6 Coastal and Marine Zones

Introduction

The Arab Republic of Egypt enjoys a vital strategic location. Its northern border is the Mediterranean Sea, and its eastern border is the Red Sea, which give it a special significance from the bio-diversity point of view as a coastal zone, and as a sensitively diversified ecosystem. The shoreline of the Arab Republic of Egypt is about 3,000 kilometers long (calculated on a baseline). It is about 1,150 kilometers long on the Mediterranean and about 1,850 kilometers long on the Red Sea.

Marine and Coastal Zones in The Arab Republic of Egypt

Egypt's coastal zone is defined as the range of marine environment covering the territorial waters, and the range of land extending inwards that is affected by or affects the marine environment, and not less than 30 kilometers in desert areas unobstructed by topographic obstacles. In the Delta depression, this range extends up till contour line +3 meters.

Eleven coastal Governorates surround the Egyptian coasts, most of whose coasts are directly exposed to sea-waves. The city of Alexandria is the most populated of those governorates (about 4 million inhabitants).

The marine and coastal regions in Egypt are of strategic importance to all Egyptians. Figure (6-1) shows that 21.9% of Egypt's population lives in coastal zones due to the availability of nutritional resources and raw materials, which are the basis of economic development. The coastal zone is also a vital route for maritime transport and trade. Also available in it are the main environmental resources and locations, which are a major entertainment destination and tourist attraction.

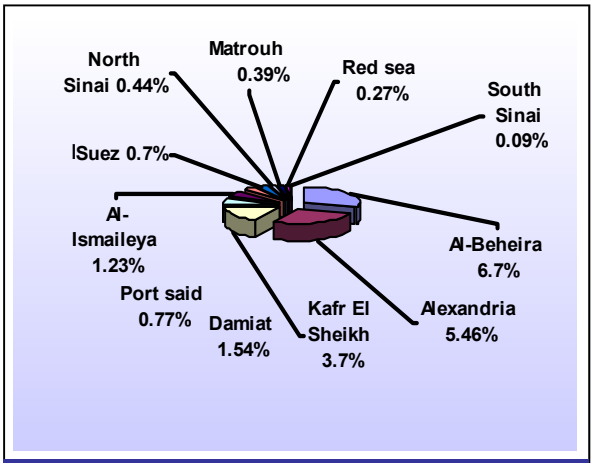


Figure (6-1) The Population Distribution of The Coastal Governorates in Egypt (Percentage of The Total Egyptian Population)

Source: Annual Statistical Book (2005)

The River Nile discharges its water into the Mediterranean Sea through two branches (The Damietta and The Rosetta Branches) in addition to a network of agricultural drains that discharges mostly indirectly, through the northern lakes of Al-Manzalah, Borollos, Edku and Mariout.

Picture (6-1) The Mediterranean Sea

The Mediterranean coastal zone includes a number of major cities such as Alexandria, Port Said and Damietta, in which various industrial activities are practiced. The Mediterranean coastal zone is also an internal tourist attraction zone especially during summer time.

The Red Sea coastal zone, on the other hand, is characterized by being located in a belt of dry regions that are at high altitude, whose sea is very saline and whose weather is quite hot. In spite of the pressures exerted by salinity and high temperatures on natural resources, such conditions in the presence of the rocky and stony abodes, permit the formation, growth and flourishing of coral reefs. This is what gives the Red Sea its special status of environmental diversity and tourist attraction.

Picture (6-2) The Red Sea

The Red Sea is divided into three main regions, namely, the main basin which is 1,350 km long and 270 km across in average, and 524 meters deep in average. Its depth goes down to more than 4,000 meters in certain areas. The second part is the gulf of Suez which is 300 km long and 20 km wide in average and 30 meters deep in average. It is wholly within the territorial waters of Egypt. It is characterized by a flat sandy bottom. The third part is the Gulf of Aqaba which is about 250 km long, of an average width of 20 km and is characterized by a sloping bottom, and its depth in most areas is more than 2000 m. It is located in an area of adjacent international borders.

The coasts of the Red Sea and its two gulfs are characterized by a most fragile and sen-

sitive ecosystems that encompass a wide environmental diversity. Corals, mangroves, its algea cover, ornamental fish and wild life generally represent a basic component of international tourist attractiveness of this region. International and local tourism that the Red Sea attracts represent a considerable part of the national income. Not less important are the industrial development in the city of Suez and the oil and gas resources that exist there too.

Pressures and Problems Threatening Coastal and Marine Environment

Coastal zones are exposed to many pressures, as they are linked with various developmental activities and various types of pollution resulting from them. The various developmental activities caused several environmental hazards that resulted in the disturbance of certain ecosystems, and in downgrading some tourist regions. Table (6-01) indicates that various activities practiced in coastal zones in general are being developed with special emphasis on agriculture and fisheries in the Mediterranean Sea.

Table (6-02) shows that the governorates suffering most from the phenomena of degradation of coastal zones are Alexandria and Suez. The governorates least suffering are Marsa Matrouh and South Sinai. Priorities regarding the problems facing coastal zone governorates are diverse. But the outstanding fact is that change in the coastline is the major problem facing the coastal Mediterranean governorates.

Table (6-03) indicates that coastline change is the most widespread high profile problem facing the governorates located on the Mediterranean Sea. Next to it come pollution problems, then sanitary drainage and solid waste management problems.

Picture (6-3) The Arab Republic of Egypt

Table (6-1) Development Priorities in Coastal Governorates as Per The Questionnaire (2005)

Governorate	Tourism	Industry & Energy	Maritime Transport	Fisheries	Agriculture
Mediterranean Sea	2	2	2	3	3
1. Marsa Matrouh	3	2	2	2	3
2. Alexandria	3	3	3	2	2
3. Al-Beheira	2	3	1	3	3
4. Kafr El-Sheikh	2	2	1	3	3
5. Domiat	2	3	3	3	3
6. Port Said	2	2	3	3	2
7. North Sinai	2	1	2	2	3
Red Sea	2	2	2	2	2
1. Port Said	2	2	3	3	2
2. Ismaileya	1	3	2	3	3
3. Suez	2	3	3	2	2
4. South Sinai	3	1	2	1	2
5. Red Sea	3	1	1	2	1

1= Slight Interest 2 = Medium Interest 3 = High Interest

Table (6-2) Causes of Deterioration of The Coastal Environment from The Viewpoint of Coastal Governorates (2005)

Governorate	Sanitary Drainage	Solid Waste	Air Pollution	Chemical & Oil	Nutrient Salts	Change of Shore Shape	Overall Indicator
Mediterranean Sea	2	2	2	2	2	3	
1. Marsa Matrouh	1	2	1	1	1	2	1
2. Alexandria	3	3	3	3	3	3	3
3. Al-Beheira	2	2	2	2	2	3	2
4. Kafr El-Sheikh	2	3	2	1	2	2	2
5. Domiat	2	2	1	3	2	3	2
6. Port Said	3	2	2	3	2	3	2
7. North Sinai	2	1	1	2	1	3	2
Red Sea	2	2	2	2	2	2	
1. Port Said	3	2	2	3	2	3	2
2. Ismaileya	2	2	1	1	2	1	2
3. Suez	3	3	3	3	3	1	3
4. South Sinai	1	2	1	1	1	1	1
5. Red Sea	1	1	1	2	2	2	2

1 = Low 2 = Medium 3 = High

Table (6-3) The Effect of The Deterioration of The Coastal Environment on The Coastal Governorates

Factor / Effect	Sanitary Drainage	Solid Waste	Air Pollution	Chemicla & Oil Poll.	Nutrient Salts	Change in Coast Shape
Average	5	6	3	3	6	3
Ineffective	3	2	6	4	3	3
High	3	3	2	4	2	5

1 = Low **2 = Medium** **3 = High**

Monitoring Coastal Environment Quality

Ministerial Decree no. 64 / 1966 was issued by the Minister of Health regarding the criteria for beaches suitable for swimming. However, due to the non-existence of marine water quality criteria, a number of indicators was selected reflecting the quality of the marine environment along the Egyptian coasts. This group of criteria includes: total nitrogen, total phosphorus, chlorophyll A, total coliform and faecal streptococci. The results of monitoring the said criteria during 2005 show the following:

Figure (6-02) shows that the highest concentration of nitrogen is in the Gulf of Suez, especially offshore the cities of Suez and Ras Ghareb and offshore ports in general.

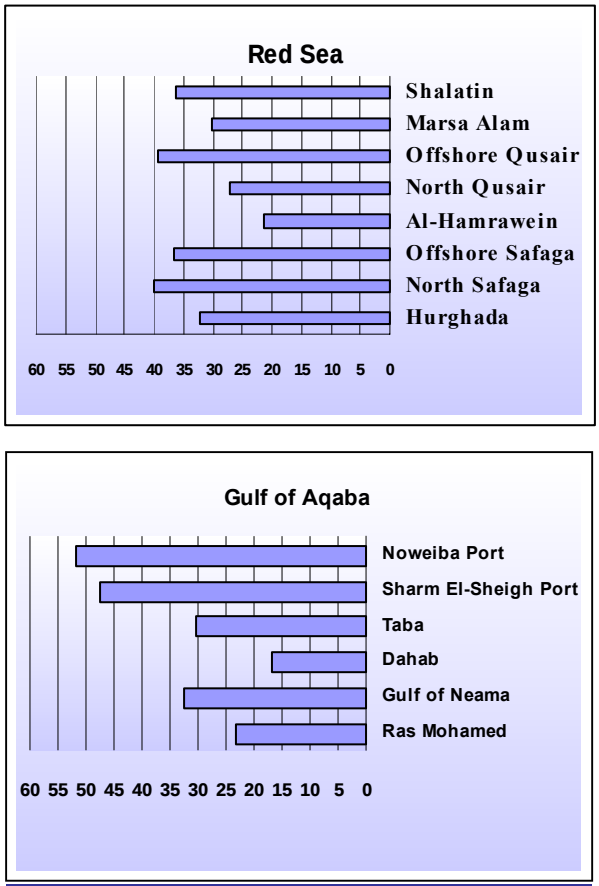
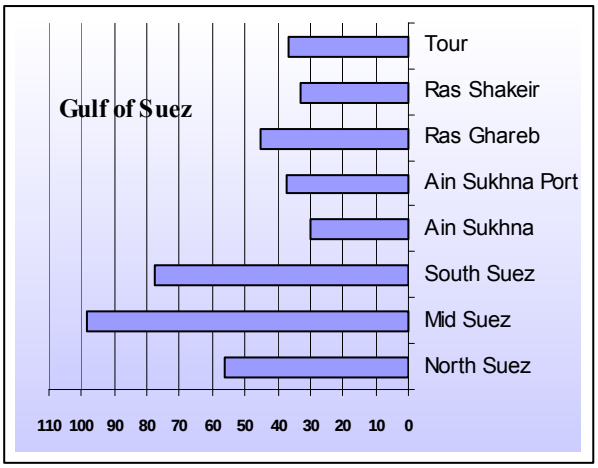


Figure (6-2) Total Nitrogen mg/l

Source: Program for monitoring the marine water quality of the coastal environment – EEAA Environment Quality Sector



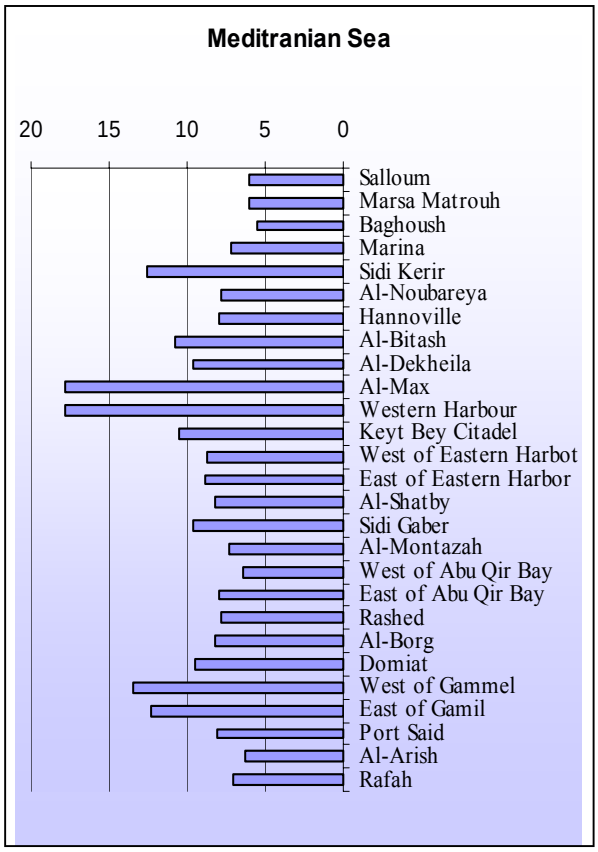


Figure (6-2) Continued Total Nitrogen mg/l

Source: Program for monitoring the marine water quality of the coastal environment – EEAA Environment Quality Sector

As for total phosphorus, as shown in Figure (6-3), the highest concentrations were recorded offshore ports and some of the outlets of lakes.

The effect of the nutritional salts' load continuously discharged into the marine environment was the abnormal growth of algea, represented in the concentration of Chlorophyll-A. The highest concentrations were recorded in the Mediterranean Sea, especially offshore the Gameel outlet (Al-Manzalah Lake outlet) and offshore Al-Max and Al-Dekheilah areas (the Mariout Lake water is discharged to the Sea through Al-Max pumping station). In other monitoring areas, the concentrations were normal and expected, except at the Suez monitoring points. There the effects of sanitary drainage were reflected as the higher concentration of Chlorophyll-A.

The high values (quantities) of nutritional salts and Chlorophyll-A in the Mediterranean are expected, since agriculture is the main vocation of the populous community in coastal zones. The abnormal values however, are related to partially treated wastewater sources.

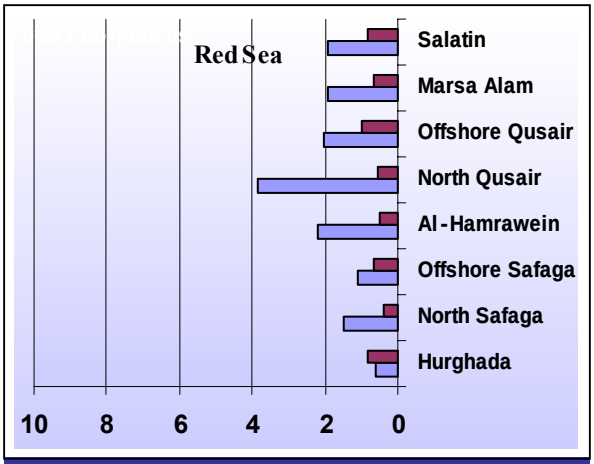
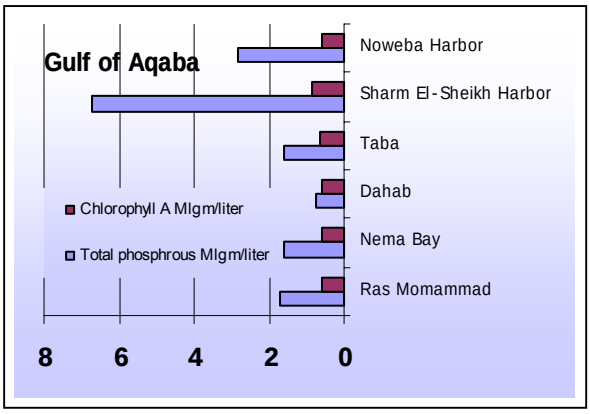
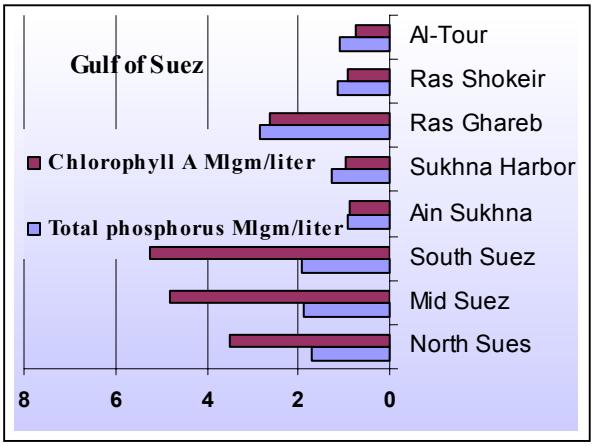


Figure (6-3) Total Phosphorus and Chlorophyll-A

Source: Program for monitoring the marine water quality of the coastal environment – EEAA Environment Quality Sector





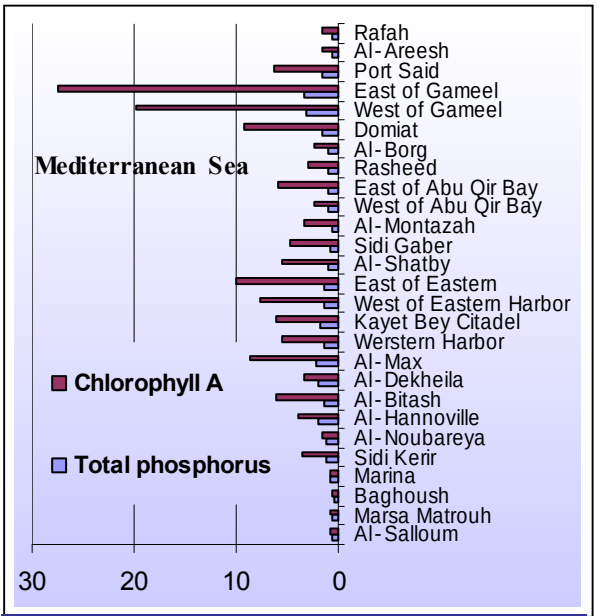
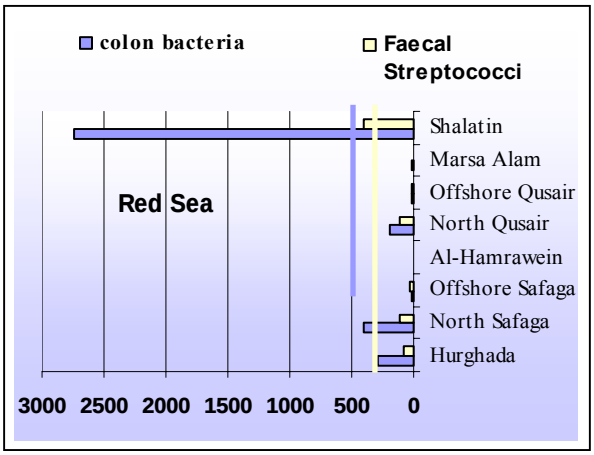


Figure (6-3) Continued Total Phosphorus and Chlorophyll-A

Source: Program for monitoring the marine water quality of the coastal environment – EEAA Environment Quality Sector

This conclusion is supported by the results of monitoring bacteria (Figure 6-4). According to the criteria of water quality in entertainment areas issued by the Ministry of Health as per Decree no. 64 /1996, it is a fact that most of the Egyptian coastal waters are not contaminated with Total Coliform and Faecal Streptococci. The contaminated areas are those linked with untreated or partially treated wastewater such as Al-Max and Al-Dekheilah areas, or with places with a number of frequenters exceeding the absorption capacity of such beaches, as it is the case with the Neema Gulf and the Agamy-Bitash beaches.



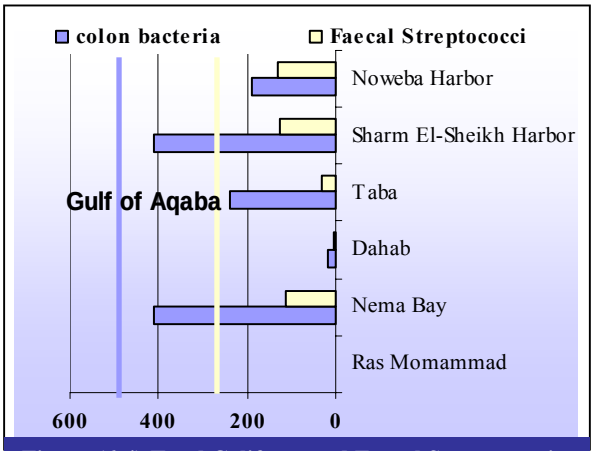
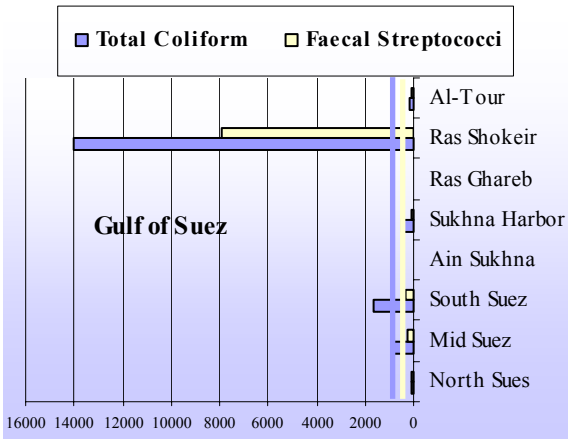


Figure (6-4) Total Coliform and Faecal Streptococci – The Vertical Lines Indicate The Limits of Water Quality

Source: Program for monitoring the marine water quality of the coastal environment – EEAA Environment Quality Sector



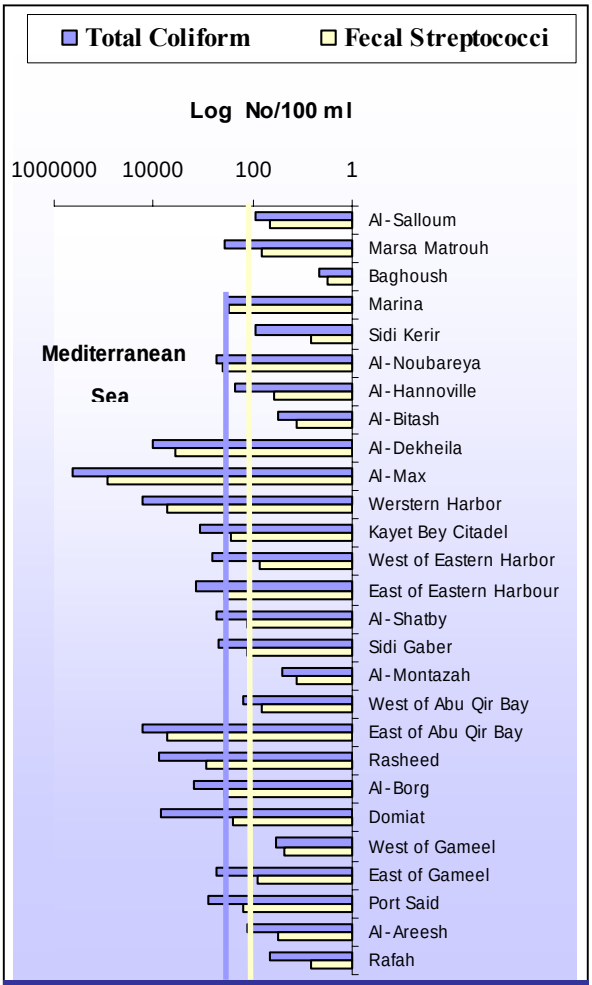


Figure (6-4) Continued Total Coliform and Faecal Streptococci – The Vertical Lines Indicate The Limits of Water Quality

Source: Program for monitoring the marine water quality of the coastal environment – EEAA Environment Quality Sector

Marine Fisheries

Egypt's overall production of fish, according to the 2004 statistics, is about 875,990 tons, of which 116,560 tons (13.3% of the overall production) are from the 3,000 km long coasts, calculated from a baseline). Although the fishing areas (until the depth of the continental shelf) exceed 87,000 sq km, sea fish production (all kinds included) is no more than 116,560 tons, as shown in Table (6-4).

Table (6-4) Egypt's Fish Production from Marine Fisheries (2003)

Location	Production (tons)	Location	Production (tons)
Mediterranean Sea		**Gulf of Suez**	
Matrouh & Salloum	379	Gulf of Suez	19,763
Alexandria	4,560	Abbatoir (Suez)	7,450
Abu-Qir	672	Al-Tour	4,953
Al-Maadeya	12,154	Ras Ghareb	43
Rasheed	5,000	**Red Sea**	
Borollos	1,517	Hurghada	12,603
Ezbet Elborg	17,900	Safaga	700
Port Said	13,400	Al-Qosair	2,150
Al-Areesh	4,042	Bernis	7,315
Gulf of Aqaba		Abu-Ramada	407
Sharm El-Sheikh	103	Shalatin	1,172
Dahab	122	**Grand Total**	**116,560**
Noweiba	155		

Figure (6-5) shows that most of Egypt's fish production is from fish farms, which produce 47% of the national production, next is fish from lakes and internal water bodies representing about 35% of the national production.

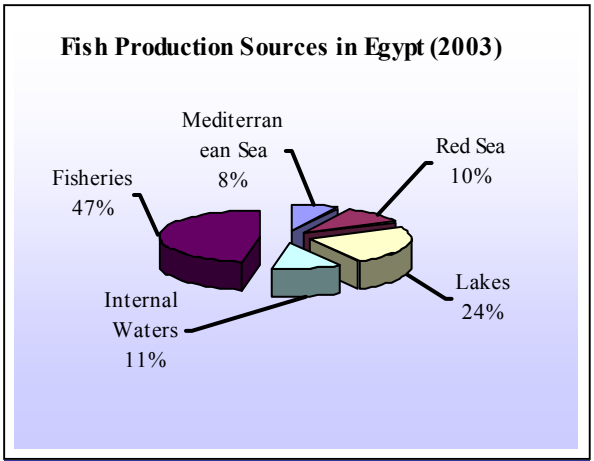


Figure (6-5) Sources of Fish in Egypt

Figure (6-6) shows the development of fisheries in Egypt from 1995 up to 2003. It indicates that marine and internal waterbody fish production increased very slightly, while the production of fish farms has significantly increased during that period.

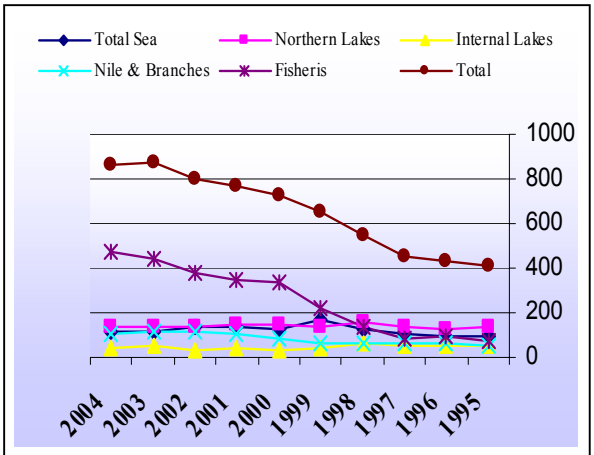


Figure (6-6) The Development of Fish Production in Egypt

Source: The Annual Bulletin of The General Egyptian Authority for Fish Wealth Development

Figure (6-7) shows that the number of fishing boats registered till 2004 was about 6,000 fishing boats, 3,954 of which are self-propelled by engines producing less than 100 horsepower, most of them being less than 10 meters long. The rest of the fishing fleet are sail boats or row boats. However, the percentage of fishing share is 21% of the overall marine fish production, Figure (6-8). Modern mechanized trawlers of more than 500 horsepower engines represent only 3% of the Egyptian fishing fleet. The number of officially licensed fishermen is about 27,550, Figure (6-9), but observations deduce that the number of non-licensed fishermen is a multiple of this number.

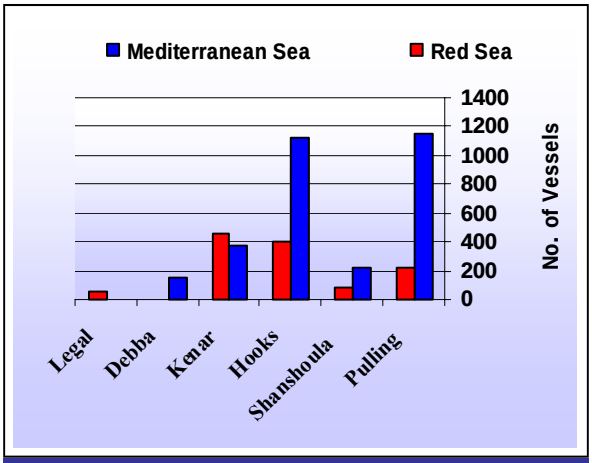


Figure (6-7) Number of Propelled Ships up to 2004

Source: The Annual Bulletin of The General Egyptian Authority for Fish Wealth Development

Methods of fishing differ according to location. In The Mediterranean Sea, fishermen use deep trawler, long net, gill net and purse sein. This is in addition to a number of conventional shore-side fishing methods using smaller thrower nets and small pieces of woven string. The Mediterranean Sea produces more than 30 kinds of fish, most importantly are sardines, anchovies, Bouri, Denies, Barbouny, Sepia, shrimp and also

other kinds of carnivorous fish such as the Sea Bass, Qarous and Miass. There is very limited production of migrating fish because the Egyptian fishing fleet cannot exploit the economic territorial zone, and concentrates only on the continental shelf zone.

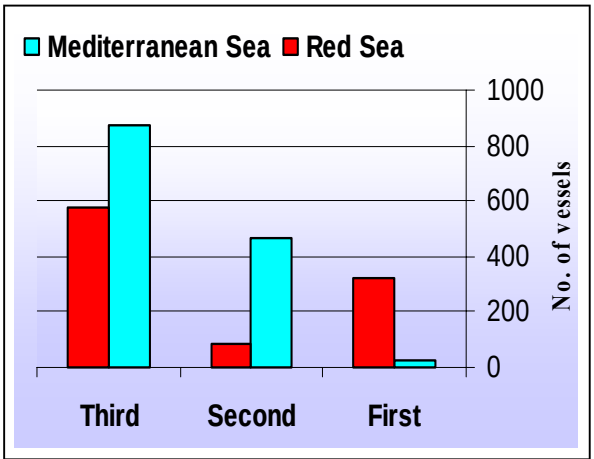


Figure (6-8) Number of Sail Boats classified According to The License Level

Source: The Annual Bulletin of The General Egyptian Authority for Fish Wealth Development

The fishing fleet of the Red Sea depends mainly on hooks in most of its regions due to the coral and the many rocky areas. Trawling or thrower nets cannot be utilized except in very limited places such as the Gulf of Suez. Carnivorous fish represents a large percentage of fish production, the most frequently encountered are the Sea Bass, and the Sho'our. There is a season during which the Sho'our fishing is prohibited (from the first of June till the end of September). Aggressive fishing of Sea Cucumber has started depleting its strategic stock, turning this kind into an endangered species. Hence, a decree was issued prohibiting its fishing or trading.

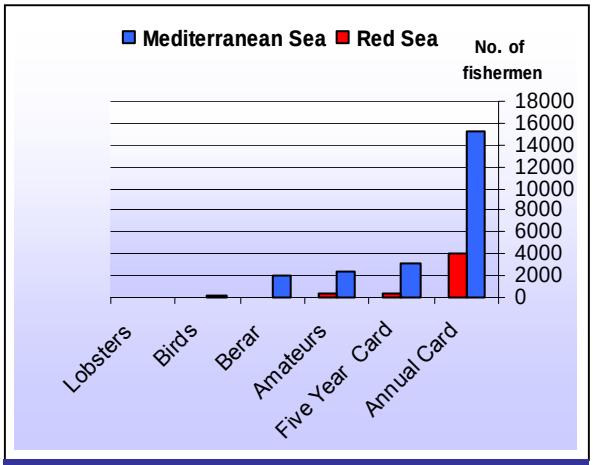


Figure (6-9) Other Types of Licenses

Source: The Annual Bulletin of The General Egyptian Authority for Fish Wealth Development

Risks Menacing Coastal and Marine Environment

There are several sources that threaten the Egyptian marine and coastal environment. The most prominent and most effective is pollution emitted from land sources and erosion processes, especially in the Mediterranean coasts besides the pollution caused by maritime transport activities and the exploration and exploitation of petroleum resources.

1- Erosion and Precipitation

The Nile Delta was formed throughout millions of years of precipitation of silt carried by the flood of the River Nile. After the modernization of the Egyptian irrigation system at the beginnings of the last century (1900-1964), the quantities of water carrying precipitants decreased. This decrease was prompted by agricultural expansion projects, such as the building of barrages and dams on the Nile stream. The building of the High Dam and the diversion of its course in 1964, prevented the passage of

the silt-loaded water that used to compensate the erosion caused by sea during the ensuing year. This resulted in a disturbance of the equilibrium of the Mediterranean coasts, leading to changes in the erosion and precipitation processes along the shore (Figure 6-10).

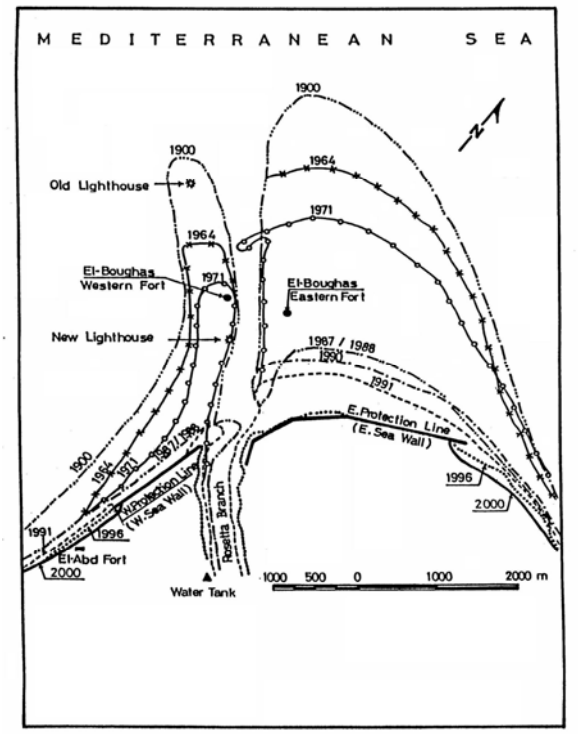


Figure (6-10) Erosion and Precipitation Processes

Increased development plans targeting the shoreline led to erosion in places that had reached the erosion limit, either naturally or through the application of necessary protection measures. The most outstanding example of erosion is that which occurred on the western coasts which can be chiefly attributed to the construction of roads and feeder dams, which prevented the precipitants from reaching the sea through the streams of valleys and floods.

Sand dunes created by the sea played an important role in preserving the coastal system. The destruction of the coastal sand dunes, which constitute a natural system for building shorelines and safeguarding their integrety, has had a considerable effect on the creation of erosion problems in the western part of the northern coast. This destruction resulted from miscalculated activities to develop those regions.

Picture (6-4) Sand Dunes

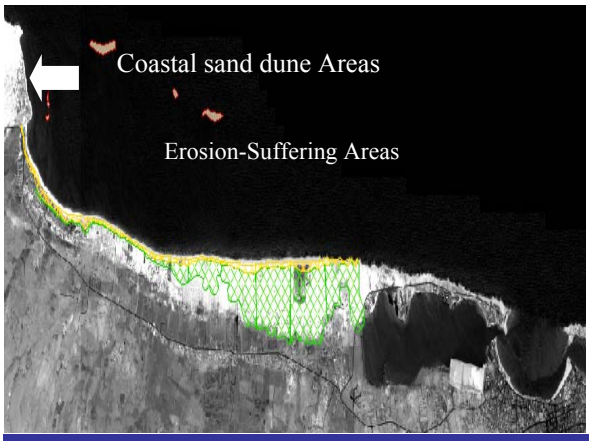
One of the problems that also afflicts this region is the problem of erosion, by which the shoreline recedes to the land causing the loss of areas of land including buildings and infrastructure. This also allowed seawater to cover areas of land, causing its salinity to rise and eventually resulting in the devastation of areas of arable lands adjacent to the sea.

The problems related to erosion and precipitation may be summarized in the following points:

a) Exposure of the coastal roads (corniche) in Alexandria and Al-Areesh to considerable erosion. This prompted the Coastal Protection Authority to intervene, taking emergency measures to prevent further degradation of those roads. However, the given protection measures produced undesirable side-effects since they were hastily implemented and in the absence of in-depth study.

b) Some of the changes observed in the direction and intensity of waves may be

attributed to climatic changes. These changes caused the erosion and flooding of the Eastern Harbor in Alexandria.



Picture (6-5) Erosion-Suffering Areas As a Result of The Development of Sand Dune Areas

Source: The planning project for the management of the shoreline region between km 60 east of Marsa Matrouh and km 60 west of it. The Egyptian General Authority for shore Protection

C) Tourist development in the coastal sand dune region West of the Mediterranean Sea has led to severe erosion in a popular beach known as Badr Camp.

2. Pollution from Land Sources:

There are several industrial companies that have not yet adjusted their positions in compliance with environmental regulations till 2005 notwithstanding efforts of the Egyptian Environmental Affairs Agency and international and regional organizations concerned.

Table (6-5) shows the main non-conforming pollution sources in Alexandria.

Table (6-5) Industrial Waste Discharged into The Mediterranean from Certain Sources in Alexandria during 2005

Location	Oils & Fats mg/l	Chaemical Oxygen Demand mg/l	Biological Oxygen Demand mg/l
Abu Qir Fertilizer Co.	2	115	42
Rashipetco Petroleum Co.	7	60,000	-
Alexandria Petroleum Co.	9	74	12
Alexandria Sodium Bicarbonate Co.	8	28	10
Abu-Qir Power Plant	2	97	13
Sidi Kerir Power Plants 1 & 2	1	45	9
Liquified Natural Gas Co.	3	40	19
National Iron & Steel	1	50	10
Standard Criteria	15	100	60

Source: The Regional Branch of West Delta – Egyptian Environmental Affairs Agency (2005)

Table (6-6) indicates the main non-conforming sources of pollution in Suez. Several measures were taken towards non-conforming entities, and it is expected that this pollution will be done with in the coming few years.

Table (6-6) Industrial Waste Discharged into The Gulf of Suez from Certain Sources in The Suez Governorate during 2005

Location	Biological Oxygen Demand mg/l	Chaemical Oxygen Demand mg/l	Oils & Fats mg/l	Total Coliform No. / 100 ml
Ataqa Sanitary Drainage Treatment Plant	58	84	—	3,350
Trust Textiles	242	872.5	—	—
Ataqa Power Plant	11	54.5	3	—
Ataqa Industrial Effluent Treatment Plant	213	350	144.8	—
Nasr Fertilizers Co.	20.5	25.7	10	—
Nasr Petroleum Co.	1	83.7	5.87	—
Suez Petroleum Co.	23	113.5	57.5	—
Standard Criteria	60	100	15	400

Source: Regional Branch of Suez Canal Region and Sinai - Egyptian Environmental Affairs Agency (2005)

The sanitary drainage problem still persists in certain areas. The Alexandria Governorate discharges the sanitary drainage waste into the Mariout Lake after only preliminary treatment. The waste is then discharged into the Mediterranean by means of the Max pumping station.

Sanitary drainage is one of the major sources causing the degradation of the quality of the Egyptian coastal environment. Table (6-7) indicates that there are more than 12 major cities on the Mediterranean coast whose sanitary drainage waste is discharged into the sea. Only six cities have preliminary wastewater treatment facilities, while the facilities of two more are under construction. Facilities are planned for the rest of the cities, but no action has been taken yet.

Picture (6-6)
Direct Discharge into The Sea

Table (6-7) Sanitary Drainage Discharged into The Mediterranean Sea from Major Coastal Cities

Data / City	Population X 1,000	Population Served by Treatment Plants x 1,000		Treatment Plant	Year Operational	Operational Level	Treated Water Cu. m. / day	Destination of Treated Wastewater
		Networks & Plants	Network Only					
Alexandria	3,800	2,800	1,000	Yes	1994	Primary	132,000	Mariout Lake
Balteem	39		39	Under Construction		Dual	10,000	Not specified
Borg El-Arab	49		49	No				
Domiat	125	125		Yes	1994	Dual	60,000	Manzala Lake
New Domiat	95	95		Yes	2000	Dual	1,900	Manzala Lake
Al-Areesh	150	150		Yes	1982	Dual	12,000	The Desert
	20		20	No				The Desert
Al-Dabaa	44		44	No				
Al-Hammam	38		38	No				
Marsa Matrouh	92		92	Yes	2002	Dual	60,000	Re-Use
Port Said	500	500		Yes	1997	Dual	12,000	Manzala Lake
Rasheed	185		180	Under Construction			92,000	Re-Use
Sidi Barrani	24		24	No				

Source: El-Sayed, M. K. 2005. National Action Plan In the Framework of the Implementation of the SAP to address Pollution in the Mediterranean from Land-Based Activities. Report presented to UNEP/MAP/ MED POL, October 2005.

There are many and diverse sources of nutrient salts, so they cannot be separated from untreated wastewater and agricultural drainage, in addition to some sources of industrial waste. Table (6-08) indicates the estimated nutrient salts reaching the marine environment of the Mediterranean Sea with their sources unspecified.

The table also indicates the massive quantity of nutrient salts and colon bacteria reaching the Mediterranean Sea environment due to the absence of waste treatment plants. This estimation is supported by the quantity of the Bio-oxygen, whose ordinary source is sanitary drainage in the first place or industrial drainage in many cases.

Table (6-8) Estimated Loads of Pollutants Discharged into The Mediterranean Sea By Maritime Transport

Dissolved Oxygen 1,000 tons / year			Nitrogen 1,000 tons / year			Phosphorus 1,000 tons / year			Coliform Billion Cultures / year	
Treated	Un-treated	Total	Treated	Un-treated	Total	Treated	Untreated	Total	Treated	Un-treated
8.3	37.1	45.4	4	11.9	15.9	0.6	1.8	2.4	10.1	59.3

3. Maritime Transport

As previously mentioned, Egypt is bordered by the Mediterranean Sea from the north and the Red Sea from the east, and a major maritime canal passes through it, namely, the Suez Canal. There is also the Sumed Pipeline, which transfers crude oil from the Red Sea to the Mediterranean Sea. The quantity of crude oil transferred annually through the Sumed pipeline is about 117 million tons.

Figure (6-11) shows that there are 57 harbors in Egypt on both the Mediterranean and the Red Seas. Of these harbors, 15 are trading harbors, 14 are petroleum harbors, 9 are mineral harbors, 11 are tourist harbors and 8 are fishing harbors, in addition to 10 jetties.

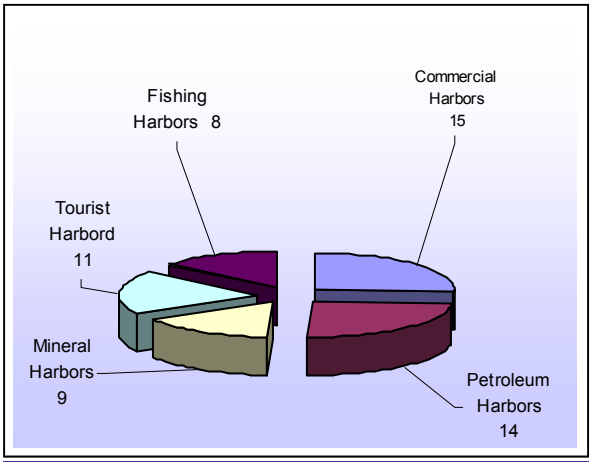


Figure (6-11) Distribution of Egyptian harbors according to type

Source: Maritime Transport Information Bank (2006)

Figure (6-12) indicates that 15,636 vessels of diverse types have entered the Egyptian harbors.

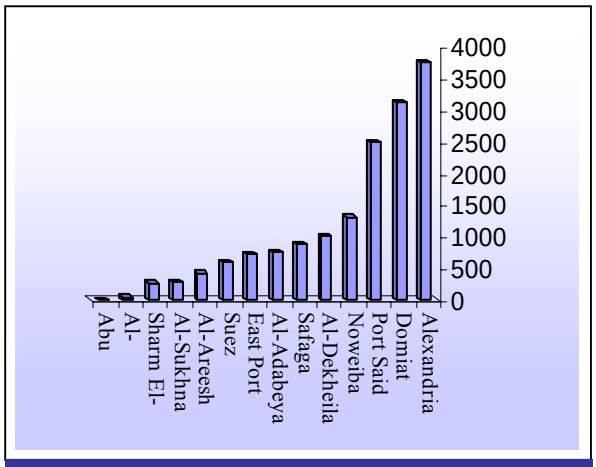


Figure (6-12) The Number of Vessels Entering Egyptian Harbors in 2005

General cargo vessels occupy a considerable share of the types of vessels that called on the Egyptian ports during 2005, next come container carriers and passenger ships.

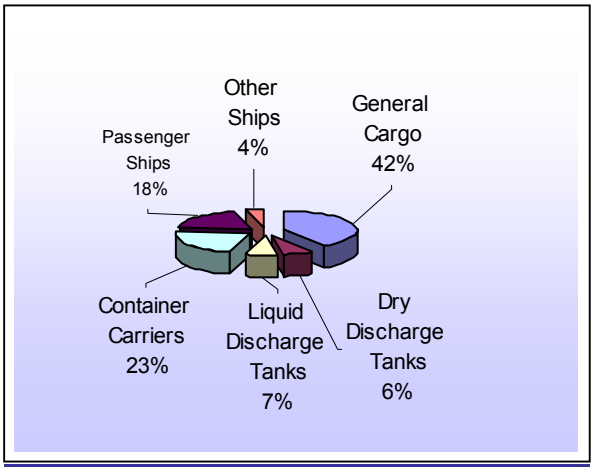


Figure (6-13) Percentage of The Types of Vessels Calling on Egyptian Harbors (2005)

Source: Maritime Transport Information Bank

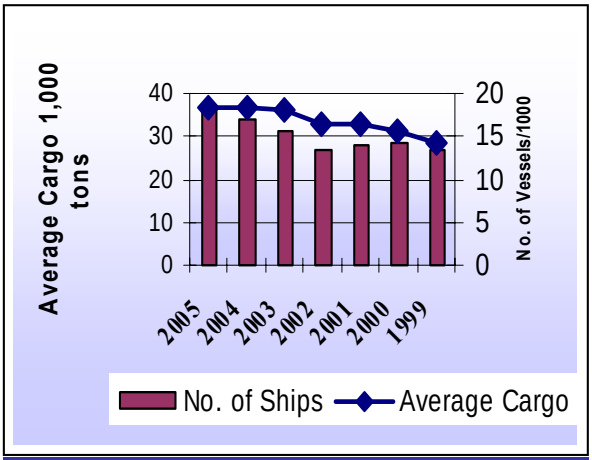


Figure (6-14) The Number and Average Overall Tonnage of Vessels Crossing The Suez Canal

Source: Economic and Financial Indicators – Ministry of Trade and Industry – June 2006

Table (6-9) shows that 18,176 ships have crossed the Suez Canal, carrying 671 million tons of cargo. It can be observed from figure (6-14) that there is an indication of a rise in the number of vessels crossing the Suez Canal, and that their average cargo is also on the ascent.

Taking into account the requirements of maritime lines and maritime transport activities mentioned above, and the deficiency of harbor in receiving oil, solid and sanitary waste, it is possible to estimate the size of the problem facing the maritime transport industry in Egypt, thus forestalling Egyptian harbors to be listed among the environmentally non-compliant harbors.

Table (6-10) indicates that out of 56 identifiable-source accidents, 24 accidents are closely linked with the waste produced from maritime transport, in addition to oil pollution accidents whose sources are unidentified, mostly illicit discharge of bilge water and oily waste.

Table (6-9) The Number of Vessels Crossing The Suez Canal during The Period from 1999 and 2005, and Their Overall Tonnage

	1999	2000	2001	2002	2003	2004	2005
No. of Vessels	13.490	14,141	13.986	13,447	15,667	16,850	18,176
Tonnage (million tons)	385	439	458	445	567	621	671

Source: Economic and Financial Indicators – Ministry of Commerce and Industry – June 2006

Table (6-10) Reported Marine Pollution Accidents during 2005

Item	Oil Pollution	Pollution by Other Substance	Total Accidents
Identifiable Source Accidents	32	24	56
Unidentifiable Source Accidents	29	-	29
Total Accidents	61	24	85

Source: Central Operations Room for Combating Marine Pollution - Egyptian Environmental Affairs Agency

4. Oil & Gas Production

Egypt owns a huge stock of natural gas. Confirmed studies indicate that Egypt's resources of natural gas have jumped from 6.35 trillion cubic feet of gas in 1982 to 67 trillion cubic feet in 2005. This encouraged oil and gas investors to direct their investments towards the exploration and production of natural gas (in Egypt), alongside the establishment of the infrastructure necessary for production and transportation. Figure (6-15) indicates the remarkable increase in Egypt's production of natural gas during the last 20 years. In 2005, Egypt's production reached 1500 billion cubic feet.

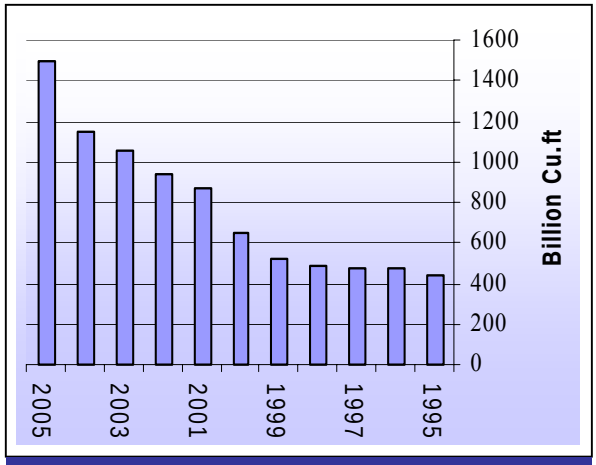


Figure (6-15) Natural Gas Production in Egypt (1995-2005)

Figure (6-16) shows that more than 68% of this production is from the coastal environment, especially the Mediterranean Sea. This trend is expected to continue with Egypt's production of natural gas expected to exceed during 2006, over 2,000 billion cubic feet.

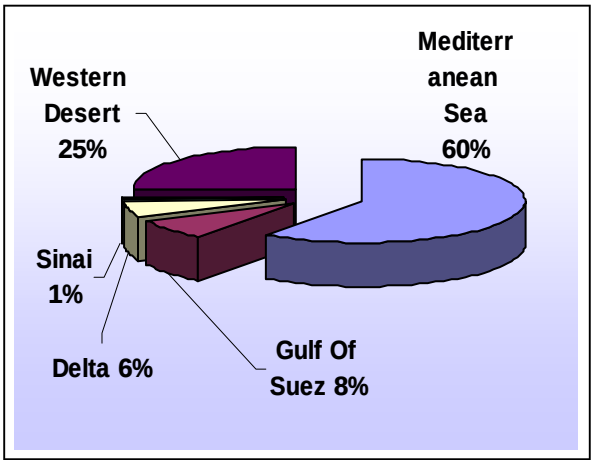


Figure (6-16) Locations of Gas Production (2004 – 2005)

This production encouraged the construction of new production sites and natural gas loading harbors on the Egyptian shores on the Mediterranean Sea.

Al-Beheira Company for Gas Liquefaction and the Edku Company for Liquefaction

and Shipping gas have a capacity of 3.6 million tons per annum. The Demiatta harbor for Natural Gas Shipping has an annual capacity of shipping 7.65 billion cubic meters of LNG per annum.

Picture (6-7) Demiatta Harbor

As for Egypt's production of crude oil, it is located mainly in the Red Sea, especially in the region south of the Gulf of Suez. Egypt's production of crude oil is about 700,000 barrels per day. It is however decreasing due to the increase in domestic demand, Figure (6-17). This led to over-consuming this non-renewable resource at the expense of the needs of generations to come.

Such production is obviously accompanied with an increase in exploratory well-drilling and production with related problems of drilling debris and the methods of their disposal, let alone maintenance programs that are not implemented by some companies. This negatively reflected on crude oil leakage accidents from pipelines extending hundreds of kilometers into the sea bottom, transferring crude oil from production wells to storage areas.

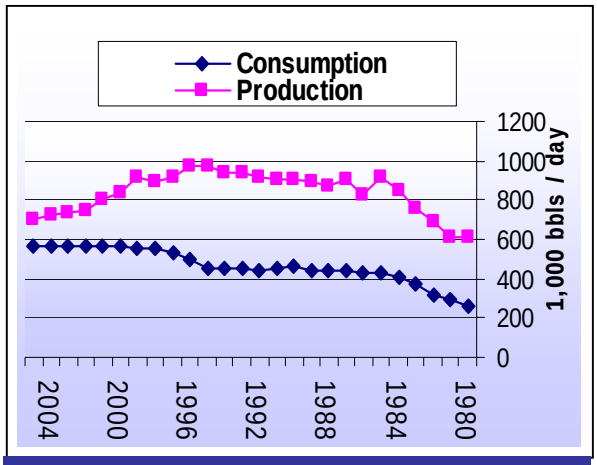


Figure (6-17) Egypt's Production and Consumption of Crude Oil

Figure (6-18) shows the number of pollution accidents resulting from petroleum and maritime transport activities. The number of accidents reported to the central operation room for combating marine pollution at the Egyptian Environmental Affairs Agency during 2005 amounted to 85 reports. Of these, 61 were oil pollution accidents.

Figure (6-19) indicates the extent of the impact of petroleum industries on the quality of water and sediments in the Suez region. It was also observed through a study conducted by the Maritime Science and Fisheries Institute that the western side of the Gulf of Suez is more polluted with oil than the eastern side. The study also reveals that natural conditions and the nature of the region play an important role in preventing pollutants from dispersing, as was the case in the Cabanon Beach in Suez.

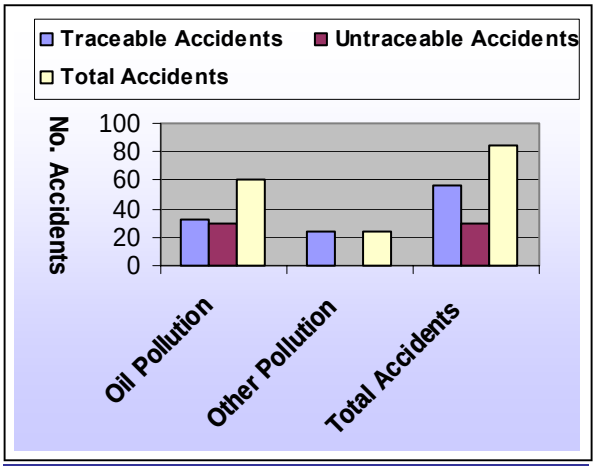


Figure (6-18) Pollution Accidents Reported during 2005

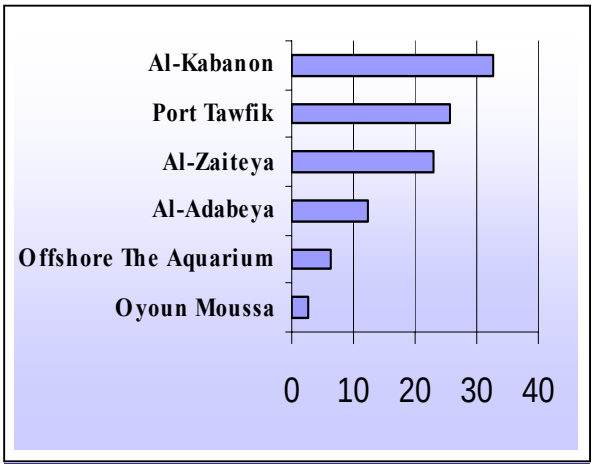


Figure (6-19) Content of Hydrocarbons (microgram / liter)

Measures Taken for the Protection of the Coastal and Marine Environment

Egypt's efforts to identify problems threatening the coastal environment were begun in the early nineties. These problems were clearly identified, root causes for their aggravation detected and measures to redress these causes adopted while necessary steps were taken for the remediation of the badly affected environmental systems, through:

1. Implementing monitoring programs as regards marine environment quality and pollutant- identification inspection.
2. Studies to sort out locations of intense pollution
3. Devising sectoral and national plans to prevent the pollution of the marine environment by different sources, through which environmental issues were specified, evaluated and prioritized respectively. The sectoral plans are to be updated up to 2010.

Table (6-11) shows the estimated cost of preventing the pollution of the Mediterranean Sea by sanitary drainage waste from Governorates on its coast as amounting to L.E. 1,5 billion.

Table (6-11) Estimated Cost of Prevention of Pollution of The Mediterranean Sea by Sanitary Waste				
Drainage Station (Secondary Treatment)	**Population (millions)**	**Capacity (cu. m. /day)**	**Proposed Disposal Method**	**Estimated Cost (Million L.E.)**
Port Fouad	0.69	37,000	Network and outlet to the sea	150
Alzobin Dest	0.167	37,000	Al-Manzala Lake	57
Al-Max – Al-Agamy	1.6	300,000	Network and outlet to the sea	650
Al-Amereya	1.3	300,000	Network and recycling	650
Total				**1,507**

Environmental Compliance Program

The Egyptian Environmental Affairs Agency, through a number of international and regional cooperation programs, such as the UNEP, the Dutch Government Program for Industrial Pollution Control (EPAP-I), the Global Environmental Facility (GEF) and the World Bank, has assisted these establishments by auditing the sources of industrial pollution on the Mediterranean Sea and the Gulf of Suez, to help provide adequate funding for them to comply with environmental regulations.

Table (6-12) shows most-polluting entities concerning the Gulf of Abu-Qir.

Table (6-12) The Entities That Most Pollute The Bay of Abu-Qir

Establishment	Projects	Cost (US $)
General Company for Paper Manufacturing "Rakta"	1. Treatment unit for the waste of paper producing machines 2. Burning the "Black Liquor" 3. Replacing the fuel oil with natural gas as a fuel for the boilers in the power plant	60,000,000
National Paper Factory	1. Treatment unit	8,000,000
Abu-Qir Factory for Organic Fertilizers	1. Nitrate recovery unit 2. Re-use of process water	14,000,000
Dye-Stuff & Chemicals Factory	1. Rehabilitation acid recover unit 2. Rehabilitation of the industrial waste water treatment unit 3. Natural gas connection 4. Drainage and cooling pipelines	7,500,000
Misr Rayon Factory	1. Recovery of chemicals 2. Re-use of process water 3. Recycling waste	5,300,000
Nutrition and Dairy Factory	1. Waste Recycle	5,300,000
Misr Factory for Chem	1. Monitoring grid 2. Recycling process water 3. Acid extraction 4. Treatment of waste water	3,000,000
Alexandria Company for Sodium Carbonate	1. Industrial waste water treatment plant, and the extraction of some high-value salts (calcium chloride) 2. Sanitary drainage treatment unit and separating the sanitary network from the industrial one. 3. Constructing a new superheater	4,500,000
Nasr Tanning Co.	1. Company is under liquidation, activities - crom extraction - waste water treatment unit	8,000,000
Alexandria Petroleum Refining Co.	1. Recycling water (DAF)	12,000,000
Amereya Textile Co.	1. Recycling water mixed with dyes 2. Upgrade of waste water treatment unit	7,600,000
Egyptian Petrochemicals Co.	1. Rehabilitation of the chemicals recovery unit	9,500,000
Amereya Refinary	1. Recycling waste water	12,000,000
Total		**156,700,000**

Future Plan 2007 – 2012

1. Devise a national strategy for integrated management of coastal zones around mid 2007. Its purpose is to coordinate national efforts in addressing coastal zone problems, and to produce a set of unified procedures and sound environmental principles to solve these problems.
2. Set specific water quality criteria targets for the marine environment, and work for their substantiation in the coming five years.
3. Re-design the coastal environment monitoring programs so as to reflect indicators of the quality of the coasts themselves, and not only marine waters.
4. Establish and publish measuring indicators of the quality of coasts and encourage the parties concerned to create a system that guarantees the continuity of flow of information.
5. Full cooperation with the maritime transport sector in establishing a national executive plan for preventing the pollution of the marine environment by maritime transport activities. Studies and observations indicate that there are many problems linked with maritime transport, harbor management activities and the handling of crude oil and chemical leakages during shipping accidents. Hence, this activity aims at putting in place an Egyptian mechanism for preventing pollution by such sources, and for dealing with accidents the very moment they occur.
6. Initiate a portfolio for the funding of marine environmental protection through national and international donors.
7. Encourage coastal Governorates to adopt the concepts and principles of sustainable development as a means to achieve prosperity without the depletion of available resources.
8. Egypt intends to apply the Exclusive Economic Zone (EEZ) philosophy in terms of exploiting and exploring petroleum resources, in developing fish wealth and in reactivating traffic through the Suez Canal upon planned development and expansion of the maritime channel. Consequently, the Egyptian Environmental Affairs Agency has started to establish an environment management system in the Exclusive Economic Zone (EEZ), especially regarding the management of renewable and non-renewable resources, the monitoring of illegal discharge of maritime waste and the waste resulting from the exploration and production of petroleum resources. It is noteworthy that the National Institute for Remote Sensing and Space Sciences has already kick-started the operation of the first Egyptian ground station for processing satellite imagery. Thus, very soon Egypt will be able to obtain satellite imagery over short periods of time, which will make it possible to trace violations in the Exclusive Economic Zone (EEZ).

References

(1) FISHERY COUNTRY PROFILE, FAO, January 2004.

(2) El-Sayed, M. K. 2005. National Action Plan In the Framework of the Implementation of the SAP to address Pollution in the Mediterranean from Land-Based Activities. Report presented to UNEP/MAP/MED POL, October 2005.

(3) ENVIRONICS, 2005, Pre Feasibility Study for Pollution Abatement from land based sources of pollution to Abou Quir Bay. UNEP/MAP/GEF Study.