspects in Zaranik protectorate:

Despite Zaranik Protectorate efforts to achieve integrated management plan of the protectorate through implementing monitoring and controlling programs, monitoring program for all protectorate components, and environmental awareness and eco tourism programs. Yet there are still some negative aspects like illegal hunting and grazing, in addition to the increased number of marine crow and its negative impact on fish production. So, alternative income sources for local residents must be searched to support the efforts of preventing illegal hunting and protecting natural graze areas as an element of sustspringable development system that protects the natural resources and improving socioeconomic conditions of local residents. Also coordination must take place with Fishery Wealth Authority regarding the use of best methods to fight marine crow.

4- Aggravating worms (reptiles) trade:

Recently, a new trade has emerged (worms' trade), which means for Bedouins reptiles like snakes, lizard, chameleon, and monitor. This trade has contractors or suppliers. For new money source, some Bedouins spend day and night to hunt the required kinds of worms and sell them to the supplier to export them illegally to Gulf area and other places to extract serums and substances that used in medicines or to use its leather in different purposes. Therefore, a monitoring mechanism must be developed to monitor and prevent the hunting of these reptiles and wild animal and birds to keep the biodiversity stability and balance, as balance simply means the existence of a group of creatures, each one depends on the other in its life. If one creature disappeared, the other shall be affected in return. So, jobs must be provided for middle Sinai people through a vital ongoing project like traditional crafts for Bedouin woman and employing environmental rangers from Bedouins with reasonable monthly salary either from the governorate or Ministry of Environment or other donor agency to use

them as a link with the governorate and to report any violations in the protectorates to protect the biodiversity of North Sinai.

5- Illegal hunting in Middle Sinai:

This item was pointed out in biodiversity item no. 4-9-2

6- Aggression on marine turtles nests:

Aggressions on marine turtles either by destroying its environment or stealing its eggs, or hunting them are among key problems of biodiversity, as the coast of Mediterranean sea in North Sinai is a key area for marine turtles landing, especially green and big head turtles, which were monitored along the coast. All kinds of marine turtles are endangered species all over the world, so they all are listed in category (1) attached to (CITES) International Agreement, which ban the trading in endangered species. Decrease in the number of these turtles result in increase of jellyfish, which means a lot of problems for fishermen and summer visitors using the beaches. This affects negatively the tourism and summer seasons in the area. So, biological fighting should be considered by protecting marine turtles and its environment, as jellyfish is its favorite meal. Therefore, a decree shall be issued by the governorate to ban aggressions on sea turtles, either by hunting, stealing eggs, or destroying its environment and must be enforced in cooperation with Borders Guards.

7- No documented scientific evident on kinds and numbers of biodiversity:

There is no documented scientific evident on kinds and numbers of animals to count on to follow up and monitor the places of these animals, especially in the middle area of Sinai. Therefore, an academic entity should be assigned to conduct such documentation like Suez Canal University, Sinai University or Desert Research Center.

8- Rare Rainfalls:

Sever dryness due to rare rainfalls in some areas result in destroying greenery and disability of many animals and birds to get their food or water necessary for their life.

9- Illegal grazing and cutting woods and using the greenery cover as fuel and building cottages:

This is due to the need and lack of other alternatives. Therefore, there must be alternatives to protect these plants and herbs by involving local residents in protecting biodiversity through prodding income-generating projects and mechanisms to prevent illegal grazing and cutting woods like solar or gas ovens and promoting the awareness of the importance of this wealth, because who does not know the value of the thing he owns, can not protect it.

10- Non sound implementation of the requirements of quail hunting season

Non sound implementation of the requirements of quail hunting season:

This results in hunting other endangered birds during crow hunting like Mera'a bird. Therefore, new tight legislations must be issued and enforced under the supervision of EMU in complete coordination with Boarder Guard and City Councils.

11- Some gaseous species in Bardaweel Lake:

There is clear disorder in biological balance in Bardaweel Lake due to decreasing number of shrimps and Denis fish as well as appearing Bolti fish as fresh water species and its accommodation with the Lake environment.

12- Wild snails on the international borders:

Among strange things included in the Environmental Profile of North Sinai is the appearance of new unfamiliar problems in Egypt that is the moving of great numbers of wild snails across borders and its spreading over the international borders at 6 km long and half km depth. They climb on plants at 5 to 25 snails on a single plant, which result in draying these plants.

4-9-4 Vision and goals:

Seeking to declare the three proposed areas natural protectorates and improving the level of protecting the biodiversity and sustainable development according to local and national legislations and international agreements.

Required policies and works:

- 1- Employing environmental rangers from Bedouins with reasonable monthly salary either from the governorate or Ministry of Environment or other donor agency to use them as a link with the governorate and to report any violations in the protectorates.
- 2- Involving local residents in protecting biodiversity through prodding income-generating projects and mechanisms to prevent illegal grazing and cutting woods like solar or gas ovens and promoting the awareness of the importance of this wealth, because who does not know the value of the thing he owns, can not protect it.
- 3- Disseminating biodiversity culture among all community categories on the importance of this wealth for us and our coming generations.
- 4- Controlling gaseous species (strange) that affects the endangered species and their environments.
- 5- Regulating birds hunting to protect the sustainability of these resources.
- 6- Establishing monitoring center to mitigate marine pollution.
- 7- Providing quick contact tools with the rangers and advertize them locally in good manner to report any violations or aggressions on wild life and biodiversity in the area.
- 8- Urging CDAs working in the environmental field to participate actively in protecting the biodiversity of North Sinai.
- 9- Suez Canal University and Desert Research Center are to list and register biodiversity, especially in unprotected areas.
- 10- Central Department of Nature Protection, EEAA has to list and register biodiversity in Jungle Protectorate and work on developing it.

4-9-5 Institutional support and capacity building

- 1- Enforcing all concerned in the governorate to implement Environmental Law 4, 1994, especially regarding biodiversity outside protectorates.
- 2- Upgrading the efficiency of the staff of EMU by training in this field.
- 3- Providing financial support for pilot programs through local media and advertising of biodiversity issues and the importance of protecting it through worship places, schools, universities, youth centers and guests in tourism resorts to highlight the importance of protecting biodiversity.

- 4- Providing financial support for number of CDAs acting in the field of environmental protection to implement energy generating projects as alternatives for wood cutting, like solar and gas ovens to ensure the protection of plant biodiversity through initiative from local inhabitants.

4-9-6 Description of some priority projects

Marine turtles' protection:

All kinds of marine turtles are endangered species all over the world, so they all are listed in list (1) attached to (CITTES) International Agreement, which ban the trading in endangered species. The coast of Mediterranean sea in North Sinai is a key area for marine turtles landing, especially green and big head turtles, which were monitored along the coast.

Study:

Monitoring is conducted on very large scale, not only in Zaranik protectorate, but on an area over 70 km starting from Sheikh Zoaid east to the end of the protectorate borders on the Mediterranean coast in the west, where the important areas of turtles landing are monitored on continuous basis starting from going out to lay eggs until time of incubation and small turtles return to its marine environment.

Project goals:

- Protecting marine turtles registered on the Mediterranean coast as endangered species.
- Identifying key areas for turtles landing to protect them during egg laying and declaring the area natural protectorate, even temporarily during this time.
- Selecting protection area inside the protectorate that can be considered breeding area for marine turtles through relocating the eggs from nesting area to that area and providing care for the eggs until incubation and returning of small turtles to their natural marine environment.
- Keeping the environmental balance of marine environment, as the favorite food of marine turtles is jellyfish.
- Disseminating public awareness programs (fishermen – Boarder Guard Checkpoints – Fish production extraction areas – Fish traders).

Required works:

- 1- Conducting general conference for all parties
10.000 (ten thousands) Pounds.
- 2- Comprehensive awareness programs, including (data show + digital camera)
90.000 (ninety thousands) Pounds.
- 3- Printed materials
100.000 (one hundred thousands) Pounds.
- 4- Equipment, including (land Rover vehicle + 2 sand motorcycles)
400.000 (four hundred thousands) Pounds.

Project total cost

600.000 (six hundred thousands) Pounds.



Figure (33) marine turtles' protection project

Support of development traditional crafts of Bedouin woman in the villages of Zaranik Protectorate:

Zaranik natural protectorate includes 4 Bedouin gathering points that are Speaka, Abu Hossain, Abu Zieton, and Abu Madi. The protectorate is also affected by another gatherings not affiliated to it administratively, but its population are carrying out economic activities within its geographical scope. These gatherings are Maidan, Mazar, and Rouda. Grazing is a basic activity for the population of these gatherings, as they have very limited economic alternatives, so they focus on grazing activities. This endangers the green cover in the area. Searching alternative income sources for local inhabitants in such gatherings is effective and rather essential for the success of natural graze areas protection and preventing illegal grazing in the area as an element of sustainable development system which gather between the two goals of natural resources protection and improving socioeconomic conditions of local inhabitants. Traditional crafts of Bedouin woman is unutilized opportunity – except for very limited amount – to find out income source in sustainable and environmentally friendly manner, besides the socioeconomic development of this activity for Bedouin woman and activating her role and improving her position in the community.

Project goal:

- Protecting biodiversity and cultural diversity.
- Improving socioeconomic conditions of local inhabitants, especially women.
- Activating civil society role and deepen the concept of participation-based work as an insurance for sustainability.
- Disseminating social and environmental awareness.
- Developing and spreading traditional crafts of Bedouin woman.
- Creating marketing channels for products.
- Building individual and institutional capacities.

Almost 250.000 pounds are required to develop the production according to market needs and to open new field to market the product. This project is existed already as part of training and production start-up only.



Figure (34) Bedouin crafts development project in Zaranik protectorate

Renovating fishermen cottages:

Fishermen cottages are located south to Zaranik Lake, where fishermen and their families live between May and December every year. These cottages are built from the remaining of old boats and some parts of metals in random way, which does not comply with the image of the area that have the cleanest lakes of the Mediterranean and among the most important birds immigration in the world. Also, the current cottages do not meet the least life requirements for inhabitants.

As cottages are located in natural protectorate where buildings are not allowed and can not become population attraction area, the project is limited to renovate the old cottages using eco materials within the limits of regulating roles of activities in natural protectorates. The project also includes income-generating component through establishing limited number of additional cottages for eco tourism and bird monitoring tourism. The project shall be managed by the community association representing the fishermen in the area.

Renovation is required for 35 to 40 cottages at one million pounds estimated cost.

Providing alternative fodders for grazing animals in Zaranik natural protectorate:

In light of the increasing population and the lack of alternative economic activities, the pressure was increased on natural grazing areas in the protectorate until it crossed the safe limits and turned into illegal grazing and resulted in area deterioration and damaging the greenery, which endangers the biodiversity in the region.

The project is implemented within the frame work of the project of protecting wetlands to keep the biodiversity and within the framework of joint work with local inhabitants to achieve the sustainable development goals.

Project goals:

- Protecting natural environment and biodiversity in the region through keeping the greenery in the grazing areas and mitigating illegal grazing, this is serious environmental threatening.
- Ensuring better chance of the local inhabitants' cooperation with the project and with the protectorate management in developing grazing areas management program and implement it.
- Linking people to protection issues in general and promoting their awareness in this regard.

- Contributing in economic development and upgrading living standards of protectorate inhabitant through developing the animal wealth as basic income source, as rare grazing areas and lack of alternative fodders are negatively affect the animal production in the area.
- Providing new job opportunities through developing animal wealth sustainably.
- Building the capacities of CDAs and training their officials on projects management and bearing the development burdens to ensure the sustainability of the local role in future.

Project funding:

The project shall be funded by grant given to two CDAs in Zaranik and Rawda. The two associations provide fodders in form of in-kind rotating loan through credit selling to ensure project sustainably.

Targeted groups:

The project targeting all inhabitants who practice or live on grazing profession in the protectorate, either living in it or near it. These are the inhabitants of villages of Speka, Abu Hussain, Abu Zieton, Abu Madi in the protectorate and Maidan, Mazar, and Rawda near the protectorate.

Estimating dry fodders needs:

The needs of dry fodders to be supplied by the project depend on the following:

- Number of animals: Available data indicates that total number is about 8.000 heads of sheep and goats.
- Food need for the animal: it depends on several elements, most important of which is the condition of the animal (age, kind, etc).
- Availability of grazes in different seasons and years: this depends on seasonal and annual rainfalls diversity.

Already 500 tons of dry fodders are purchased in 2007 and are recycled to ensure the project sustainably. LE250.000 is required to the project to achieve its goals.

Providing gas ovens as an alternative for cutting woods:

Project goal:

- Protecting natural environment and biodiversity in the protectorate through protecting the greenery and preventing cutting woods operations that destroy wild plants and impose serious environmental threats.
- Ensuring better chance of the local inhabitants' cooperation with the project and with the protectorate management in protecting the greenery.
- Linking people to protection issues in general and promoting their awareness in this regard.
- It is required to supply 500 gas ovens (oven + butane gas cylinder) at LE400 per oven.
- Total cost: $500 \times 400 = 200.000$ Pounds.

Listing and registering medical plants in middle Sinai and breeding of endangered plants:

Project justifications:

- Mitigating negative behaviors against medical plants and regulating grazing in preparation to stop it on medical plants and preventing its use as fuel or building cottages and Bedouin houses.
- Prevailing of harmful traditions and norms among local inhabitants that require promoting the awareness of the importance of these plants.

Project goals:

- Protecting wild medical plants in North Sinai.
- Developing real encyclopedia on the true numbers of medical plants in Sinai.
- Existence of great numbers of these plants that can be used to extract medicines out of it.
- Achieving self volunteering protection by local inhabitants for the medical plants.

Project partners:

- Inhabitants of southeast and middle Sinai (Kasema – Wadi el-Omar – el-Sabha – Spring el-Godairat – Spring Kedis – el-Sheha – residents of key medical plants areas in south Sinai).
- Scientific agencies and research centers working in this field – Desert research center – Suez Canal University – Pharmaceuticals industries Faculty in Sinai University).
- Pharmaceuticals and medicines agencies.
- EMU in South Sinai governorate.

Required works:

1- Intensive awareness programs (fifty thousands).	LE50.000 (fifty thousands).
2- Plants listing programs (fifty thousands).	LE350.000 (three hundred fifty thousands).
3- Providing grazing alternatives (thousand).	LE100.000 (one hundred thousand).
4- Providing dry fodders (fifty thousands).	LE150.000 (one hundred fifty thousands).
5- Providing solar or gas ovens (thousand).	LE100.000 (one hundred thousand).
6- Providing 5 green houses half shadow to breeding endangered plants (90m x 60m) (twenty five thousands).	LE25.000 (twenty five thousands).
7- Bag, agro tools and technical manpower (thousands).	LE50.000 (fifty thousands).
8- Irrigation net + tank + pumping engine (thousands).	LE75.000 (seventy five thousands).
9- Medical plants encyclopedia (thousands).	LE200.000 (two hundred thousands).
10- Double cabin vehicle (twenty thousands).	LE120.000 (one hundred twenty thousands).
Total project cost: LE1.220.000 (one million two hundred twenty thousand pounds).	

4-10 Coastal areas management

4-10-1 General background:

North Sinai governorate has 200 km long beach on the Mediterranean. The beach is dominated by sand formulations in the unpopulated areas of Sheikh Zoaid and west Arish. In Paloza, the dominated formulations are mud and silt that make the beach stable in the first few meters of the coast. Seabed consists of sandy soil and very big percentage of silt and fine gravels of decomposed rocks over very long times, especially at straits of Bardaweel Lake, where waves move them. Therefore, they are usually closed.

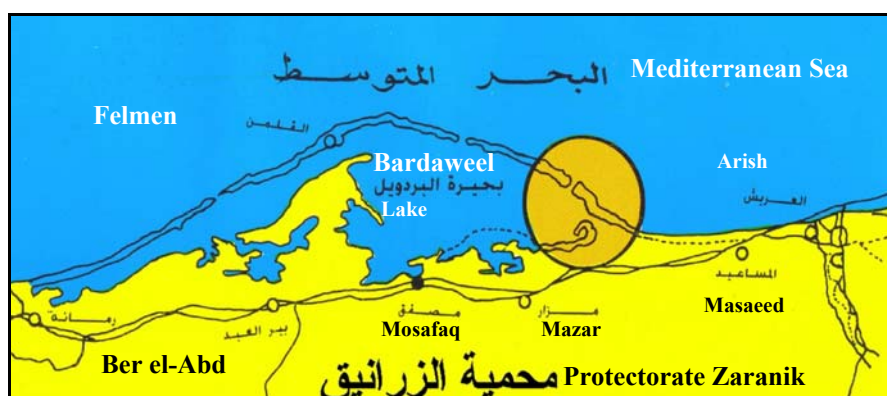


Figure (35) Straits of Bardaweel Lake

In the areas of east Bardaweel Lake and Zaranik, the beach consists of clean sands, which usually move with sea water without resistance. So, when the straits of Zaranik are closed in one area, it is naturally opened in another area by the outcome of the natural forces prevailed since Lord has created land and seas.

Marine current in the morning till before sun down is from west to east. There is daily return for few hours towards west, due to physical factors concerning temperatures, sea expansion and the speed of ocean compensation of evaporated water from the Mediterranean.

There are several environmental signs on the sea, most important of which is Bardaweel Lake, east to which is Zaranik protectorate, which is connected to the sea through two straits: Zaranik and Makas Abu Salah. These also are closed and opened naturally according to marine waves and currents and the sand movement on the coast.

4-10-2 Current situation

Additional rocky heads were set up to protect the Cornish of Arish until the port. The beach erosion east the port still swing east and west despite the establishment of rocky heads to reduce erosion. No center or agency is working in environmental monitoring in Sinai along the beach on 200km. Oil leakage in Baloza and from crossing ships in Mediterranean in front of Sinai still threatens Bardaweel Lake and the entire beach. Arish port is threatened by many pollutants of cargo materials, which were done without EIA or controls and without providing safety factors against marine pollution.

Requirements of coastal zones planning

1- Open coastal areas:

- 3km planning area (subject to special terms) according to the governorate point of view.
- 200m protected area (sea line).

2- Summer recreational area (the developed ones):

- 3km planning area (subject to special terms) according to the governorate point of view.
- 200m protected area (sea line).
- 3km planning area (subject to special terms).
- 100m protected area (sea line).

3- Urban areas (already developed):

- Special planning requirements: tourism resorts on no more than 24% of the total area, height no more than 8 meters in far areas from natural protectorates. As for the facilities needed for the natural protectorates and serving its visitors, the height shall not exceed 4m.

4- Undeveloped areas:

- Identifying coastal planning areas till 3km depth to be developed according to special planning requirements.
- Sea line of 200m (coastal protection area) in the open coastal areas.

Requirements of local planning for coastal areas management:

On local planning to manage coastal areas, the following should be taken into consideration:

- Development should depend on the optimal use of natural resources under the concept of sustainable development.
- Plans should be clear and can be implemented.
- Facilities height shall be less than 8.5 meters.
- To establish public beaches free of charge for citizens.
- All plans must be reviewed every four years.

Requirements of planning coastal cities:

On planning the coastal cities, there must be 3km at least clear from any development activities as original right for the next generations.

Tourism facilities must have the following criteria:

- To be connected to current cities or tourism areas.
- To be established within the framework of national and integrated plans and strategies.

Requirements of coastal areas integrated management:

The integrated management of coastal areas can be summarized as follows:

- There must be outstanding plans to fight any oil pollution due to leakage in the sea, as Mediterranean Sea is among the biggest canals and is crossed by different carriers from 150 tons to 70.000 tons load. Oil represents 50% of marine pollutants, therefore, it is necessary to have ready equipment in the

northern lakes, especially Bardaweel to fight oil leakage incidents and to protect beaches and fish wealth, as lake pollution deprives Egypt from its most important fish sources.

- Due to siltation on Bardaweel Lake's inlets and its impact on marine navigation, the area needs research study on soil nature and the characteristics of its gravels as well as studying the movement of such gravels to know the real reasons behind siltation.
- Preventing disposing wastewater from neighbor countries into the Mediterranean and respect of international agreements, most important of which is Barcelona Treaty for Mediterranean marine environment protection 1975, signed by all basin countries.
- It is required to stop real estate development on the beaches of Sinai and issuing binding legislations to stop expansion in building real estates on the beach or after 200m at least from shore line according to the integrated management programs of coastal areas and expanding in assigning open areas on the beach to encourage the day-use tourism with least possible service facilities (cafeteria/ restaurants, etc).
- Non establishment of any project on the beach unless after ensuring the soundness of its EIA outcomes and its impacts on the coast as per Law 4, 1994.

The next figure shows key projects on Arish Beach

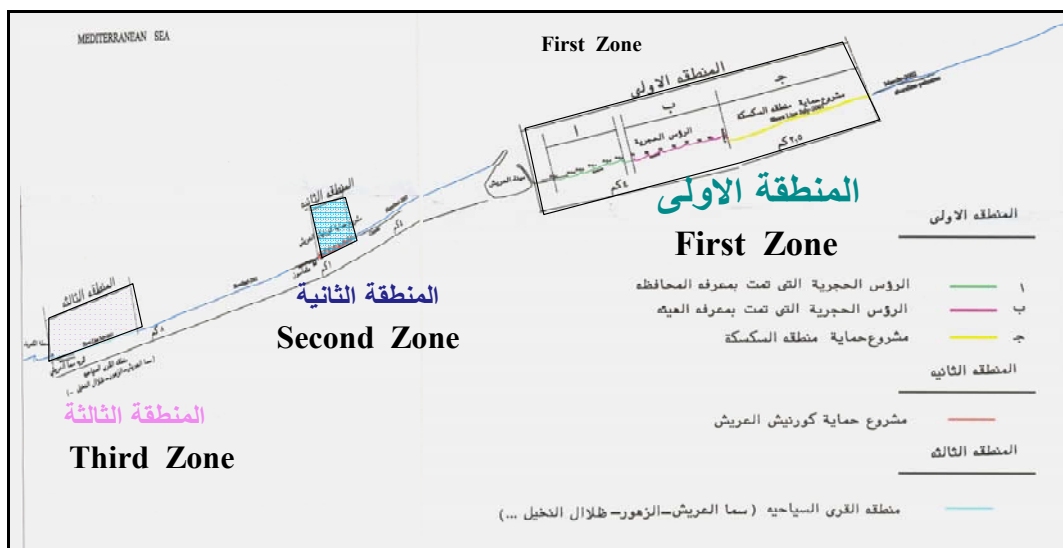


Figure (36) Arish beach projects

Results of environmental monitoring of Egyptian coastal water of the Mediterranean during March 2005

First: Field observations:

- Different kinds of wastes in various quantities along the Egyptian coast, most density found on Nubariya, Max, Dekhela, west ort, east prots, Gamil, Port Said and Rafah beaches.
- Old and new oils were found at little quantity in some beaches from Salloum to Rafah.
- Seaweed and alga were found in little quantities in most of the monitoring sites from Salloum to Rafah, except for big quantities at Nubarayia and Gamil. Little human wastes were found in limited number of beaches.

Second: Hydrographical measurements:

- Coast water in all monitoring sites were good ventilated, as the average of dissolved oxygen (BOD) in water was 5.22 to 7.64 mg/l and it was 3.74 to 4 mg/l at the seabed near power generating plant and west port.

Third: bacterial measurements:

- 44% of monitoring sites were completely clean from bacterial pollution.
- March 2005 results showed that environmental improvement is high in Anfoushi area.
- On the other side, it was observed that there is no bacterial pollution in Rafah beach during March 2005, due to not affected by wastewater disposed into sea from Palestinian territory adjacent to Rafah beach from the east.

Sampling date	Sampling site	Analysis result
8/4/2004	Abu Sakl beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
7/4/2004	Sheikh Zoaid beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
8/4/2004	Arish, opposite Ibn Sina Mosque	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
8/4/2004	Arish, opposite Kholafa'a Mosque	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
8/4/2004	Arish bungalows beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.

Sampling date	Sampling site	Analysis result
10/5/2004	Massaied, opposite Mubarak Park	Not complying with law 48, 82 for turbidity and sulfates increase beyond limits.
10/5/2004	Arish Sea beach	Not complying with law 48, 82 for turbidity and sulfates increase beyond limits.
10/5/2004	Abu Sakl beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
10/5/2004	Kholafa'a Rashedin beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
7/7/2004	Sheikh Zoaid beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
26/6/2004	Sheikh Zoaid beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
9/6/2004	Rafah, between Egyptian/Palestinian borders	Not complying with law 48, 82 for ammonia increase beyond limits.
30/5/2004	Rafah, between Egyptian/Palestinian borders	Not complying with law 48, 82 for ammonia increase beyond limits.
18/5/2004	Rafah, between Egyptian/Palestinian borders	Not complying with law 48, 82 for ammonia increase beyond limits.

Sampling date	Sampling site	Analysis result
15/7/2004	Opposite Baraka Mosque beach	Sample is not complying with decree 64, 96 for sulfates increase beyond limits
15/7/2004	Opposite Arish beach	Sample is not complying with decree 64, 96 for sulfates increase beyond limits
6/6/2004	Arish sea beach	Not complying with decree 64, 96 for turbidity and sulfates increase, BOD decrease beyond limits.
6/6/2004	Opposite Mubarak Park beach	Not complying with decree 64, 96 for turbidity and sulfates increase, BOD decrease beyond limits.
3/5/2004	Opposite Kholafa'a Rashedin	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
10/5/2004	Arish sea beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
8/4/2004	Opposite Kholafa'a Mosque	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
16/5/2004	Rommana beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
8/4/2004	Arish bungalows beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.

Sampling date	Sampling site	Analysis result
8/4/2004	Abu Sakl beach	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
8/4/2004	Saad bungalows, Abu Sakl, Kholafa'a mosque, Sheikh Zoaid beaches	Not complying with decree 64, 96 for turbidity increase, BOD decrease beyond limits.
9/6/2004	Abu Shenar beach	Sample is not complying with decree 64, 96 for ammonia increase beyond limits
9/6/2004	Rafah, between Egyptian/Palestini an borders	Sample is not complying with decree 64, 96 for ammonia increase and colonic group bacteria beyond limits
18/5/2004	Abu Shenar beach	Sample is not complying with decree 64, 96 for ammonia increase and colonic group bacteria beyond limits
18/5/2004	Rafah, between Egyptian/Palestini an borders	Sample is not complying with decree 64, 96 for ammonia increase beyond limits
30/5/2004	Rafah, between Egyptian/Palestini an borders	Sample is not complying with decree 64, 96 for ammonia increase beyond limits

Sampling date	Sampling site	Analysis result
30/5/2004	Abu Shenar beach	Sample is not complying with decree 64, 96 for ammonia increase beyond limits

(Source: Health Directorate)

Environmental monitoring of costal border area in Egyptian Rafah:

Physical measurements:

Studying physical characteristics, including temperature, BOD, Hp, salinity, CTD, and transparency, we found out the following:

- Concentration of Hp is 7.54 to 7.24, which means it is weak alkaline field within the international permissible limits for sea waters.
- Salinity degree is 38.5 ppt, means it is not different from other shores of Mediterranean that are not connected to fresh water sources.
- BOD is normal and ranges between 8.04 and 9.66 ppm.
- Waste transparency is very high.

Therefore, physical characteristics of the first day 30/12/2002 and second day 31/12/2002 measurements are all within environmental standards and the international permissible limits.

Chemical measurements:

Samples of chemical measurements according to European criteria of European and Mediterranean coastal water quality concerning unimodal salinity for each kind based on chemical analysis of sea water taken from Rafah border area shows the following:

- No pollution by nutrition salts like nitrates, ammonia, phosphate, silica comparing to Sidi Abdulrahman area, which is a reference station of Mediterranean Environmental Monitoring Project.
- Such elements are found lower than the permissible limits, except for silica, which is slightly higher by 0.5 micromole and there is no significant differences between the three sites that samples are taken from.
- Nitrates concentrations are about 3 micromoles and less by 25% from the permissible limits. Ammonia concentrates are less than 0.5 micromole and is 25% of the permissible limits.
- Chlorophyll concentration of the aforementioned area is less than 1.5 microgram/ liter and is much lower than the permissible limits.

4-10-3 Problems as Prioritized

First: Coast problems:

- 1- Establishing Arish port resulted in erosion in the coast east to the port and falling down of huge numbers of palm trees with 30 to 60 meters width vertically on marine current and forms sand sedimentations in the sea, the

depth of which reached 80 meters. In the eastern side, the sea overlapped with the land due to erosion.



Figure (37) Palm trees destruction due to erosion

- 2- Bardaweel strait no. 1 turned the strait from natural openings of sands to openings of cement and stones and erosion east to straits, which affects east of the Lake and a lot of erosion problem in the unpopulated areas, so it is not economic valued.
- 3- Steam station established waves barrier around cooling water intake, which impedes water currents and consequently direct erosion east to the station and shore erosion from 15-40 meters. This made confusion due to increasing the value of coastal lands in this area.
- 4- Egyptian Authority for Shore Protection, funded by EEAA has established number of rocky heads east the port to avoid erosions. Yet these heads have impacts on the coast and makes erosion east to these heads still existed till now. This is the urgent problem which was discussed in the Local Popular Council in the governorate to protect the area of east port from the impacts of establishing Arish port and verify the erosion impacts on agro and tourism areas on the sea shore.

Third: Shore problems:

- 1- Shores' pollution, especially Rafah shore is among eco proplems of North Sinai. The problem is summarized in the direct drainage of wastewater in Mediterranean water across international borders, which affects the purification and suitability of its water for tourism and summer entertainment. Also Rafah city is affected, as wastewater of Palestinian Rafah is collected in a pond in front sign no. 10 of the borders, which result is bad odors, flies and

mosquitoes spreading out, in addition to its effects on surface water reservoirs in the area, which Rafah city depends on in household uses and drinking.



Figure (38) sites of marine pollution in the governorate

- 2- Shore pollution by oil spots, especially Baloza shores due to its close from Port Said harbor. This pollution is due to uncontrolled monitoring to crossing ships of Suez Canal to the sea at the beginning of the northern entrance in Port Said, where ships dispose the rejected oils at the first point in the wide sea.



Figure (39) Crude oil spreading east and west ORASCOM station on Baloza shore

- 3- Dumping dead animals from ships into sea water, where they reach the shore by the effect of water currents and waves.
- 4- Disposing reject oil of fishing units into sea water and Bardaweel jetties as well as Arish sea port.
- 5- Disposing cooling water of Arish steam power plant in the sea, which led to high water temperature, which have negative impacts on water species.

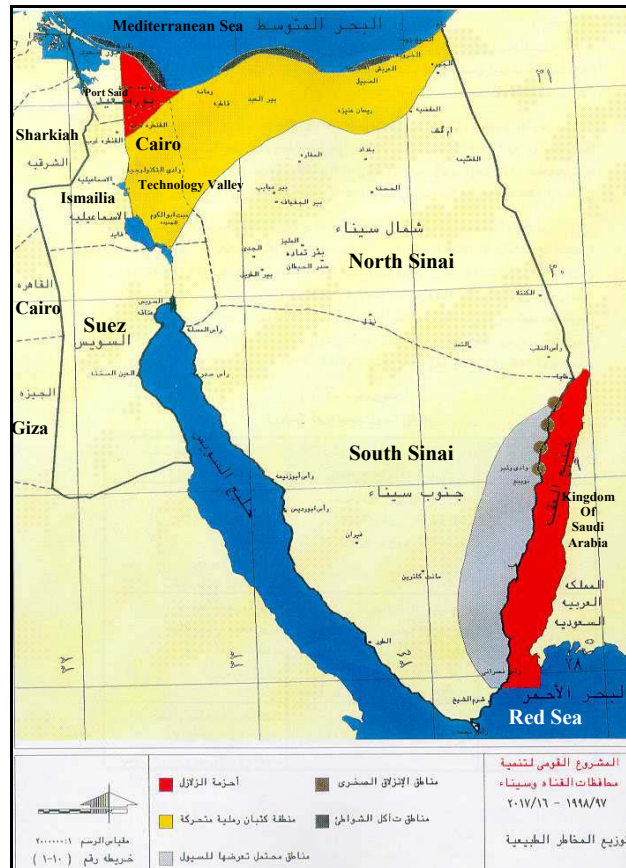


Figure (40) Distribution of natural risks in coastal areas in the governorate

4-10-4 Vision and goals:

- Taking into consideration the current capacity and the consequences of tourism activities' impacts on the environmentally sensitive utilities.
- Comparing the strategy vis the national strategy of tourism development.
- Evaluating the local and regional impacts on the economy and job opportunities.
- Evaluating whether the plan is supporting the multi use of facilities.
- In the protected areas, it is forbidden to change the shore condition or making further coastal extensions.
- It is forbidden to build any fences or establishing any mobile houses (caravans) or trailers.

- It is forbidden to make any backfilling works.

4-10-5 Institutional support and capacity building

- 1- Training the staff on monitoring methods concerning physical changes on the shore line and on monitoring pollutants, especially oil pollution.
- 2- Providing Arish sea harbor (east Mediterranean) with enough monitoring equipment, giving the fact that all the area of east Port Said is totally clear from marine monitoring sites, in addition to providing inspection and monitoring transportation means.
- 3- Enforcing the legislation of shore line protection and not violating the safe limits of real estates development along the coast line.
- 4- Activating the aforementioned six roles of integrated management of coastal areas.

4-10-6 Description of some priority procedures:

- 1- There must be outstanding plans to fight any oil pollution due to leakage in the sea, as Mediterranean Sea is among the biggest canals and is crossed by different carriers from 150 tons to 70.000 tons load. Oil represents 50% of marine pollutants, therefore, it is necessary to have ready equipment in the northern lakes, especially Bardaweel to fight oil leakage incidents and to protect beaches and fish wealth, as lake pollution deprives Egypt from its most important fish sources.
- 2- Due to siltation on Bardaweel Lake's inlets and its impact on marine navigation, the area needs research study on soil nature and the characteristics of its gravels as well as studying the movement of such gravels to know the real reasons behind siltation.
- 3- Preventing disposing wastewater from neighbor countries into the Mediterranean and respect of international agreements, most important of which is Barcelona Treaty for Mediterranean marine environment protection 1975, signed by all basin countries.
- 4- It is required to stop real estate development on the beaches of Sinai and issuing binding legislations to stop expansion in building real estates on the beach or after 200m at least from shore line according to the integrated management programs of coastal areas and expanding in assigning open areas on the beach to encourage the day-use tourism with least possible service facilities (cafeteria/ restaurants, etc).
- 5- Non establishment of any project on the beach unless after ensuring the soundness of its EIA outcomes and its impacts on the coast as per Law 4, 1994.

4-11 Tourism development:

4-11-1 General background:

North Sinai is unique in its tourism potentials and resources. It is new in tourism development since its liberty (1979 – 1982). Tourism movement reaches its peak during its high season in summer (15 June to 15 September) every year. North Sinai (27546 km²) enjoys the following relative privileges:

- Unique geographical location links Asia with Africa and looks over Europe through the Mediterranean.
- Moderate climate conditions, as sun rise degrees are 4-5 degrees, which is complying with the international standard (5 units).

- Mediterranean is bordering the governorate (Rafah/ Baloza) with 180 km long, penetrated by Bardaweel Lake (168.000 feddans) and Zaranik Protectorate (250km²).
- It is linked to the coast through sand formations of different forms and height that is itself the main location of urban and agro growth. It is also linked through the north tourist coastal road (Rafah – Salloum) and the railways (Ismailia – Ber el-Abd), which is expected to reach Rafah in the future. Also, infrastructure elements are spread over this sector (electricity, gas, water supply).
- Desert environment consists of a group of wadi (valley) systems (Arish valley, Milaiz valley, Karm valley, Grafi valley) which are penetrated by series of mountains and valleys, among which emerge natural springs as potable water source (Spring Qedes, Spring Godirat). Qaseema oasis is a unique component for desert tourism, which is not utilized properly till now. This environment also comprises some and historical monumental sites in addition to irrigation and drinking water wells and blocking dams.
- North Sinai environment contains 1000 medical plants and herbs, which are used now by cutting off and marketing through herbs shops with some attempts to use it in the field of curing tourism as medicines packs.
- Natural resources in North Sinai vary (fish, salts, marble, white sands, clay, limestone, black sands, etc) which contribute in refreshing scientific and geological tourism.

4-11-2 current situation:

Tourism activities:

The next table shows the types of tourism activities available in the governorate:

Type	Components
Beach tourism	Beaches on Mediterranean, Rowak beach, Bardaweel Lake - Hotels, resorts, bungalows. - .Arish Cornish/ Massaied Cornish. - Beach services (toilets, showers, rescue towers, cafeteria, and ambulance). -
Curing tourism	Moderate climate and temperature balance - make the high tourism season 7 months in Rafah and 6.5 months in Arish.

Type	Components
	Keeping away from pollution. -
	Plenty of medical plants and herbs. -
	Treatment center using bees acupuncture -
Yachts tourism	.Arish sea harbor -
Natural Protectorates' tourism	Zaranik protectorate. -
Oasis and natural springs tourism	Qaseema oasis and Qaderat spring - Qedes spring -
Desert tourism	Mountains and valleys - Grazing - Traditions and norms - Eco crafts production - Popular foods - Folklore -
Scientific and geological turism	Mountains and valleys - Economic wealth sources -
Cultural and historical tourism	Historical roads and routes (Horus, Islamic Pilgrims, Sacred Family, Islamic concurs). - Historical citadels. - Old cities. -
Transit tourism	Rafah Gateway -

Type	Components
	Middle road (Ismailia/ NakhI/ Nuibie). -

Table (13) Tourism activities in the governorate

Tourism areas and their locations:

First: Utilized beaches in North Sinai:

The next table shows the utilized beaches in North Sinai.

Name of coastal sector	Totally utilized	Partially utilized	Unutilized
Rafah beach		-	
Rafah Abu Shenar beach		-	
Sheikh Zoaid Abu Shenar beach		-	
Sheikh Zoaid beach		-	
Sheikh Zoaid/ el Masiada			-
El Masiada beach/ el Kharoba			-
El Masiada beach			-
El Kharoba beach			-
El Kharoba Abu Skaik beach			-
Abu Skaik beach			-
Abu Skaik Negmet Sinai		-	

Name of coastal sector	Totally utilized	Partially utilized	Unutilized
beach			
Negemet Sinai beach	-		
Arish Port beach	-		
Abu Sakel beach	-		
Abu Sakel Arish beach	-		
Arish beach	-		
Arish el Masaied beach	-		
El Masaied beach	-		
El Masaied el-Maydan beach		-	
El Maydan el Zaranik beach		-	
El Zaranik Lake beach			-
Bardaweel Lake and Islands			-
beaches			
Rommana beach		-	
Rommana Baloza beach		-	
Baloza beach		-	
El Rowak beach		-	

Table (14) Utilized beaches in the governorate

Second: Historical roads:

- War and trade north road (Horus Great War Road): from Rafah to Qantara. It witnessed most military invasion campaigns. Pharaohs recorded their victories in eternal pictures on the walls of their temples. The road also witnessed the Islamic concur to Egypt.
- Sacred Family Road: from Rafah to Qantara adjacent to Mediterranean coast just north to Horus Road. It is the route of the sacred family (Jesus, Mary, her cousin Youssef el-Nagar) from Palestine to Egypt and their way back to Palestine after the death of the tyrant Hairdos.
- Islamic Pilgrims Road: Penetrating middle of Sinai as sole land road links Egypt with Hejaz countries directly through which Egyptian Muslims travel to Hejaz lands to conduct pilgrims and Umrra until the First World War.

Third: historical Cities:

The next table shows the historical cities in the governorate:

Historical city	Old name	Current location
Pharma	Pharaoh name Bramen (City of God Amoun), Roman anme (Bebloze), Arab name (Pharma).	4 km north Sinai
Arish	Pharaoh Rinclore	Southwest Arish
Sheikh Zoaid	Bier Ma'aet – Nekhso city	Current Sheikh Zoaid city
Rafah	Old Pharoah Rabeh city	Current Rafah city
Nakhel	Nakhel, because its sand is fine	Current Nakhel city
Mohamadiya		West area of Bardaweel Lake

Table (15) Historical cities in the governorate

Fourth: Islamic and Coptic monuments:

Decrees were issued to put 19 sites under Monuments Law, including the following:

- Sultan Soliman el-Kanoun Citadel in Arish, Ali bin Abu Taleb street, el-Safa district. It is registered by Ministerial Decree no. 282, 1997, among Islamic and Coptic monuments, subject to provisions of article 20, law 117, 1983, concerning Monuments Protection.
- Khoainat and Flosiat area southeast Bardaweel in Zaranik natural Park, registered by decree no. 2137, 1994 among Islamic and Coptic monuments, subject to provisions of article 20, of Monuments Protection Law, which forbidden taking any actions that change the site nature or the features of the monumental and ambient area

Fifth: Other historical monuments:

- Mohamadyat Citadel, Qateba monuments, Kasrawit and Pharma City in the eastern side of old delta lands, which include huge church east of the city named Tall el-Makhzan, Citadel and two Roman-like bathrooms and the Pharma bridge leading to Al Motawakel Alallah El Abbassi Citadel. In addition, the industrial zone in the west and the remaining of big water tanks on the roofs of buildings.
- El Tina Citadel and Tall el-Khair and Sahl el-Tina hills – Lahfen Citadel.
- Monuments group on the route of Egyptian pilgrimage like towers, Om Ashtan escape, and Mabouk well.
- Mabouk citadel in el-Raha valley and Nakhel citadel.
- Monuments in Goura, Qaseema, Godayrat, Mowilh citadel, el-Sahba hill, el-Sabha monuments, Oga monuments, and Amro valley.
- Amouria, Mazar, Swaidat, and Fals hills.



Figure (41) Tourism areas in the governorate

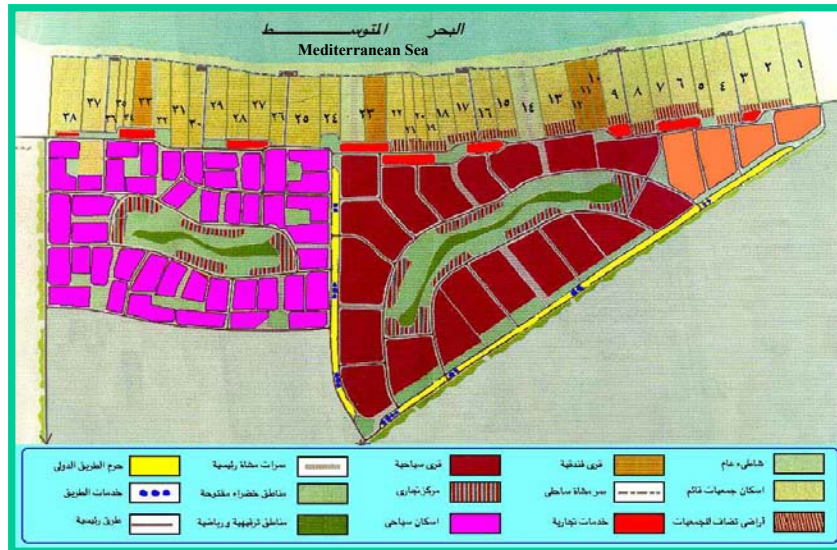


Figure (42) Detailed plan of tourism development of Baloza-Rommana sector

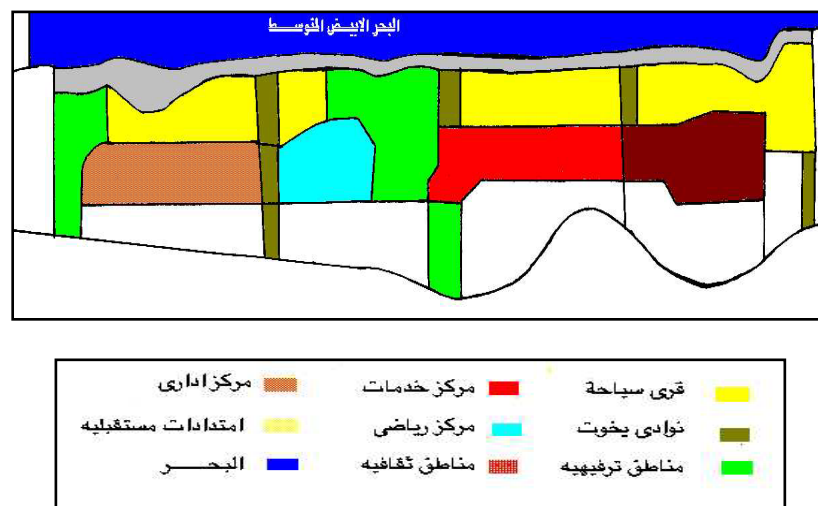


Figure (43) General Plan of tourism development northeast Arish

4-11-3 Problems per priorities

Problems were prioritized as follows:

First: Beach problems:

- 1- Deterioration of palm trees numbers along the coastal sector of North Sinai governorate from Massaied area till the political borders in Rafah.
- 2- Coastal marine erosion in the tourism area:
 - Sama el-Arish resort.
 - West end of Arish Cornish.
 - Sakaska village beach.
- 3- Sand creeping in the areas of:

- Beaches, especially the coastal line north the Cornish of Arish and Massaied.
 - Scattered areas on the northern international tourist road.
- 4- Jellyfish: Spreading out during summer season.
 - 5- Wastewater drainage systems on the main beaches:
 - Toilets.
 - Showers.
 - 6- Random urban growth in scattered areas, most significant of which is Thursday Market area and Arish Citadel.
 - 7- Lack of visitors' awareness on waste disposal issues.

Second: Monuments problems:

- 1- High level of groundwater and salts, due to monuments' location inside Bardaweel or near the sea, which impedes excavation works and leads to decomposition of the concrete of the buildings due to humidity and slats like "el Tina Citadel, Om Demiat, el-Mohamdiyat, Amouria, el-Flosiyat, el-Khoynat". This problem can be solved through conducting studies to find out viable solutions to protect the cultural and monumental heritage.
- 2- Creeping sand dunes on the monumental sites, which led to its disappearance, like Donkeys hill, Lady hill, Abu Shenar, el-Sabah, Rasim Zaza hill, el-Kharouba, el-Goura, el-Massaied, Mazar, Kasrowait hills and Beir Dwedar monuments, Bier Mabouk and the monuments on the Egyptian pilgrimage as well as Wadi Amro and Qaseema.
- 3- Some monumental sites are located inside the residential areas and human activities, which is so vulgar like Arish Citadel which suffers from health directorate garage, telephones, asphalt, Thursday weekly market, surrounding inhabitants, workshops and chicken shops. This problem can be solved through re-planning the area, utilities and roads.
- 4- Lack of coordination between Quarries and monuments in sustainable and integrated way, despite that Monuments Protection Law no. 117, 1983 regulating this issue. The problem can be overcome through full coordination with the Supreme Council for Monuments before working in any quarry and monitoring the quarry operations during its work.
- 5- Lack of coordination on implementing projects like (agro development, roads, new urban areas, transportation lines outside the cordon).
- 6- Transporting sands and dusts leads to backfilling heritage sites (el-Flosiyat Citadel, el-Khowinat, Balaza monuments) and the active winds leads to changing the monument features.
- 7- Dry winds and its speed results in severe changes in the building materials of the monuments, especially the outer components, as they were protected when they were under the ground. They contain very high rates of humidity. The exposure to dry winds shall result in their loss of high rate of humidity which may amount to 30%. This may lead to severe cracks and the collapse of the buildings and thus harm about 25% of such sites (physiological impacts of seasonal winds). Also, active winds leads to break down and backfilling of access roads to the monuments and make it difficult for moving around and maintaining them as well as exploring more possible monuments. Over 7% of Sinai monuments are threatened by this problem. Key affected areas are Balaza, el-Flosiyat, el-Khowinat. Arish citadel is a key monument which is threatened by air pollution due to ambient workshops like steeling, car

painting and repairing, etc. These workshops emit smokes with chemical materials the directly affect the stone components of Arish Citadel.

4-11-4 Institutional support and capacity building:

- 1- Developing Zaranik protectorate and providing the necessary allocations through the State Ministry of Environment and donor agencies, in addition to identifying timetable for the development process and maintain it to continue as key environmental signs in the area.
- 2- Developing legislations and enforcing them to protect eco systems and the natural resources.
- 3- Conducting the necessary seminars to increase the number of protectorates in North Sinai to reach 7% of the governorate area through declaring Qaseema, Maghara and Hassana natural protectorates (National Parks) in addition to Bardaweel and Jungle protectorates.
- 4- Activating environmental awareness programs through mass media, conferences and field trips and incorporating environmental dimension in the education curricula in schools and universities.
- 5- Supporting environmental integration between regional governorate of Port Said, South Sinai, Ismailia, North Sinai through exchanging expertise and implementing legislations aiming at protecting the environment of wild life (flora and fauna) and protecting the immigrant birds.

4-11-5 Description of some priority projects:

Natural tourism:

Advertising the natural places in the governorate within the framework of advertising plan in mass media and direct contacts between individuals, agencies, and institutions, besides using the internet services (desert tourism – Mountains – Valleys – medical Plants).

Natural Protectorates tourism:

- Developing Zaranik protectorate by 2007 and preparing it for birds watch fans and providing services for visitors, including implementation of service programs by protectorates' management.
- Using modern methods in advertizing the protectorate, its distinguished places, and environmental famous places.

Monuments tourism:

- Good preparation of monuments sits. Key sites include:
 - a- Arish monuments.
 - b- Pharma monuments in Baloza and Phlosyiat.
 - c- Old pilgrimage road and Sacred Family road.
- Providing training for local and regional tourist guides to accompany tourists.
- Documenting the visits and sharing expertise with counterpart institutions.

5- Roles and responsibilities:

5-1 EEAA

Responsible for formulating the political framework and developing action plans necessary for environmental protection and following up its implementation in coordination with competent administrative authorities.

5-2 RBO, EEAA in Suez Canal and Sinai Area:

Representing RBOs of EEAA at the governorate level. It is responsible for implementing EEAA policies at the regional level. Tasks include environmental inspection, reviewing IEAs and enforcing EEAA instructions.

5-3 General Department for Environmental Affairs:

The department is responsible for protecting the environment from pollution inside the governorate. It is directly affiliated to the Governor and is responsible for enforcing Law 4, 1994.

5-4 Environmental Offices in the cities:

They assist the General Department for Environmental Affairs in its activities; therefore they implement the assigned tasks for them by the General Department.

5-5 Environmental communication officials in villages:

They follow up activities of solid wastes management and examine simple complaints.

6.0 Plan Implementation Costs

The costs of environmental projects in North Sinai were identified as follows:

Sector	Project Name	Location	Recommended Agency for the Project	Estimated Costs in LE
Water and Wastewater	Increase Potable Water Resources	Al Tamad	Irrigation, Nakhl City Council, Environment Department	9,000,000
	Institutional Support for Water and Wastewater utilities	Cities Councils	Water Utility, WW Utility, Cities Councils, Environment Department	1,070,000
	Protect international groundwater and Stopping pollution across borders	Rafah	City Council, Irrigation, Water Resources Researches Center, Environment Department	2,266,000
	Use WW Effluents in	Garada	WW, Environment	1,000,000

Sector	Project Name	Location	Recommended Agency for the Project	Estimated Costs in LE
	planting Castor, wood trees, and Water Treatment by using E.M	Zarie	Department, Cities Councils	
	Backfilling of Swamps	Garada Zarie	City Councils of Al Arish and Beir El Abd	750,000
	Minimize Overdrawing of well waters and apply modern irrigation systems	Garada Zarie	City Councils of Al Arish and Beir El Abd	1,300,000
Solid Wastes	Safe disposal of hazardous medical and hospital wastes	Cities Councils	Health, Environment Department	2,500,000
	Separate hazardous medical wastes from domestic wastes	Al Arish	Health, City Council, Environment Department	250,000
	Landfill	Cities Councils	Cities Councils, Environment Department	2,200,000
	Rehabilitation of Public Dumpsites	Cities Councils	Cities Councils, Environment Department	5,500,000
	Improve efficiency of solid waste collection and recycling	Cities Councils	Health	20,000
	Safe Handling of Medical	Cities Councils	Health	200,000

Sector	Project Name	Location	Recommended Agency for the Project	Estimated Costs in LE
	Wastes			
Agriculture and Fish Wealth	Use palm trees products to make chairs, tables, and to process dates (ajwa)	Districts of Al Arish, Rafah, and Sheikh Zowwayed	Agricultural Directorate, Environment Department, Faculty of Agricultural Sciences in Al-Arish	1,850
	Protect medical plants and Increasing endangered plant species, establish plant nurseries, initiate integrated pest control program	Nakhl Wadi El Amro	Cities Council in Nakhl and Al-Hosna, Agriculture Directorate, Environment Department	650,000
	Biological, Chemical, and Mechanical Combats for Creeping Snails	International borders in Rafah	Rafah City Council, Environment Department, Agriculture Department	250,000
	Developing and increasing number of palm trees and establish a plant nursery	Al-Arish	Agriculture Department, Faculty of Agriculture	1,000,000
	Produce improved seeds and hybridized seedlings of local plants	Sheikh Zoaid, Rafah	Agriculture Directorate, Agricultural Researches Center	500,000
	Protect the infrastructure from the creeping sand dunes and establish a plant nursery	Beir Al-Abd, Al Arish	Beir Al-Abd and Al Arish City councils, Agriculture Directorate, Sinai Urbanization	4,000,000

Sector	Project Name	Location	Recommended Agency for the Project	Estimated Costs in LE
			Authority	
	Minimize flies spread in the governorate	Cities councils, Beir Al-Abd, Sheikh Zoaid	Health Dept., Agriculture Dept. Environment Dept.	400,000
	Combating Jelly Fish, and protecting fish mother breeding	Governorate beaches	Fish Wealth Authority, Cities Councils, Environment Dept	117,100
	Provide Bardaweel Lake with two big launches to prevent catching any mother fish from the bays	Bardaweel Lake	Lake Management, Fish Wealth Authority	300,000
	Study on Combating thorny snails in Bardaweel Lake	Bardaweel Lake	Lake Management, Fish Wealth Authority	120,000
	Integrated Pest Control Program and Minimize pesticide usage	Al-Arish, Beir El-Abd, Sheikh Zoaid, Rafah	Agriculture	750,000
	Protect the road and Al-Salam lake against desertification and establish nursery	Beir Al-Abd, Rafah-Qantara road	Cities councils, Agriculture	2,300,000
	Combating rodents and insects/pests	Al-Arish, Beir El-Abd, Sheikh Zoaid, Rafah	Agriculture, agriculture	200,000

Sector	Project Name	Location	Recommended Agency for the Project	Estimated Costs in LE
Industry and Mining	Establish a WWTP in the new industrial zone	Industrial zones	Industrial zones management, Quarries management	250,000
	Monitoring Industrial emissions	Industrial zones	Industrial zones management, Environment Dept	75,000
	Relocating industrial workshops from city to craft industrial zone	Al-Arish city	Al Arish City Council, Crafts, Industrial Zone Management	5,125,000
Biodiversity	Tree planting in the crafts industrial zone and protecting sea turtles	Al Arish city, Governorate shores	Crafts Industrial zone management, Environment Dept	107,000
	Document and survey medical plants	Central Sinai	Al-Hassana City council, Environment Dept	1,220,000
	Upgrade traditional crafts of Bedouin women in Zaraneeq protectorate villages	Al-Zaraneeq protectorate	Al-Zaraneeq protectorate	250,000
	Provide alternative fodders for pasturing livestock in AL-Zaraneeq protectorate	AL-Zaraneeq protectorate	AL-Zaraneeq protectorate	250,000
	Use natural gas fueled furnaces instead of using fuel wood	Central Sinai	Al Hassana and NakhI cities councils	200,000

Sector	Project Name	Location	Recommended Agency for the Project	Estimated Costs in LE
	Protecting natural heritage	Governorate	Culture and Environment	3,000,000
	Protecting the endangered species and protecting the natural heritage of the governorate			
	Utilize solar energy in operating solar heaters and furnaces	Cities councils	Environment Dept	400,000
	Rationalize use of solar energy and minimize heat emissions	Cities councils	Environment Dept	250,000
	Provide settlements o desert Bedouin communities	Cities councils	Environment Dept	2,000,000
TOTAL				80,700,000

7.0 Financing Mechanisms

It is agreed that the governorate, the private sector. And the NGOs shall implement this plan. Although it is the government's mission to supply utilities services, yet the private sector participation should be properly encouraged to maximize coverage of improved services. In addition, external funding shall also be made available from donor agencies.

8.0 Plan Implementation

8.1 Priorities of Implementation

- 1- Provide clean potable water to governorate urban and rural areas and residential communities
- 2- Minimize the hiking salinity of groundwater for cultivated lands
- 3- Stop pollution impacts over residential areas, concerning the following activities:
 - Inefficiency of solid waste collection and safe disposal procedures
 - Olive oil presses
 - Wastewater
 - Noise pollution resulting from operating professional workshops
- 4- The risk of medical wastes accumulation and being mixed with ordinary domestic wastes
- 5- Fight desertification and minimize the creeping sand dunes over governorate infrastructure
- 6- Negative impacts on shoreline because of construction development projects (shore erosion problem)
- 7- Irresponsible usage of pesticides and hormones in agricultural crops
- 8- Combat rodents and flies
- 9- Confront environmental pollution across Egyptian borders
- 10- Monitor the marine environment via harbors, coastline, lakes, and over-fishing in central Sinai and natural protectorates
- 11- Follow up the governorate natural protectorates conservation procedures
- 12- Rationalize use and utilize of natural resources, namely raw marble, glass sand, salt, and coal
- 13- Expand environmental education and reform public attitudes and behaviors into positive values directed towards environmental development and conservation, through involving the Education Directorate, NGOs, and "Reading for All" programs

8.2 Responsibilities

The following table tackles the target aspects based on the Environmental Action Plan (EAP), as well as the executing agencies

Target Aspects	Implementing Agencies	Stakeholders
<u>Wastewater</u> -Extend WW services to all urban areas -Support and build institutional capacities of wastewater sectors on the governorate level -Maximize the reuse of treated WW effluents and Sludge	-Cities Councils-Ministry of Reconstruction -Cities councils, Water utility, WW utility -Agriculture Directorate	Ministry of Housing and Reconstruction -National Organization for Water and Sanitary Drainage (NOPWASD) -Ministry of Housing and Reconstruction
<u>Solid Waste Management</u> -Develop an appropriate strategy for the integrated solid waste management in North Sinai -Improve the operation and management of waste services and utilities -Improve the ongoing waste collection and transport systems -Adopt proper and highly qualified solid waste treatment and disposal system -Ensure safe and sustainable waste recycling -Introduce proper hazardous medical waste management systems	-Environment Department, Cities Councils -Cities Councils - Cities Councils - Cities Councils, Environment Dept -Cities Councils -Cities Councils, hospitals, factories/Health Directorate	-Ministry of State for Environmental Affairs (MSEA) -Ministry of Local Development -Ministry of State for Environmental Affairs (MSEA) -Ministry of Local Development -MSEA -MSEA Ministry of Health, Ministry of Industry

Target Aspects	Implementing Agencies	Stakeholders
-Improve the institutional organization and capacity building in solid waste management procedures	Cities' councils	Governorate Environment Dept. -MSEA, Ministry of Local Development, Governorate Environmental Dept.
<u>Water Supply and Water Quality</u>		
-Achieve service coverage by (100%) and increase productivity to satisfy expected demands	-Cities councils	-Governorate, Ministry of Housing ad Reconstruction
-Improve water quality to comply with Egyptian standards by 2008	-Cities councils, Health Directorate	Ministry of Housing ad Reconstruction, Ministry of Health
-Improve the efficiency of consumption fees collection system from 40% to 85%, and reduce losses in networks from 25% to 40%	-Cities councils	Governorate
-Ensure capacity building to improve the water supply management and the service network	-Cities councils	Governorate/Ministry of Housing and Reconstruction
<u>Water Resources</u>		
-Improve Surface and Groundwater resources	Irrigation Dept. Agriculture Dept., Water Resources Dept.	Governorate, Ministry of Irrigation
<u>Agriculture</u>		
Improve soil irrigation efficiency	-Agriculture Directorate,	Ministry of Irrigation,

Target Aspects	Implementing Agencies	Stakeholders
	Irrigation Directorate, Faculty of Agriculture, Desert Research Institute	Ministry of Agriculture Governorate
-Minimize overuse of fertilizers and pesticides	Agriculture Directorate, Environment Dept	Ministry of Agriculture Governorate
Enhance fish productivity	Fish wealth zone, Faculty of Agriculture	Ministry of Agriculture Governorate
Minimize and handle agricultural crop losses	Agriculture Directorate, Faculty of Agriculture	Ministry of Agriculture Governorate
Upgrade Institutional Management	Agriculture Directorate, Faculty of Agriculture Agricultural societies	Ministry of Agriculture Governorate
<u>Industrial Pollution</u>		
-Ensure safe storage of hazardous materials and safe disposal of hazardous wastes	Industrial zones, cities councils, Environment Dept	Governorate, MSEA, Ministry of Industry
-Reduce gaseous emissions and particulate matter from major industrial facilities (50%)	Industrial zones, cities councils, Environment Dept	Governorate, MSEA, Ministry of Industry
-Enhance government capacity in industrial activity management		

<u>Poor Environmental Awareness</u> -Raise environmental analysis of government sector employees and the North Sinai population -Improve service supply standards to enable population to follow sound hygienic practices	Environment Dept. Cities councils, NGOs Environment Dept. Cities councils, NGOs	Governorate, Ministry of Environment Ministry of Environment, Min. of Local Development, Min. of Housing
<u>Natural Resources</u> -Support planning and operation, support organization of work in mines and quarries -Ensure capacity building for the management of mines and quarries -Improve the conduct of EIA -Minimize the negative impacts resulting from the operation of mines and quarries	Quarries Dept., Environment Dept. Quarries Dept., Environment Dept, Cities councils Quarries Dept., Environment Dept, Cities councils Quarries Dept., Environment Dept, Cities councils	Governorate, Min. of Industry Ministry of Environment -Governorate, Environment Dept., Ministry of Environment - Governorate, Ministry of Environment, Min. of Industry
<u>Cultural Heritage</u> -Support the management of cultural sites of ecological significance	Higher Council for Archeology, North Sinai governorate, Regional Organization for Tourism Activation	-Ministry of Culture, Ministry of Tourism

-Support Capacity building	Higher Council for Archeology, North Sinai governorate, Regional Organization for Tourism Activation	Higher Council for Archeology, Ministry of Tourism
-Enhance preservation of cultural heritage	Higher Council for Archeology, North Sinai governorate, Regional Organization for Tourism Activation	Higher Council for Archeology, Ministry of Tourism
<u>Biodiversity Protection</u>		
-Develop a nature conservation and biodiversity protection program	EEAA, Environment Dept., Governorate	MSEA, Ministry of Agriculture, Suez Canal University
-Natural Protectorates Management	Al-Zaraneeq protectorate, Environment Dept.	MSEA, Governorate
-Minimize Environmental Risks and Threats	-Environment Dept. / Crisis Management	MSEA, Ministry of Foreign Affairs, Ministry of Local Development, Governorate

9- Environmental Action Plan Cycle

9-1 Following up the activities

EAP was designed to allow for measuring and regular follow up of the development of environmental activities of agreed priorities.

Activities of priority environmental issues were identified and goals were set up, through which the success of such activities can be measured. Therefore, it is

necessary to design simple and effective follow up system to help measuring the development in activities.

Outcomes of follow up shall be submitted to the Executive Council of the governorate instead of the Higher Committee for Environment. The Council shall also update EAP issues according to changes as time goes on.

9-2 Annual assessment

“Environmental Status” report shall be developed and submitted to the Environmental Higher Committee annually and shall include a summary on:

- Achievements in the agreed upon activities (implementation).
- Achieved environmental improvement as a direct result of achieving EAP activities.
- Areas that need more attention due to poor performance or obstacles.
- Recommended necessary changes due to changing priorities or environmental conditions.

EAP Coordinator in the General Department for Environmental Affairs in the governorate should coordinate the development of this report in cooperation with Environmental Offices and environmental communication representatives working in the governorate. NGOs and private sector as well as popular leaderships should participate in the evaluation process.

9-3 EAP as ongoing process:

EAP shall be effective and realistic to ensure its sustainability. Also, policies, activities and targets incorporated in EAP shall be updated in addition to keep consulting with concerned parties, so EAP can reflect the changes of local conditions. In addition, learned lessons should be documented in the EAP follow up reports so as to make improvements in the future actions.

In the EAP circle, the following shall be considered:

- Developing and updating detailed implementation plans (3-5 years) and budget of required priority activities annually.
- Monitoring and evaluating achievements and implementation performance.
- Evaluating implementation obstacles and identifying alternatives to achieve the goals.
- Continue consultations with main and secondary concerned parties and reflecting their views and support for the coming environmental plans.
- Identifying the necessary new activities due to changing conditions (like laws and/or new standards).
- Ongoing attempts to attract external investments either from the government, private sector or donor agencies.
- Complying with technological development that can contribute in providing solutions of economic feasibility and effectiveness for the environmental problems.
- Responding to variable requirements of institutional support and capacity building.

10- Conclusion

All main concerned parties have participated in developing EAP to agree on the following:

- Priority issues.
- Main activities and procedures to be taken at the governorate and markazs level by governmental, industrial and private sectors, in addition to number of NGOs and CDAs.
- Basic requirements for institutional support for all main agencies.
- Public awareness and required training courses.
- Tasks of leading organizations and main agencies.
- Needs to develop accurate budgets for the agreed development.
- Required ongoing environmental monitoring and planning.

Concerned parties are expected to participate in implementing the activities and operations of EAP.

11- Desired benefits from implementing EAP:

Benefits
• Improved health/ decreased mortalities. • Better level of training and experience to EMU staff. • Promoting citizens' feeling of ownership/ streets clean-up. • Mitigating environmental risks. • Better training on environmental issues. • Wider community participation. • Providing opportunities to increase profits. • Providing more job opportunities • Increasing opportunities of funding from donor agencies. • Increasing cost recovery opportunities of infrastructure and environmental services. • Increased technology transfer. • Providing safe and improved irrigation water. • Improved agro soil drainage and soil protection.

12- Annexes:

Annex 1: Statement of the participants in developing EAP.

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Participated in the preparing:

- 1) **Mohamed Sleem Azab.**
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- 5) **Samir Ibrahim Hegazi.**
- 6) **Ahmed Mohamed el-Masri Zaki.**
- 7) **Ezz el-Din Amin Shaker – General Manager of Information Center.**
- 8) **Khairya Mohamed Mahmud, Information Center.**
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- 1) **Kamla Refai Hemdan.**
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- **First Undersecretary/ Ahmed Salah el-Din Tawfik – Secretary General of the governorate**