Arab Rebuplic of Egypt

FEBRUARY 2012

ACRONYMS	
EEAA	Egyptian Environmental Affairs Agency
FAO	Food and Agriculture Organization of the United Nations
GDP	Gross Domestic product
GEF	Global Environment Facility
ICZM	Integrated Coastal Zone Management
IMO	International Maritime Organization
JICA	Japan International Cooperation Agency
LBA	Land-based Activities
MWRI	Ministry of Water Resources and Irrigation
PERSGA	Regional Organization for the Protection of the Environment of the Red Sea and Gulf of Aden
SAP	Strategic Action Programme

UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNIDO	United Nations Industrial Development Organization

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PREFACE

According to GEF/UNDP/IMO/IOI (2009), shipping is essential to the global economy, providing the most cost-effective means of transporting bulk goods over great distances. Over 90% of all global trade – including everything from food and fuel to construction materials, chemicals and household items – is carried by ships, with some 36,000 merchant ships sailing the world's oceans, with a combined tonnage of over 1 billion dead weight tonnes (dwt) (UNCTAD, 2008).

Ships are specifically designed and built to move safely through the water while carrying this cargo. But, when the ship is travelling either without cargo, or only partially laden, it *must* take additional weight on board to enable it to operate effectively and safely by, for example, keeping the ship deep enough in the water to ensure efficient propeller and rudder operation. This additional material is called **ballast.** When ships were first built years ago, they carried solid ballast, in the form of rocks, sand or metal. However,
since around 1880, ships have used water as ballast principally because it is more readily available, much easier to load on and off a ship, and is therefore more efficient and economical than solid ballast (GEF/UNDP/IMO/IOI, 2009).

While ballast water is crucial to the safe operation of ships, studies have shown that when ballast water is taken on board, the organisms living in that water are also drawn in to the ballast tanks. Depending on the duration of the voyage and other factors, many of these organisms are then able to survive the journey, and are subsequently released live into the waters of the destination port when the ballast water is discharged. Thus, ballast water serves as a vector for the transfer of species from one part of the world to
another. Where this new area is outside of its natural geographic range, the species which has been transferred is commonly known as an **invasive alien species**. If
the environmental conditions in this new geographic area are suitable, the alien species may then not only survive, but may establish and spread, in many cases causing, or with the potential to cause, harm to the local environment, economy, or human health

Invasive alien species are now generally recognized as one of the greatest threats to biodiversity globally. They also have serious economic, environmental and health impacts and, as a result, place major constraints on development. In marine and coastal environments, invasive species have been identified as one of the greatest threats to the world's oceans. Ballast water is of particular concern as a vector for the introduction of invasive alien species both because of the large quantities of ballast water being used and discharged into new environments around the world, but also because of the huge variety and numbers of species which it may transfer (IMO, 2009).

The International Maritime Organization (IMO) is the United Nations' initiatied the development of the International Convention for the Control and Management of Ships' Ballast Water and Sediments (2004), and the GloBallast Programme. The primary objective of the second phase of the GloBallast Programme (Globallast Partnerships (GBP)) is to assist developing countries with the implementation of the Ballast Water Management Convention by supporting the development of appropriate national policies, legislation and institutional arrangements. This support is provided through the development and distribution of relevant technical guidelines– of which the Guidelines for National Ballast Water Status Assessments are one example.

Accordingly, the Regional Organization for the Protection of the Environment of the Red Sea and Gulf of Aden "PERSGA", has initiated in cooperation with the IMO the development of national assessment reports for its riparian countries. Within this context, Egypt developed this report following the GEF-UNDP-IMO GloBallast Partnerships and IOI, 2009: Guidelines for National Ballast Water Status Assessments. GloBallast Monographs No. 17.

This integral report has multifaceted purposes. It will not only serve the ultimate goal that is developing Egypt's National Ballast Water Management Strategy, but it will be the building block for other reports if required in the BWM process.

The formal contributor to this report is the Red Sea Port Authority, Egypt. National experts on their personal capacities provide invaluable efforts and assistance to finalize this document.

The report is based on accessible, accredited, documented and reliable information provided from all contributors.

1. INTRODUCTION

The Red Sea is a great canyon created by the pulling apart of the Arabian Peninsula and Africa. The longitudinal axis of the Red Sea extends for about 2950 km between 40º N and 12º 40' N and has a surface area of 440,000 square km. The Red Sea connected at its northern end with the Mediterranean Sea through the man made Suez Canal, and at its southern end with the Indian Ocean through Bab el Mandeb strait. The average width of the Red Sea is about 280 km.

The maximum depth the Red Sea is 3039 m, and its average depth is 524m. In cross section The Red Sea is roughly V shaped. Meanwhile the depth of Bab el Mandeb does not exceed 100m.

This shallow sill, separating the Gulf of Aden and the Red Sea water masses below the level of 100m, and has a determining influence on all the oceanography of the Red Sea. According to the 200 mile limits and the limited width of the Red Sea, the whole width of the Red Sea is included in the national economic zones of its bordering countries.

The Egyptian coast of the Red Sea proper is about 750 km, stretching from Ras Gemshah (N) to Ghubbet Essa (S) on the Latitude 22º which represent the Southern border of Egypt (Figure 1). The northern end of the Red Sea is bifurcated by the Sinai Peninsula, creating the Gulf of Suez in the west and the Gulf of Aqaba to the east. The Gulf of Suez is a relatively young rift basin, dating back 40 million years. It stretches some 280 km to north, terminating at the City of Suez which is the entrance to the Suez Canal. Along the mid-line of the Gulf lies the border between the continents of Africa and Asia. The entrance of the Gulf of Suez in the south lies atop the mature oil and gas field. The Suez Canal, extending from Port Said to Port Tawfiq (near Suez) and connecting the Mediterranean Sea with the Gulf of Suez, and thence with the Red Sea. The canal is about 160 km long. The Canal comprises two parts, north and south of the Great Bitter Lake, linking the Mediterranean Sea to the Gulf of Suez on the Red Sea. The Canal allows two-way north to south water transport between Europe and Asia without circumnavigating Africa (EEAA/JAICA, 2009)

Figure 1. Egypt's topographic map including the Red Sea

Egypt's coast along the Red Sea is formed mainly of more or less flat lands with average width varying between 3 and 20 km. This flat land is bordered from the western side by the chain of the Red Sea Mountains. The highest of which is Gabel Shayib El Banat (2187 m.). The mountains may have extensions seaward as in Ghubbet El Zeit north of Hurgada, or may produce islands, as Shedwan and Giftoon. The wadis extend from the mountains to the coast.

The Red Sea and Gulf of Aden carry around 7% of global seaborne trade and a significant portion of the world's crude and refined oil cargoes (PERSGA, 2004).

There are 25,000-30,000 ship transits annually of the Red Sea (Figure 2). Oil tankers and other ships constitute another significant source of oil pollution and the southern entrance to the Gulf of Suez (GIWA 2006).

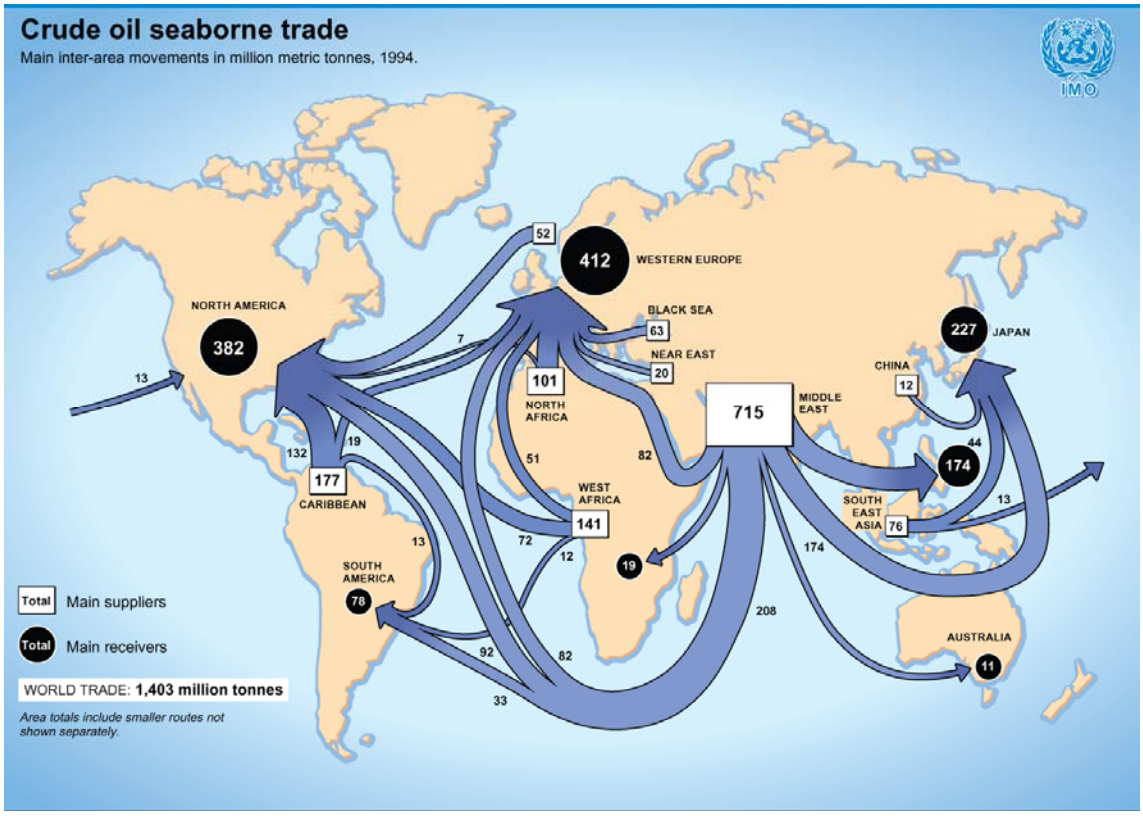


Figure 2. Oil transport pathways/source ports including the Red Sea area (source: IMO website).

2. SHIPPING

2.1 The role of shipping in the national economy

There are several variables which affect the cost of maritime transport and related logistics including geography, directional imbalance in trade between countries, port infrastructure and port services. While there are some variables which cannot be easily influenced, such as geography, others can be positively affected by improving both the institutional infrastructure and the policy framework.

Maritime transport and related logistics services play an important role in Egypt's economy and international trade with Egypt's maritime ports handling over 65 percent of exports (Al Tony, 2005). Recent efforts to upgrade and reform ports and port services have resulted in significant improvements when compared to the past where the costs of handling a container in Alexandria port were 30 percent higher than similar ports in the Mediterranean (World Bank, 1997).

Maritime services and related logistics are important to a large number of sectors in the economy because of their link to both exports and imports. Improving the efficiency of maritime transport and related logistics can have significant positive spillover effects on encouraging private investments, trade flows, and subsequently enhancing production and job creation in almost every sector in the economy, reducing costs of imports for producers and consumers, and increasing government revenue from port services.

Maritime service is important to the Egyptian economy which contribute to more than 48 percent of GDP and 51 percent of jobs. The maritime sector and related logistics services together with other production services constitute 36 percent of GDP and 16 percent of jobs in the economy.

Egypt enjoys a revealed comparative advantage in a number of services including transport, travel, communications and construction. In fact, exports of services have contributed significantly to the surplus achieved in the current account and have overcome the chronic deficit in the merchandise trade balance. In other words, enhancing maritime services and related logistics, among other services, can play an important role in achieving Egypt's national policy objectives, which are mainly focused on promotion of non-oil exports, attraction of foreign direct investment and job creation. Efficient maritime services and related logistics can help Egypt to achieve such goals both directly and indirectly through their direct links to the rest of the economy. There is increased attention given by the government of Egypt to this sector (captured by the increased amount of public investment allocated to the maritime sector). The number of containers handled by Egyptian ports has increased by more than 56 percent between 1995 and 2003, and the number of vessels calling into Egyptian ports increased by 35 percent within the same period. Moreover, Egypt has remained among the 20 largest developing countries in terms of container traffic. On the negative side, the study points out that the Egyptian fleet has decreased from 141 vessels in 1999 to 71 vessels in 2005 and that the existing fleet has aged (Figure 3). Moreover, there is a high degree of concentration among the shipping lines visiting Egyptian ports (Ghoneim and Helmy, 2007).

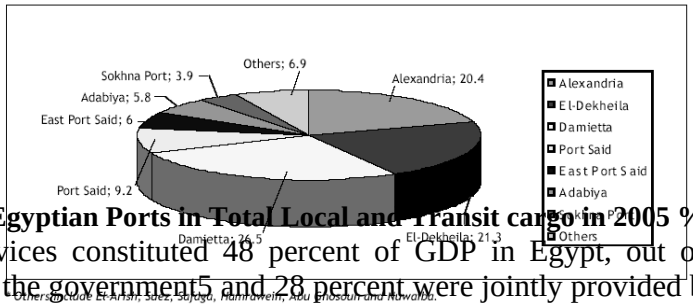


Figure 3. Share of Egyptian Ports in Total Local and Transit cargo in 2005 %

In 2005/2006, services constituted 48 percent of GDP in Egypt, out of which 20 percent were provided solely by the government5 and 28 percent were jointly provided by the government and the private sector. The employment share of services reached 51 percent in 2004/2005 with government employees representing more than half of this percentage (Ministry of Economic Development, 2007a). Maritime transport and other production services6 contributed nearly 32 percent to value added in 2005/2006 and more than 16 percent to employment in 2004/2005 (Figure 4).

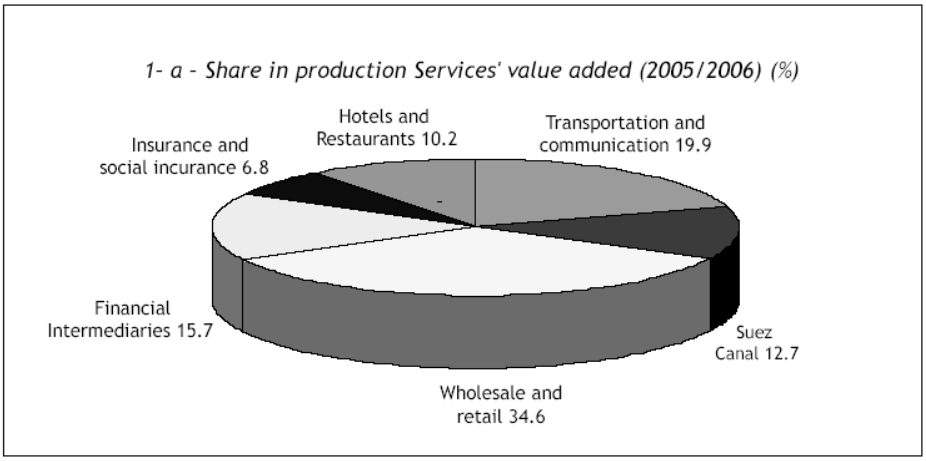


Figure 4. Share of transport sector, including maritime, in Egypt,s production services

2.1.2 Registered shipping companies

Egypt is a flag state country. The registered shipping companies are provided in Annex 1.

2.1.3 Number and types of vessels registered

The number and types of vessels registered are 140 Vessels of which 123 are operational and 17 are out of service (Table 1).

Table 1. Types, number and conditions of registered vessels (source: Red Sea Port Authority)

Types	All	Operational	Out of service
Tug boats	**52**	**46**	**6**
Water tankers	**2**	**2**	**-**
Trawlers	**6**	**6**	**-**
General cargo	**5**	**3**	**2**
Dredgers	**2**	**2**	**-**
Oil tankers	**8**	**5**	**3**
Others	**65**	**59**	**6**
Total	**140**	**123**	**17**

2.1.4 Shipyards

Shipyards are aas follows: Suez Shipyard, PortTawfiq shipyard, Port Said shipyard (Portsaidia), Fisheries dry-dock at Suez, Hurghada slipway (small boats), Safaga shipyard (synchro-lift) army forces, Sharm El sheikh slipway) small boats).

2.1.5 The number of people employed in the sector

The number of people employed in the sector is about 4000 (2000 Temporary employment, 2000 Permanent workers).

2.2 Ports and harbours (Source: Red Sea Ports Authority)

Egypt issued Law No. 1 of 1996 on the specialized ports and issued a decision of the Minister of Transport No. 81 of 1999 and the issuance of the Special Regulations for the Law of specialized ports. It is intended specialized ports (and that of the 35 port) that the construction built on the Egyptian coasts or in the Special Economic Zone Arab Republic of Egypt to receive the fishing vessels or oil tankers or mining materials or tourist yachts in ports of a special nature, taken in the rule of specialized ports Platforms marine and coral specialist within the boundaries of public port. The Red Sea Ports and harbors operate under the above regulations.

In the Red Sea of Egypt, the capacity of ports is as follows:

- 4.5 million tons of general cargo
- 6 million tones of dry bulk goods
- 8.5 million tones of liquid bulk cargoes
- 3.4 million passengers / tourists
- 100 thousand containers

The total number of berths 41 different ports ,the berth Jetty 5 (oil) and the total lengths of the various ports of berth 9063 meters deep linear gradient from 5:17 m. Figure 5 shows the locations of major ports and harbors along the Red Sea of Egypt.

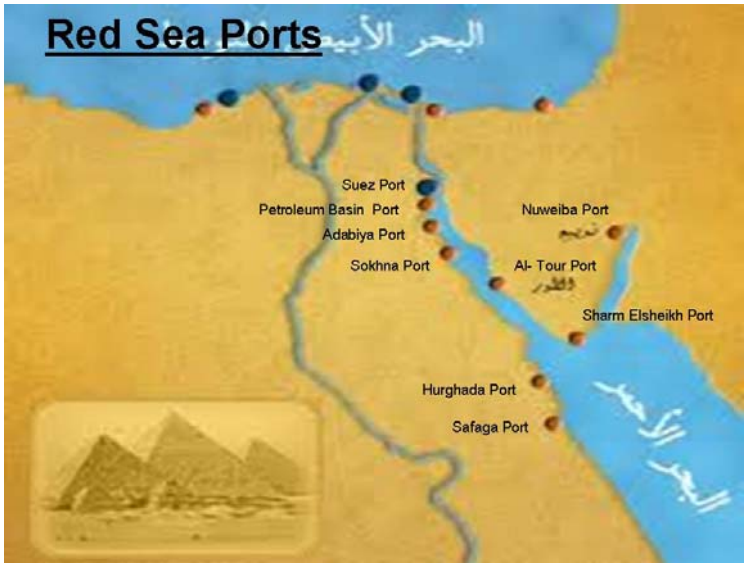


Figure 5 a. Location of major ports and harbours along the Red Sea of Egypt (source: Red Sea Ports Authority)

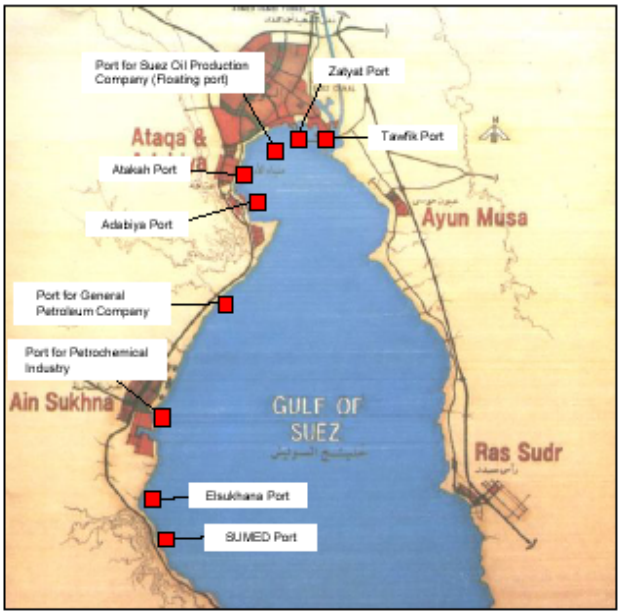
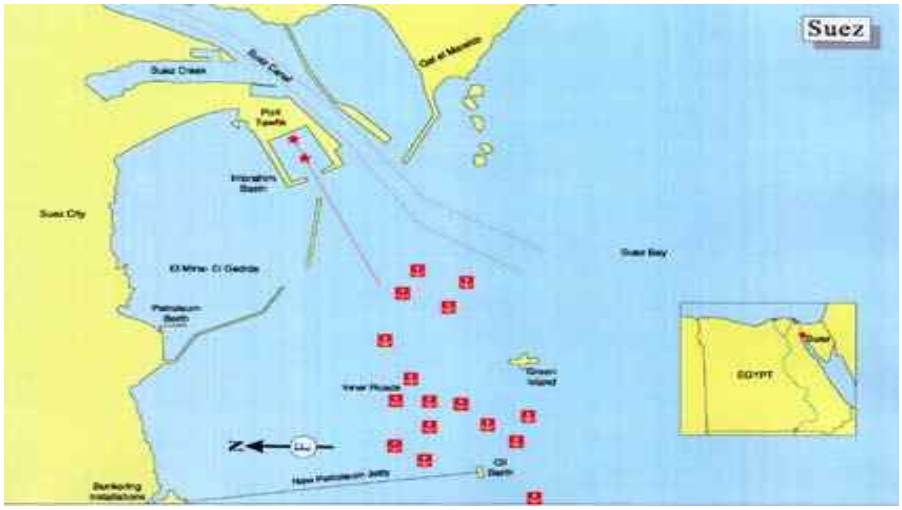


Figure 5 b .Ports in the Gulf of Suez (source: EEAA/JICA, 2009)

2.2.1 Major Ports, harbors and marinas along the the Red Sea, Gulf of Suez and Aqaba costs:

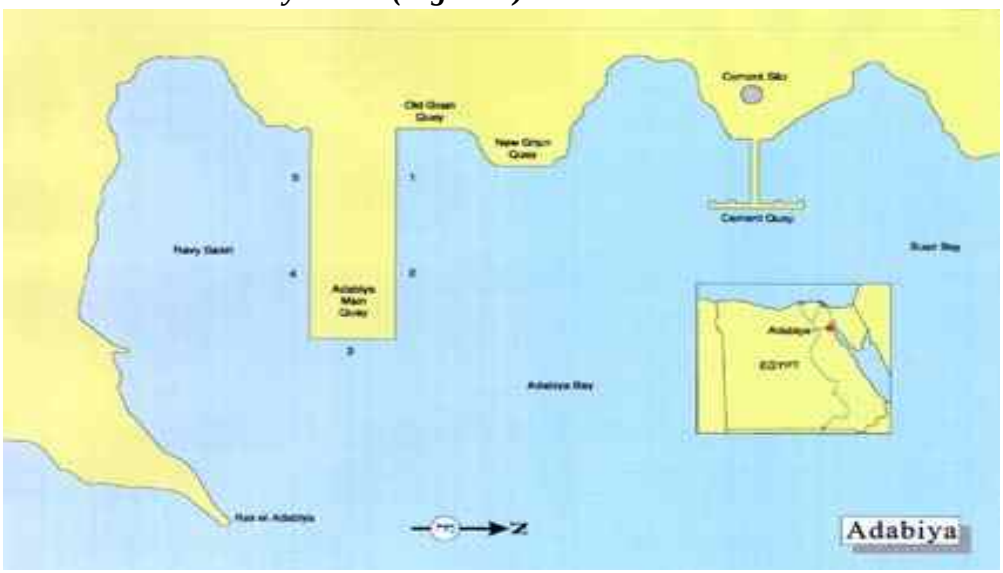
2.2.1.1 Suez port (PortTawfiq) (Figure 6)



Location: Located on the northern side of the Gulf of Suez at the southern entrance to the Suez Canal.
Activity: general cargo / passenger / tourism.
Boundaries: from the southern entrance of the Suez Canal in the north, to an imaginary line Sadat Ras Masalla in the south.
Total area: 162.40 km2 (portawfiq, adabia, petroleum basin)
Land area: 2.30 km2
Maximum capacity of cargo: 3.50 million tonnes
Number of berths: 12
Length of berths: 2070 m
Depth of berths: 8 m

Squares and stores area: 18615 m2

2.2.1.2 Adabiya Port (Figure 7)



Location: Located on the western coast of the Gulf of Suez at a distance of 16 km from Suez.
Activity: general cargo / Dry Bulk / Liquid Bulk
Land area: 0.85 km2
Maximum capacity of cargo: 6.75 million tonnes
Number of berths: 9
Length of berths: 1840 m
Depth of berths: 12 m

2.2.1.3 Petroleum Basin Port (figure 8)

Location: Located in the western part of the port of Suez.
Activity: Pour liquid / receive crude oil and gas.
Land area: 1.16 km2
Maximum capacity of cargo: 4.14 million tonnes
Number of berths: 7
Length of berths: 828 m
Depth of berths: 9 m

Zatyat Port (Petroleum Port)

Zatyat Port is known as the Petroleum Basin. The harbor consists of five concreted platforms extending for the oil tankers with 18,000 tons capacity. The platforms are equipped with pipe lines to receive and handle all oil product vessels with about 5 m in depth. The total length of platforms is about 510 m. In addition to that a deep platform (about 11m) is placed outside the harbor to receive oil tankers with 40,000 tons capacity. The maximum length of oil tankers that enter the harbor is 169 m and the maximum depth of oil tankers is 8 m. The port lies to the west from Tawfik Port. The average number of ships entering the port is 120 annually. The average quantity of petroleum that the port receives annually is approximately 1,000,000 tons (EEAA/JAICA, 2009).

2.2.1.4 Sokhna Port

Figure 9. Sokhna Port

Location: Located on the western coast of the Gulf of Suez, at a distance of 43 km south of Suez.
Activity: container / general cargo / Dry Bulk / Liquid Bulk
Total area: 87.80 km2
Land area: 22.30 km2
Maximum capacity of cargo: 6.00 million tonnes
Maximum capacity of containers: 00.45 million containers
Number of berths: 6
Length of berths: 2000 m
Depth of berths: 17.05 m

Squares and stores area: 11140 m2

Sokhna 2020 (source: Ministry of Transportation)

2020 Year Master plan Development of Sokhna Port and Logistic Center

Ain Sokhna , located about 40 km south of Suez on the Red Sea , the Egyptian government has allocated 9,000 hectares of land for economic and industrial development.

This area is referred to as the Suez Special Economic Zone (S.S.E.Z.). In the direct vicinity of this industrial development, the Sokhna port and logistic center is under development, offering excellent deep – sea port facilities for the handling of liquids and bulk cargo, containers, break–bulk and general cargoes.

The port is built at an excellent location on the coast of the gulf of Suez, with Cairo located some 130 km to the west. The new port will provide the necessary interface for import and export cargo flows, serving the Suez Special Economic Zone as well as the Red Sea area and the Greater Cairo Region.

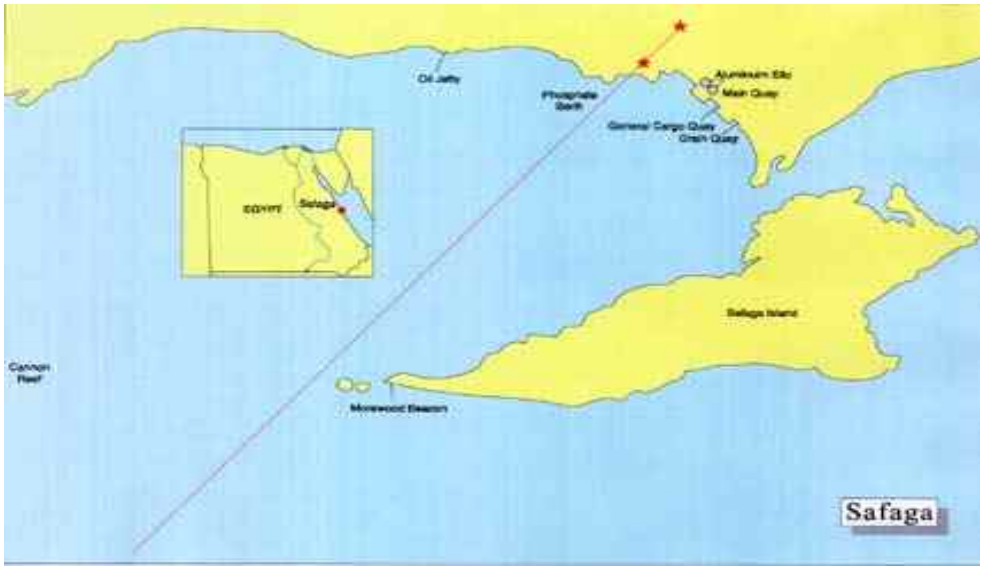
Operations in the port started in 2002. To be able to met the cargo handling demands in the future , a Masterplan has been developed that shows the development of the Sokhna port up to 2020.

Figure 10. Sokhna Port (Master Plan 2020)

2.2.1.5 Hurghada Port (Figure 11)

Location: Located on the western coast of the Red Sea at a distance of 370 km south of Suez.
Activity: Passenger / Tourism
Total area: 9.90 km2
Land area: 0 .02 km2
Number of berths: 3
Length of berths: 240 m
Depth of berths: 5 m

2.2.1.6 Safaga Port (Figure 12)



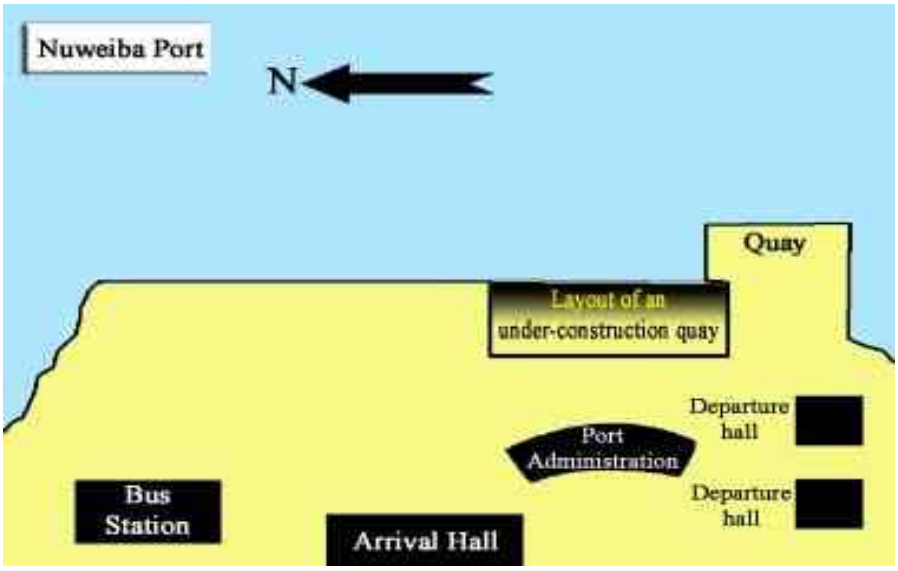
Location: Located on the western coast of the Red Sea at a distance of 60 km south of Hurghada.
Activity: general cargo / Dry bulk / passenger / tourism.

Total area: 57 km2
Land area: 00.48 km2
Maximum capacity of cargo: 6.25 million tonnes
Number of berths: 3
Length of berths: 730 m
Squares and stores area: 33940 m2

2.2.1.7 Al-Tour Port

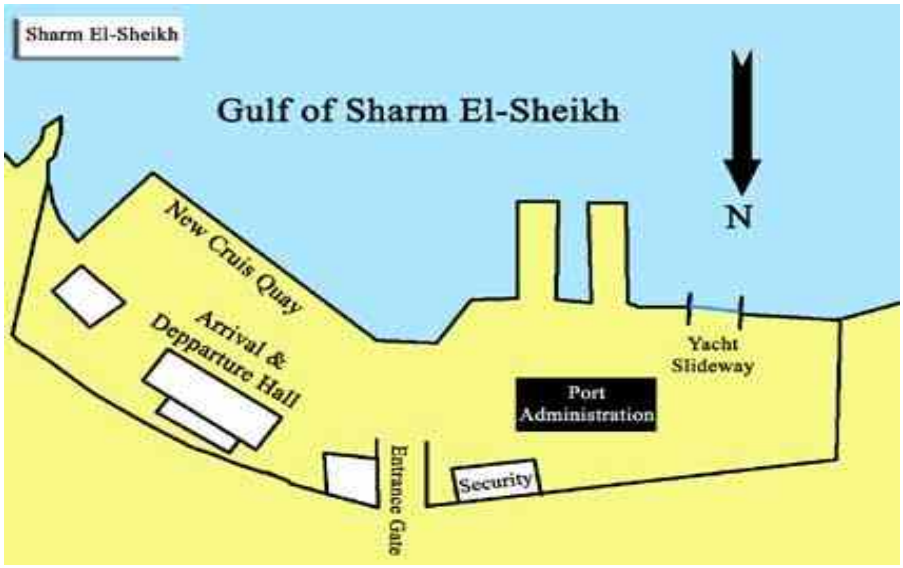
Location: Located on the eastern coast of the Gulf of Suez at a distance of 280 km south of Suez.
Activity: Services of petroleum.
Total area: 1.65 km2
Land area: 0.43 km2
Maximum capacity of cargo: 0.38 million tonnes
Number of berth: 1
Length of berth: 75 m
Depth of berth: 5 m
Squares and stores area: 385600 m2

2.2.1.8 Nuweiba Port (Figure 13)



Location: Located on the western coast of the Gulf of Aqaba at a distance of 64 km south of Taba.
Activity: Passenger / Tourism.
Total area: 9.87 km2
Land area: 0.34 km2
Maximum capacity of cargo: 0.25 million tonnes
Number of berths: 4
Length of berths: 380 m
Depth of berths: 8 m
Squares and stores area: 22720 m2

2.2.1.9 Sharm El Sheikh Port (Figure 14)



Location: Located in the far south of the Sinai Peninsula at the confluence of Alois and Gulf of Aqaba.
Activity: passenger / tourism.
Total area: 88.28 km2
Land area: 0.16 km2
Number of berths: 1
Length of berths: 625 m
Depth of berths: 8 m
Squares and stores area: 48000 m2

2.2.1.10 Specialized Ports

- ***SUMED Port***

SUMED Port lies approximately 55 km south of the Suez City and is made of numbers of moorings where oil pipelines can be attached to. The harbor receives oil takers where their loaded oil is pumped through pipelines on land to Sidy-Krair in Alexandria City, and the numbers of oil tankers are approximately 3,000 annually. Some 117 million tons of oil and petroleum products are transported annually.

***SUMED Pipeline** (source: EEAA/JICA, 2009) (Figure 15)*

A further factor adding to the importance of the Red Sea and Gulf of Aden route is oil movement across the Gulf of Suez via the 200 miles SUMED (Suez to the Mediterranean) Pipeline complex. This pipeline allows ships that are too large to transit the Canal to discharge their cargo at Ain Sukhna, south of Suez, at the oil terminal built for this purpose. The SUMED pipeline runs from Ain Sukhna to Sidi Kerir on the Mediterranean coast of Egypt, west of Alexandria. Loaded tankers can call at the Ain Sukhna Oil Terminal to discharge their cargo to shore and return southwards in ballast to reload, generally in Red Sea or Gulf ports. Very large tankers also have the option of partially discharging at Ain Sukhna in order to reduce their draughts and then transiting the Canal part-loaded their cargo to shore and return southwards in ballast to reload, generally in Red Sea or Gulf ports. The SUMED's original capacity was 1.6million bbl/d, but with completion of additional pumping stations, capacity has increased to 3.1million bbl/d.
The region has some oil shipping terminal used by oil companies to transfer their production to its final destination. Namely, Gabal El Zeit, El Zeit East, Mersa Badran, Ras Shukheir, Wadi Feiran(Abu Redeis-El Nazazat), Ras Sudr Sadat and Ras Ghareb.

- Ras Sidr
- Ras Shukheir
- Ras Gharib
- Marina Sadat
- Offshore Oil Port Mount
- Port Marina Badran
- East Port offshore oil
- Wadi Ferran

Mining Ports

- Abu Zenima
- Abu branches
- Hamrawein
- Maritime pavement (stone head)
- short
- Bernice
- pavement Orientals (McDermott)
- Safaga Mining Port (Abu Tartour)
- Safaga Mining Port (Egyptian)

Tourism Ports/Marinas

- El Gouna
- Hurghada
- Port Ghalib
- Marina Taba
- Marina Dome Valley

Tourism Ports under construction

: • Porto Sokhna
- Marsa Alam
- The Egyptian Company for tourism products (draft Serena Tourism) Sahl Hasheesh
- Red Sea Sharm for Tourism Development (the project of establishing a local yacht marina beach Oriental Marsa Alam - Red Sea).

Fishing Ports/ Marinas

• Attaka

Atakah Port (Fishing Harbor)

Atakah Port (called the fishing harbor) is managed by Public Fish stock Authority in the *
Ministry of Agriculture. The number of platforms is 2 and the total length of platforms is 456 m to receive the fishing ships and boats. The average number of fishing ships is 447 annually, meanwhile the average number of boats is 495 annually.

• Al Tour
• Hurghada
• Suez
• Marina Oburmad
• Marina Bernice Military
• Marina Safaga
• Marina Shalateen
• Point El Salakhana
• Point Srouh Dahab

Types and frequency of vessels visiting Egypt's Red Sea Ports

The following tables (2 – 4) present the types and frequency of vessels visiting Egypt"s Red Sea Ports from 2008 to 2011.

Table 2. Number of frequented vessels calling on Red Sea Ports during the period from 1/7/2008 to 30/6/2009 (source: Red Sea Ports Authority)

Ports / Vessels	Suez, Adabiya and Petroleum Basin	Sokhna	Safaga, Hamrawein and Quseir	Nuweiba	Sharm Elsheikh	Hurghada	Total
General cargo	537	701	10	0	0	0	1248
Containers	132	668	0	0	0	0	800
Dry Bulk cargo	193	23	111	0	0	0	327
Liquid Bulk	311	0	1	0	0	0	312
Vessels of a special nature	109	2	1	0	0	0	112
Passenger ships	16	0	1088	2971	0	604	4679
Tourist ships	51	54	237	0	1245	352	1939
Total	1217	780	1448	2971	1245	956	8617

Table 3. Number of frequented vessels calling on Red Sea Ports during the period from 1/7/2009 to 30/6/2010 (source: Red Sea Ports Authority)

Ports / Vessels	Suez, Adabiya and Petroleum Basin	Sokhna	Safaga, Hamrawein and Quseir	Nuweiba	Sharm Elsheikh	Hurghada	Total
General cargo	570	724	5	0	0	0	1299
Containers	115	686	0	0	0	0	800
Dry Bulk cargo	182	38	113	0	0	0	333
Liquid Bulk	296	0	6	0	0	0	302
Vessels of a special nature	158	4	4	0	0	0	166
Passenger ships	16	0	1334	2486	0	412	4248
Tourist ships	51	76	242	0	1569	419	2357
Total	1273	842	1704	2486	1569	831	8705

Table 4. Number of frequented vessels calling on Red Sea Ports during the period from 1/7/2010 to 30/6/2011 (source: Red Sea Ports Authority)

Ports / Vessels	Suez, Adabiya and Petroleum Basin	Sokhna	Safaga, Hamrawein and Quseir	Nuweiba	Sharm Elsheikh	Hurghada	Total
General cargo	554	678	5	0	0	0	1237
Dry Bulk cargo	140	40	167	0	0	0	347
Liquid Bulk	262	0	7	0	0	0	269
Vessels of a special nature	181	3	10	0	0	0	194
Passenger ships	20	0	1165	2654	0	385	4224
Tourist ships	7	130	231	0	1942	231	2407
Total							8678

2.4 The annual volumes of traded goods – imports and exports – passing through each port

The annual volumes of traded goods (in tones) - imports and exports – passing through each of Egypt's Red Sea Port from 2009 to 2011 are shown in tables 5 and 6

Table 5. The annual volumes of traded goods- imports and exports – passing through Egypt's Red Sea Ports (tonnes) during the period from 1/7/2009 to 30/6/2010 (source: Red Sea Ports Authority)

Goods	Suez, Adabiya and Petroleum Basin		Sokhna		Safaga, Hamrawein and Quseir		Nuweiba	
	Import	Export	Import	Export	import	Export	Import	Export
General cargo	1088562	1181225	3396511	2183688	14186	69827	211506	456923
Dry Bulk cargo	1045889	1275803	470643	1267371	1315701	1585606	20125	21787
Liquid Bulk cargo	1972949	1299	0	0	4842	0	31	251
Cargo of a special nature	265416	28870	11886	5926	3551	0	7220	11377
Total	4372816	2487197	3879040	3456985	1338280	1655433	238882	490338

Table 6. The annual volumes of traded goods- imports and exports – passing through Egypt's Red Sea Ports (tonnes) during the period from 1/7/2010 to 30/6/2011 (source: Red Sea Ports Authority)

Goods	Suez, Adabiya and Petroleum Basin		Sokhna		Safaga, Hamrawein and Quseir		Nuweiba	
	Import	Export	Import	Export	Import	Export	Import	Eport
General cargo	1072828	1607784	3219716	1981973	11448	89165	246438	531078
Dry Bulk cargo	771389	706710	387700	609595	1473393	2781614	26060	24881
Liquid Bulk cargo	2081393	29747	0	0	9928	0	48	56
Cargo of a special nature	235033	150995	16693	0	8224	0	11688	12512

2.5 The Suez Canal

In addition to the Red Sea harbors and ports, the Suez Canal plays a major role in the maritime industry in Egypt.

The Suez Canal is an artificial waterway in Egypt, connecting the Mediterranean Sea to Gulf of Suez, and then to the Red Sea. The canal is 163 km long, and its width varies, and 60 meters at its narrowest ends. Along most of the length, there is only one lane for traffic available, though there are a handful of passing bays.

The canal is extensively used by modern ships, as it is the fastest crossing from the Atlantic Ocean to the Indian Ocean. Fees paid by the vessels represent an important source of income for the Egyptian government.

The total tonnage of ships transiting the canal is now rising due to world trade increases and the average size of ships using the canal is also rising. This is urged by the increase size of container

ships employed in world trade and by the greater capacity of the Canal to handle larger vessels (Table 7).

Table 7. Total Suez Canal crossing vessels, net tonnage, containers and total cargo (2001 – 2008) (source: Ministry of transport)

	2001	2002	2003	2004	2005	2006	2007	2008
Total Crossing Vessels (Vessel)	13986	13447	15667	16850	18193	18664	20384	21415
		-3.85%	16.51%	7.55%	7.9%	2.41%	9.22%	5.06%
Net Tonnage (million tons)	456.1	444.8	549.4	621.2	671.8	742.7	848.2	910.1
		-2.48%	23.52%	13.07%	8.15%	10.55%	14.20%	7.30%
Number of Containers (Vesel)	4700	4549	5209	5928	6557	6974	7718	8156
		-3.21%	14.51%	13.80%	10.61%	6.36%	10.67%	5.68%
Total Cargo Volume (million tons)	372.4	368.8	457.9	521	571.1	628.6	710.1	723
		-0.97%	24.16%	13.78%	9.62%	10.07	12.97	1.82%

2.6. Situation of oil pollution in coastal waters (source EEAA/JICA, 2009)

2.6.1 Sources and Generation of Oil Pollution

Land-Based Pollution Sources - Port related Oil Facilities

The Suez region accommodates a number of ports for various purposes along the western coast of the Gulf of Suez as shown in Figure 5 b, along with other possible sources as oil fields, terminals and pipelines (Figure 16). Therefore, many numbers of possible sources of oil pollution exist, like oil loading/unloading facilities, oil pipelines and storage facilities.

2.6.2 Oil Spill Incidents

According to EEAA/JICA (2009), the numbers of oil spill incidents recorded in the Gulf Region is a total of 122 between 1998 and 2005, ranging from a very small spill to a large scale spill. As seen from these records, on average some 15 oil spill incidents are likely to happen annually in the Suez Canal and the Gulf of Suez.

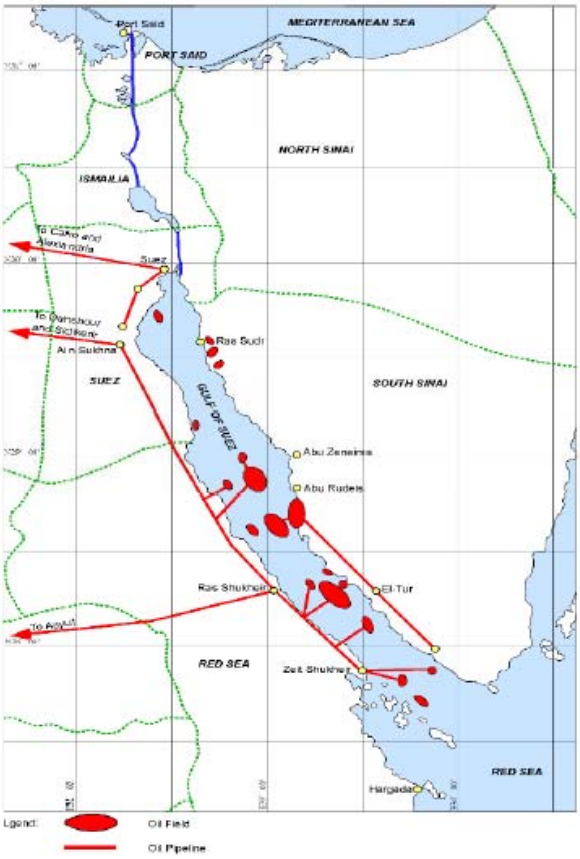


Figure 16 .Location of oil fields and pipelines in the northern Red Sea of Egypt (source: EEAA/JICA, 2009)

Several oil spill incidents affected the northern Red Sea area, 51incidents were recorded only in 2005 (Figure 17).

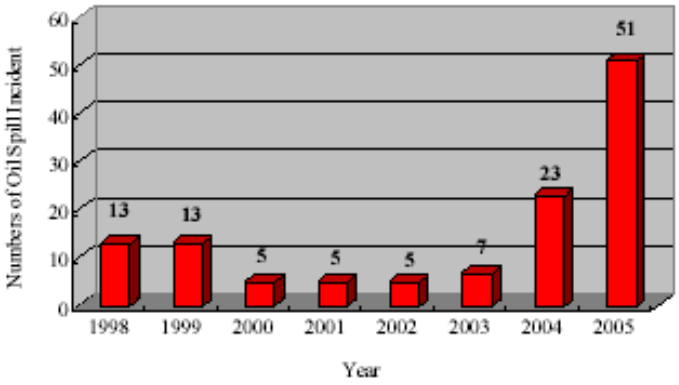


Figure 17. Oil spill incidents in the northern Red Sea (source: EEAA/JICA, 2009)

It is not certain whether a sharp increasing tendency is true phenomena, or, whether it is depending on the procedure of data collection of oil spill incidents.

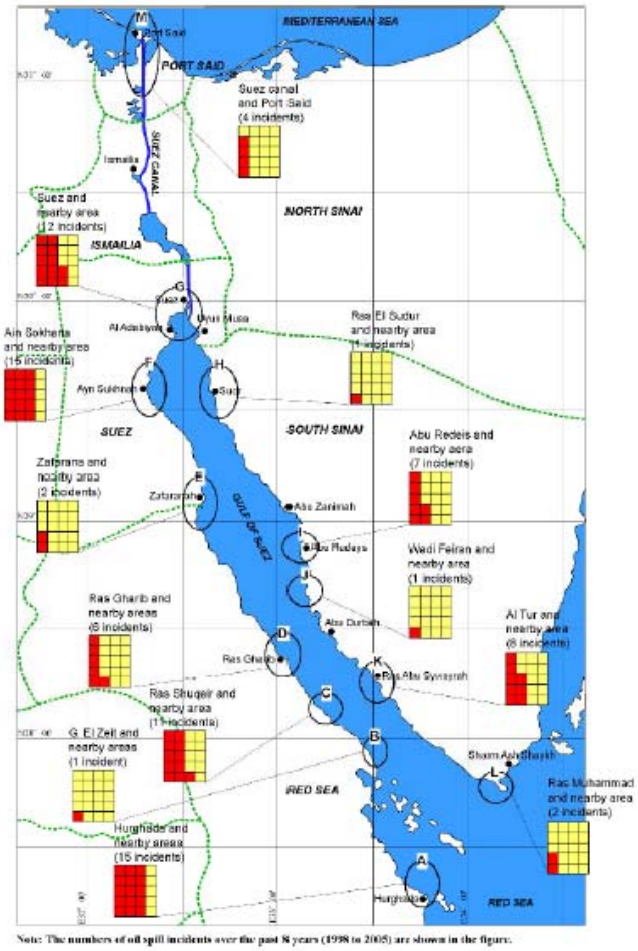
2.6.3. Spots of Frequent Oil Spill Incidents

Of 122 oil spill incidents, 85 incidents spots have been identified. Figure 18 shows the zones having suffered from oil spill incidents in the past. From this figure, the Gulf of Suez manifested the highest possible oil spills on the whole area.

However, the following zones have suffered from frequent incidents:

· The zone including Abu Rudays of Ras Abu Sywayrah in the Governorate of South Sinai and Ras Gharib and Ras Shuqeir in the Governorate of Red Sea. This zone incorporates many oil fields and associated pipelines at the seabed and on land, and

· The zone including Suez City and Ayn Sukhnan near the entrance of Suez Canal in the Governorate of Suez. Many ports facilities with oil loading/unloading are located in this zone.



Note: The numbers of oil spill incidents over the past 8 years (1998 to 2005) are shown in the figure.

Figure 18. Location of oil spill incidents (source: EEAA/JICA, 2009)

2.6.4 Sources of Spilled Oil

Of all the oil spill incidents, incidents in which spilled oil sources were not identified account for 48 %, as shown in Figure 19. This indicates that finding out the sources of spilled oil is very difficult, resulting into the failure in identifying the sources of nearly half of the oil spill. This clearly implies that secure identification system with analytical technologies for finding out spilled oil sources is strongly needed in the region.

Among the sources of oil spills identified, movable sources like tankers and ships (cargo vessels, passenger ships, fishing ships, etc.) account for 25 %, the largest percentage. Next, oil spills caused by the breakdown or wrong operations in pipelines (especially seabed pipelines), and loading (including unloading) facilities account for large parts with 19 % and 5 %, respectively.

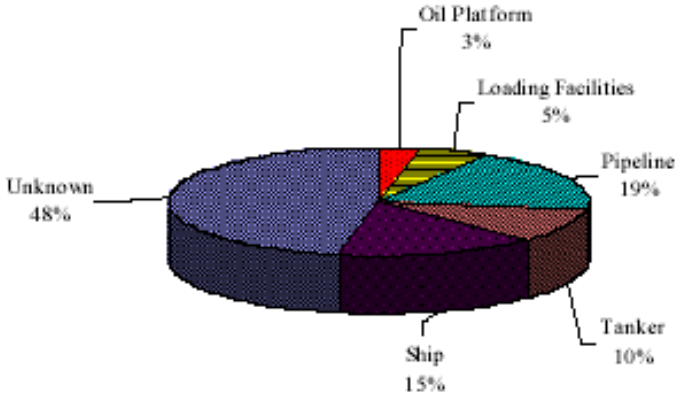


Figure 19. Sources of spilled oils (source: EEAA/JICA, 2009)

2.6.6 Actions Undertaken for Oil Spills

Actions undertaken to contain oil spills are not necessarily recorded for all the incidents.

As far as known from the limited records, removals by means of mechanical and manual operation have been the most frequent methods, accounting for some 40 %, as shown in Figure 20. Despite some recognition of environmental concerns to the marine ecosystem, dispersants have been used often to clean up oil slick, accounting for 26 %.

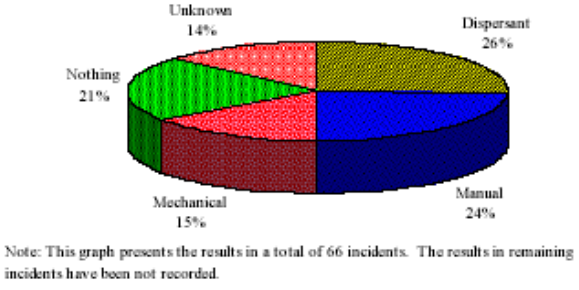


Figure 20. Actions taken for oil spills (source: EEAA/JICA, 2009)

2.6.7 Oil Pollution in Coastal Waters

EEAA continuously monitors the water quality along coastal lines like the Mediterranean Sea and the Red Sea in the Coastal Water Monitoring Program (CWMP). In CWMP, a total of 16 monitoring stations are located in the Gulf of Suez and the water quality measurements have been carried out four times annually, on average. The CWMP have recorded the situation of oil pollution, observing visually the pollution pattern by tar and oil at respective monitoring points. By employing these results, pollution index of oils have been calculated. In the pollution index of oil, the index "0" means no oil pollution to be observed and the index "15" means the utmost polluted status.

As shown in Figure 21, Ras Gharib indicates the high oil pollution, where it has a higher pollution index are largely consistent with the areas of oil field, and that the coastal waters at Ras Gharib have chronically suffered from oil pollution.

2.7 Ballast water uptake and discharge

According to the Red Sea Ports Authority, vessels carrying bulk oil calling on Zaitia Port (only segregated ballast tankers). After discharging their cargo, these vessels take additional weight on board (ballast water) to adjust their stability and to enable it to operate effectively and safely by, for example, keeping the ship deep enough in the water to ensure efficient propeller and rudder operation.

From inspection, most of the vessels have BWM Plan, and perform exchange method: sequential or flow through method.

Sources of registered ballast water uptake are : Alexandria , Aqaba, Jeddah, Sudan, Malaysia, Indian ocean ,Yemen, Philippine ,Aden gulf , Rotterdam, Spain, Colombia , Atlantic Ocean, Russia, U.K. , Mombasa & Black sea . The estimated volumes per m^3 of ballast water being discharged in the Red Sea major ports annually are presented in Table 8.

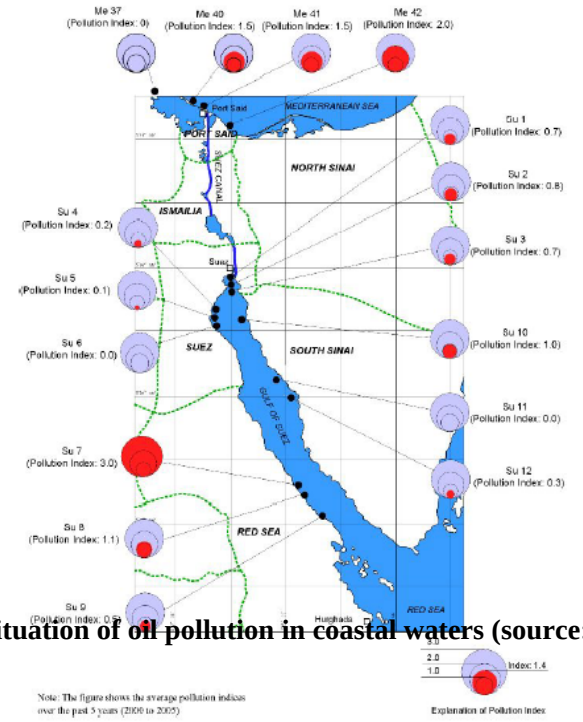


Figure 21. Situation of oil pollution in coastal waters (source: EEAA/JICA, 2009)

Table 8. The estimated volume of ballast water being discharged in Red Sea ports annually (2009 – 2010) (source: Red Sea Ports Authority)

Ports	2009 (m^3)	2010 (m^3)
Suez, Adabiya and Petroleum Basin ports	5120239	4735219
In Sokhna Port	3281665	3132015
Hurghada Port	4022143	3091090
Safaga, Hamrawein and Quseir Ports	6092117	6338424
Nuweiba Port	12499779	9247255
Sharm Elsheikh Port	5238042	5836260

3. THE MARINE AND COASTAL ENVIRONMENT

3.1 Marine and coastal ecology

3.1.1. The Red Sea coastal area

The coastal plain of the Red Sea proper is narrow and lies between the high fringing mountains, consisting mostly of crystalline rocks, and the sea. Along the shores there is an almost continuous band of emergent reef terraces between 0.5 to 10 km wide. Between these and the foot of the crystalline hills extends a sand gravel surface which is inclined towards the sea with gradients that range from 1:80 to 1:200. The width of this plain ranges from less than one km to over 20 km. This plain is covered mainly with Middle Miocene and later sediments (Said, 1969). An escarpment is the northern limit of the Southern Galala Plateau is made of Eocene limestones with Cretaceous rocks. To the S of this highly broken massif, the coastal plain becomes wider. About 40 km south of Zaafarana the Red Sea hills begin to appear and the monotony of the plain is broken further S by the appearance of the Gebel Zeit and Esh-Mellaha ridges which form conspicuous topographical features between the coast of the Gulf of Suez and the main red Sea hills. These ridges are seaparated by a plain which forms the southern extension of the main coastal plain to the N (Said, 1969)

The Zeit range extends in the NW direction close to the seashore for about 30 km; its average breadth is 5 -6 km. Its granitic core, rising in a series of irregular peaks to a height of over 400 m above the sea, appears in two separate patches interrupted by a saddle of evaporate deposits which divides the main Gebel Zeit in the north from the so-called Little Zeit range in the S. To the E, the granitic ranges end abruptly in a line of high scarps over the waters of the Gulf; where patches of dolimitic limestones and gypsum abutting at the sides of the granite. To the S and N the granite disappear under a series of sedimentary rocks of Cretaceous and Miocene ages; which series extends along the western side of the range in a parallel ridges of decreasing heights to the west.

The plain that separates the Zeit range from Esh-Mellaha range is about 15 – 20 km in breadth. It is gravel-covered plain traversed by a few drainage lines which descend from Esh-Mellaha range to the sea. Generally, the Red Sea geomorphological units are as follows (Figure 22;.GEF/TDA/EEAA/RSG, 1998):

The Coastal Belt

The coastal belt forms a continuous strip of low-lands bordering the Gulf Suez and Red Sea, at altitudes rarely exceeding 200 m. The subsurface is generally comprised of mildly tectonized strata (sandstones, marls and limestones) of mid-Tertiary age, which locally rise in low hills and hummocks. Extensive gravel terraces and raised beaches of Pleistocene age cover this basement: they slope gently seawards, where they generally terminate in a pronounced step.
Numerous flat-bottomed wash-filled wadis cut across these formations in a direction perpendicular to the coast. The sea-shore forms a nearly continuous coralline beach. Rocky shores are exceptional.
From Zafarana, to Safaga, the coastal belt overlies the large sedimentary structures and forms at 20 to 30 km wide plain, marked by the extrusion of elongated granitic ridges parallel to the shore-line.

The Eastern Mountain Belt

The high and rugged Red Sea mountains do not form a continuous range, but rather a series of mountain groups which are more or less coherently lined up parallel to the coast. These mountains offer no easy communication between the Nile and the Red Sea.
The constituent rocks belong to the Pre-Cambrian complex of schists and gneiss, granites and volcanics. The uplift of this block is recent and possibly still active. The mountains are therefore in a stage of youthful erosion, indicated by an extremely dissected and rugged relief and a total denudation of the rock.
Wadis run deeply in geometrically arranged narrow gorges incised along the faults and fractures, showing everywhere evidence of current cutting. A shallow wash-fill occurs only in the major collectors where it consists of a coarse arenaceous sand, or a pebbly pavement.

The Elevated Central Belt

The western side of the Pre-Cambrian block exhibits a comparative maturity. The rock often shows a degree of granular decomposition and even, in places, of arenaceous accumulation.
The wadis forming a dentritic pattern, are less deeply incised and are sometimes ill-defined. Extensive alluvial sand covers, reaching at times the dimensions of an internal plain, accompany the main collectors.

The Dissected Table-Land

The virtually flat-bedded Nubian Sandstones and associated younger formations of the Upper Cretaceous give rise to a highly distinctive morphology, marked by a series of structurally controlled scarps, tables and mesas.
The Nubian Sandstone outcrops themselves are generally depressed at altitudes of about 200 meters. They are traversed by some major wadis which have developed immense alluvial plains. Thick pebbly terraces of the Pleistocene flank the sides of these valleys.

The Limestone Table-Land

The undistributed Eocene limestones give rise to flat-topped plateau which boldly dominate the surrounding relief, at altitudes of 400 to 500 meters.
Short wadis cut deeply across the bordering cliffs in narrow gorges. With the exception of some dune massifs, their surface is formed of bare limestone and chalk rocks, with a karstic morphology.

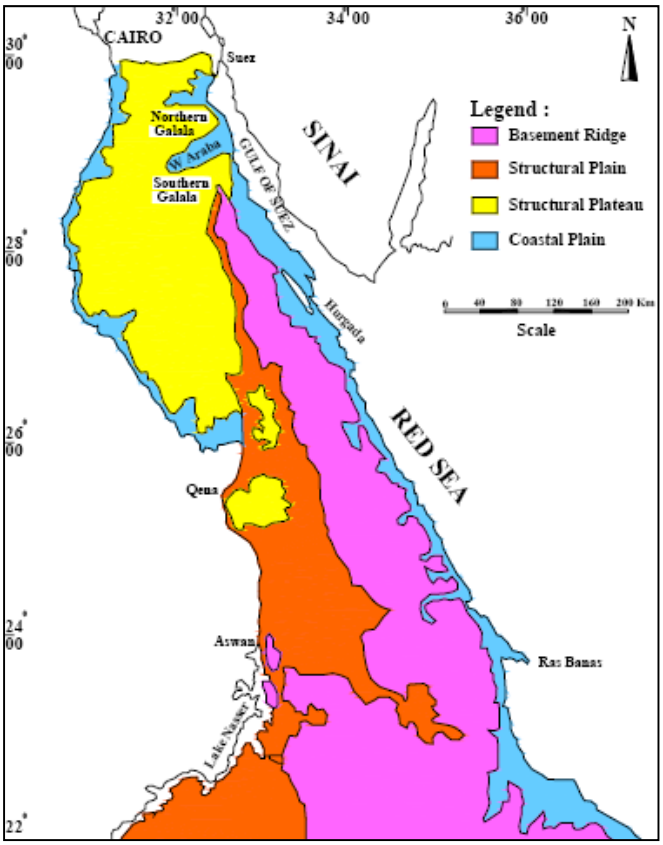


Figure 22. General geomorphologic map of the Red Sea, Egypt

3.1.2 Oceanographic conditions

The oceanographic characteristic of the Red Sea is influenced by its structure. In cross section, the Red Sea is V shaped with average depth of 524m., and a maximum depth of 3039m. Meanwhile the depth in Bab El Mandeb that connects the Red Sea with the Indian Ocean is only 100m., and hence, the Red Sea basin is partially isolated from the Indian Ocean.

The Northern part of the Red Sea is located between two arid regions, the Eastern Egyptian desert (W) and the Saudi Arabian (E). A daily alternation between the day time sea breeze and the nocturnal land breeze in the Northern part of the Red Sea is due to the large variation in local heating.

Oceanograhic conditions are largely based on the findings of the EEAA/JAICA (2009)

Tides

The physiographic configurations of the Red Sea, and the Gulf are long, narrow and an almost closed embankment, dictate the nature of the tides. Tides are semi-diurnal and their characteristics differ in the two Gulfs. In the Gulf of Suez, a nodal point occurs near El-Tur about 180 km north of the southernmost limit of the Gulf. The tidal range in the Gulf of Suez, near its northern limit, is about 2 m, decreasing southward to 0 m at El-Tur and increasing again up to about 60 cm near Ras Mohammed. The tidal range in the Gulf of Aqaba is about 70 cm at Taba and 90 cm near Sharm El-Sheikh. No nodal point exists along the Gulf of Aqaba.

Water Movement and Currents

The fundamental movements of surface water follow the winds, so that the northerly wind of summer drives surface water south for about four months at a velocity of 12 to 50 cm/sec, while in winter, the flow is reversed, pushing water into the northern Red Sea from the southern part; the net value of the latter movement is greater than the summer current to the north, and the drift continues to the northern end of the Gulf of Suez. The main surface drifts are slow moving and are easily modified and even reversed by local effects and by small tides.

Although south-flowing currents, generated by the prevailing northern winds, exert a major force that affects the sea marginal depositional environments, other northward-moving currents in the southern parts of both gulfs counteract this influence. These
northward-flowing currents include currents resulting from salinity differences. A warm less saline surface water current flows into the gulfs from the Red Sea replacing waters lost by evaporation and lost by an out flowing deeper density current of more saline cooler waters. Stormy winds from the south at the tip of the Sinai Peninsula drive currents northward in
both gulfs.

The common storms in the Gulf of Aqaba accompanied by winds of up to 45 to 80 knots
provide considerable bursts of energy to these currents. Because some of the high winds are southerly, especially in winter, one can expect to find the normal long shore current's flow to be temporarily reversed. Currents in the southern part of the gulf are most affected by strong southerly winds. Oceanic currents in the Indian Ocean change the level of the Red Sea and the gulfs seasonally. The effects in both gulfs are sea levels that are about 30 cm higher in winter than in summer.

Water Temperature

The water temperature is lower in the northern parts than in the southern part of the Red Sea. Sometimes, sudden changes of temperature occur from one area to another, especially in the central part of the area. This change may reflect the natural barriers that prevent free mixing of waters in the area and thus inhabiting regular changes. The Gulf of Suez water affects the northern and western side of the Red Sea down to 200 m in depth. Surface temperature declines slightly towards the entrance of the gulfs, owing to the influx of cooler water from the Gulf of Aqaba, and there is also a gradual decrease of temperature in the northerly direction. The mean annual maximum and minimum water temperatures of the coast of the Gulf of Aqaba are higher than those of the Gulf of Suez.

In Sharm El-Sheikh area the surface water temperature in summer (June 1996) showed a variation from 25.5 to 27.3^{o} C, with an average of 26.1 ^{o} C. In winter (February 1997) the temperature were lower than that of summer showing less variability at the surface, ranging from 22.6 to 23.2 ^{o}C, with an average of 22.9 ^{o}C.

Salinity

The salinity gradient in the Gulf of Suez is greater than the values recorded for the Red Sea or Gulf of Aqaba. Salinity show limited variation in spite of the presence of desalination plants in Naama and Sharm El-Maya Bays, but it appears to be with negligible effect. In Port Bay, the salinity distribution showed an increase in the North West direction indicating the effect of land drainage resulting from human activities in this area. There is considerable evidence that, in

given latitude, salinities are higher on the western side than in the east so that isohalines are aligned generally from north-north east to south-southwest. The difference between the two sides in the same latitude sometimes amounts to as much as 1 %.

The inflow current from the Red Sea at the surface is a less saline, whereas the more saline (denser) waters, resulting from the large evaporation precipitation ratio, sinks and forms a counter flow to the south. A sill at the Strait of Tiran (depth 252 m) separates the Gulf of Aqaba from the Red Sea and restricts deep circulation. The salinity increases from south to north in the Gulf of Aqaba. Low winter and high summer values of salinity are observed.

Dissolved Oxygen

The measured dissolved oxygen concentration in the surface water of the Red Sea is near to saturation values. The saturation values are in the range of 4.8 to 6.5 ml of oxygen per liter depending on temperature and salinity values. The saturated layer in the Red Sea extends to about 100 m depth. Below 100 m in the Red Sea, the dissolved oxygen concentration values drop to only 10 to 25 % of the saturation values. The Gulf of Suez resembles the Gulf of Aden in many others of its characteristics, and has no oxygen minimum, while in the Gulf of Aqaba, there is a gradual decline with depth but never to lower than about 50 % saturation. The dissolved oxygen in the water of Sharm El-Shiekh area showed more or less homogeneous distribution. However, the oxygen content at 100 m layer was significantly lower in spring, yet still indicating a well oxygenated condition (5.3 mg/l).

Horizontal distribution of dissolved oxygen concentrations in summer at the surface of the lagoons in Sharm El-Sheikh showed values ranging from 4.3 to 4.8 mg/l and from 96 % to 108 % saturation. In winter, oxygen distribution showed higher values (5.3 to 5.7 mg/l) than that of summer, which may be attributed to lower temperatures. Super-saturation of oxygen values is shown in Sharm El-Maya Bay in summer due to photosynthetic activity.

pH Values

The distribution of pH values at the surface water in summer showed values ranging from 8.3 to 8.4 reflecting low variation. In winter, pH values were lower than that recorded in summer with a variation range of 8.0 to 8.2. The observed higher pH values at surface water in summer could be attributed to the photosynthetic activity due to higher temperature and long light span.

Eutrophication

Most of the Red Sea water has been considered oligotrophic with the exception of small areas off the Sinai Peninsula. The upper waters of the Red Sea are nutrient-poor, with nitrate being depleted more than phosphate. High levels of nitrite and ammonia have been recorded in the upper waters, which can be considered as an indicator of high bacterial activity. Seasonal variations occur in dissolved nutrient concentrations near shore and that local eutrophication is resulting from anthropogenic inputs. Water in the Gulf of Aqaba and Gulf of Suez is poor in nutrients compared with the Indian Ocean.

3.1.3 Habitats and Biological Communities

The Red Sea's ecosystems (includes habitats and species) are highly productive and generate an array of marine and coastal renewable resources. Hence they function as 'coastal food factories'.

It is highly significant that most of the Egyptian Red Sea's productivity is confined to a narrow coastal strip. However, this coastal strip is also the area associated with greatest human activity and hence environmental pressures (Galal, 2003).

In the Red Sea coast, wetlands include the extensive coastal plain areas with mangroves and other coastal vegetation, intertidal flats and many shallow water enclosed habitat. Coastal vegetation is considered as an important ecological component of the Red Sea. This vegetation includes:

1. Date palms, reed swamps and other freshwater-dependent vegetation;
2. Salt-tolerant vegetation (halophytes);
3. Mangroves.

These ecosystems stabilize the shorelines and help prevent erosion.

The Red Sea contains representatives of all major tropical marine communities except estuaries, which cannot be formed due to lack of permanent fresh water source (Galal, 2003).

Halophyte ecosystems

Vegetation of the salt-marsh ecosystem generally occurs in zones parallel the shoreline. Salt marshes are commonly found in low lying inshore areas, where the salt water is close to the surface. This community is dominated by three or four plant species (e.g. *Halocnemon strabilaceum*, *Zygophyllum album*, *Z. simplex* and *Zilla spiuosa*) (GEF/TDA/EEAA/RSG, 1997).

Mangrove ecosystems

Of the four mangrove species known for the Arabian region, *Avicennia marina* is by far the common. Mangrove stands in Egypt are, in general, relatively small (Figure 22). They are dispersed along the Egyptian Red Sea coastline in sheltered bays and lagoons protected behind coral reefs. The mangrove stands along the Gulf of Aqaba and the Egyptian Red Sea coastlines cover a total area exceeding 550 hectares. They are predominantly mono-specific, consisting only of *Avicennia marina*, except for a few stands in the southern Sudanese border area where *Rhizophora mucronata* coexists along with *Avicennia marina*. From a geographical point of view, the Egyptian mangroves may be divided into the Sinai mangroves, and mangroves growing on the Egyptian-African Red Sea coast (PERSGA/GEF, 2004).

The Sinai mangrove thickets are found only on the south-eastern tip of the Sinai Peninsula. They consist of five stands. One of these includes a small group of *Avicennia* trees growing along a channel that cuts across Ras Mohammed at the southern extension of the peninsula. The other four stands are denser and are found along a 20km stretch of coast on the alluvial fan of Wadi Kid, to the north of Nabq Oasis.

In Hurghada area, the northern most stands along the coast of the Egyptian Red Sea is at El-Gonah, located 25 km north of Hurghada. This stand is a cluster of scattered trees parallel to the shoreline. It is considered the most severely damaged of all stands on the whole coast due to extensive cutting. This same geographical area also contains the mangrove stand on Abu Monkar Island, which covers about 40% of the island area (Figure 23).

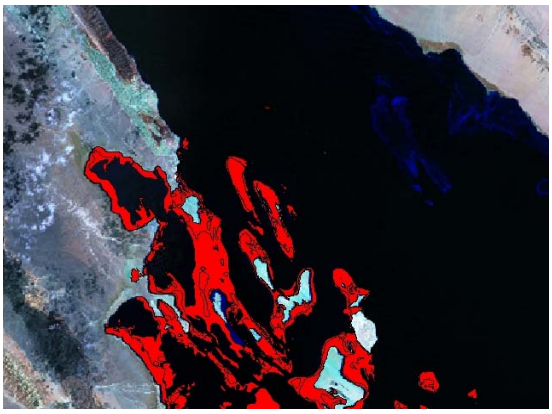
Figure 23. ***Avicennia marina*** **from the Red Sea coast of Egypt**

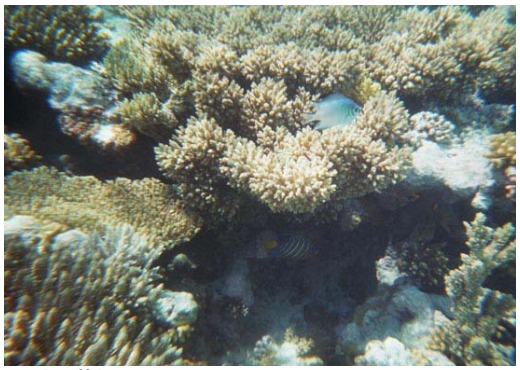
In Safaga, south of Hurghada, two major mangrove sites are found. The first is located 17 km south Safaga. It is a long compact patch of A. marina trees in the shore line, growing in the edge of the highest water mark. The second is located at the Shore of Safaga Island. The mangrove in this stand grow in the sandy western coast of the island forming continues stretch of healthy trees.
Further south, El-Qussyer mangrove stands are located at Abu Hamrah (36 km north of Qussyer) and El-Sharm El-Bahari. The Abu Hamrah stands all grow behind reef flats.
Wadi El-Jimal group includes two stands, while **Wadi Al-Qul'an group** contains the best-developed stands along the entire coast. The first stand is known as Wadi Masturah , the second stand is located in Wadi Al-Qul'an delta. The last largest stand is Wadi Harbiyyah or Hamatah. This stand extends about 9 km facing a group of wadis that open on the shore on a large wetland area.
Other stands: The first stand is only a few trees growing in the edge of the sandy bay north of Ras Banas known as Qoraat Hartway. The second stand is located at El-Hemirah area north of Shalateen (Figure 24). This second stand is characterized by the presence of the only recorded *Rhizophora mucronata* trees.

Figure 24. ***Rhizophora macronata*****, Shalatin**

Coral reef ecosystems

Egypt is home to some of the most spectacular coral reefs and associated marine life in the world. The coral reefs of the Red Sea are of particular importance to Egypt due to the country's proximity to the millions of tourists in Europe (Cesar**,** 2003).The Egyptian Red Sea now possesses over 4000 km2 of some of the most diverse and abundant coral reef ecosystems on Earth (Figure 25).





Corals offshore

Coral reefs distribution

Offshore reef

Figure 25. Distribution of coral reefs in the Red Sea, Egypt

The most northerly reefs at found near Suez, along the eastern coast of the Gulf of Suez, patch reefs are small and penetrate to a depth of 1 - 5 m resting on calcareous sandy substrates. On the western coast of the Gulf of Suez reefs are more developed, forming a fringing reef that extends form 50 km south of Suez to Ain-Sukhna that extends 30 - 40 m offshore and sloping from 1 - 5 m depth. There are extensive reefs in the southern Gulf of Suez, on the Sinai Peninsula at Ras Mohammed and surrounding the Ashrafi islands close to the western shores of the Gulf. In the Gulf of Aqaba there are narrow fringing reefs along the steep cliffs of both shores (Figure 24). At the mouths of wadis (river valleys) and across bays the fringing reefs extend outward up to 1 km from shore. In the Red Sea proper, fringing reefs extend from Gubal at the north nearly continuously to Halaib, at the border with Sudan. These reefs are 25 - 150 m wide at the northern end, increasing to 500 m wide from Marsa Alam to Shalatein. At Shalatein the reef then extends up to 12 km from shore to Mirear Island, decreasing in width (to 50 m) southward to Abu Ramad (Pilcher and Abou Zaid, 2000).

A total of 209 hard coral species and approximately 120-125 soft coral species have been recorded in the Egyptian Red Sea. On average, coral diversity is greater in the northern part of the Egyptian Red Sea than in the south with nearly double the number of coral species and genera (Table 9) (Pilcher and Abou Zaid 2000).

Table 9. Number of genera and species of reef building corals in the Egyptian Red Sea (Source: Pilcher and Abou Zaid, 2000).

Region	*Genera*	*Species*
Gulf of Aqaba	47	120
Gulf of Suez	25	47
North Red Sea	45	128
Central Red Sea	49	143
South Red Sea	31	74

Threats to Coral Reef Biodiversity

A recent global survey by the World Resources Institute estimated that 61% of the coral reefs of Egypt were seriously at risk from human impacts. Despite the fact that tourism generates income from the use of coral reefs, it also poses the most serious threat to reefs in Egypt. Besides this, a variety of smaller threats occur from other anthropogenic impacts, over fishing and destructive fishing, ship groundings and pollution, for example (Cesar, 2003).

Other threats include:

- **Wadis Flash Floods**
- **Coral Disease**
- **Sedimentation and Siltation (landfill)**

In Egypt, siltation is invariably the result of poorly planned and implemented construction. Dredging and land reclamation (landfilling) activities have resulted in the loss of numerous reef habitats. In Hurghada, a 2,900,000 m^2 including reef flat was landfilled, and the sediments plume from this activity extended several km from shore between 1994 and 1997. Mandatory Environmental Impact Assessment studies have curtailed landfilling operations (Figures 26, 27).

Figure 26. Landfilling a beach in Hurghada

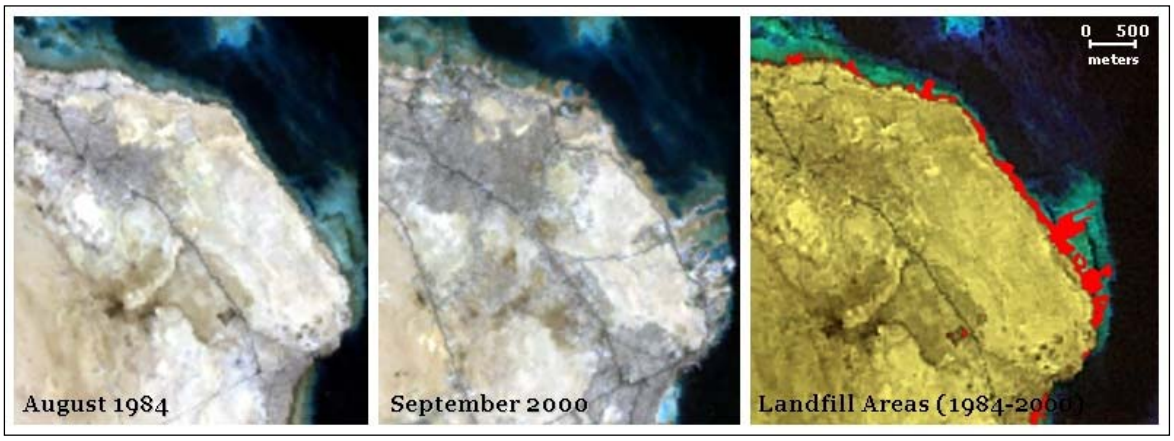


Figure 27. Areas subjected to land infilling operations in Hurghada during the 16-year period from 1984 to 2000.

- **Nutrient Enrichment**
- **Destructive Fisheries**
- **Bleaching**

Rising sea surface temperatures, especially the above-normal warm period between 1997 and 1998, are believed to have resulted in the large scale bleaching and mortality of many scleractinian corals

Curio Collecting

Vast amounts of corals, molluscs and fish are collected for the curio and aquarium trades.

Recreational SCUBA Diving Practices

Major effects of the recreational SCUBA industry include anchor, trampling and flipper damage (Figure 28).

Figure 28. Recreational impact on coral reef

Fish Communities

The total number of reef fish found in the Egyptian Red Sea is 325 of which 17% are endemic species. Butterfly fish have decreased in the Red Sea from an average of 9.7 per 100 m^2 in 1997 to 5.2 per 100 m^2 in 2002, and Sweetlip populations have dropped by 69%. In addition the abundance of groupers and parrotfish in the Egyptian Red Sea have also decreased and this has been attributed to the lack of enforcement in the Red Sea where poaching in no take zones is high. In the more heavily dived areas of the north, an average of 55 species can be found on undegraded reefs of Hurghada and Sharm El Sheik. In contrast, a little further down the coast in Marsa Alam, where the number of tourists and development decreases, average fish diversity increases to 70 species on undegraded reefs (Cesar**,** 2003)**.**

Seagrass beds

Seagrasses are specialised angiosperms (i.e. higher plants) that can form dense underwater meadows (Figure 29). They are found in shallow lagoons in coastal waters but may extend to 50-70 m depth. Eleven species of seagrass have been recorded in the Red Sea, compared with only four species for the Gulf. Seagrasses, like mangroves, may have a high productivity and are most extensive in the southern Red Sea. About 50 species belonging to 12 genera of seagrasses are known world-wide, of which only 11 species have been recorded from the Red Sea (GEF/TDA/EEAA, 1997).

Figure 29. Sea grass beds from the Red Sea

Seaweeds Sub-tidal sand and mud

Vast tracts of the Egyptian Red Sea, particularly in offshore environments, are composed predominantly of sand or mud, devoid of attached plants or corals. Sub-tidal sandy ecosystems are prevalent in high energy environments (e.g. near coral reefs), whereas mud is more common in low energy environments associated with low water movements (e.g. shallow embayments and wadis). Although visually unspectacular, these ecosystems may harbour rich biological assemblages in terms of both species

abundance and diversity. The occurrence of rich sand and mud faunas suggests that primary productivity (e.g. from benthic diatoms and cyanophytes) is high in some areas. In addition to sessile epiphytic and infaunal benthos, sand and mud ecosystems are a major habitat for motile fauna (e.g. demersal fish and crustaceans) during some or all phases of their life cycle (GEF/TDA/EEAA/RSG, 1977).

Oil and other Hydrocarbons

The danger from oil pollution comes not only from exploration activities but also from transport, in which up to 100 million tonnes per annum may pass through the area (PERSGA 1995). Oil and gas exploration is concentrated in the Gulf of Suez, with the main sources of pollution being from Ras Ghariba, Ras Shoukier, Abu Rudees, and Abu Zenimah through the inefficient operation of equipment, illegal discharges and lack of monitoring. More than 20 oil spills have occurred along the Red Sea since 1982. The spills involve a number of pollutants, which smother corals and poison them through hydrocarbon absorption. Oil exploration through seismic blasts is also a threat to coral reefs (Pilcher and Abu Zaid, 2000).

Pelagic systems

Demersal - a large proportion of the zooplankton within nearshore areas consists of larvae of corals and other reef associated species. Planktonic larvae form an important food source for benthic fauna (suspension or particle feeders) and reef fish.

Phytoplankton - is generally dominated by diatoms in the Red Sea. However, many species do not survive the transition from the Indian Ocean through the Bab el Mendab. Of 452 species of dinoflagellates known from the Indian Ocean only 88 exist in the Red Sea. A westward decline is partly compensated by the presence of several endemics and blooms of *Oscillatoria erythraeum*. Similarly cell and bloom densities decline westwards.

Zooplankton - Zooplankton distribution decreases westwards and peak numbers lag a few weeks behind the phytoplankton. Calanoid copepods are the most important group with 60 species in the southern Red Sea and 46 in the north. Euphasiids are also important but only 10 species of the 22 recorded for the Indian Ocean have been recorded in the Red Sea. Densities can be high and up to 3,000 per m^3 individuals have been recorded. Total pelagic primary production of the Red Sea is about 0.21-1.60 g/cm^2/day with greater values in the south. Pelagic production also increases nearshore, reaching 1.0-2.5 g/cm^2/day which represent a faster turnover than benthic systems (GEF/TDA/EEAA/RSG, 1977).

Benthos

The benthic communities are not well developed (except in the Gulf of Suez and foul Bay) because of the geomorphology of the Red Sea and the limited development of its continental shelf. Wealthy benthic communities were recorded in some coastal areas like the mangrove stands, the soft bottoms of the shallow water bays and the intratidal coral zone. Commercially, benthic organisms (except Shrimp) do not constitute an important part in the marine production of the Red Sea (GEF/TDA/EEAA/RSG, 1977).

Molluscs

The total production of molluscs in the Red Sea is not estimated. The fishermen and local peoples mostly consume the catch. Some species are collecting for industrial purpose and others for ornamentation because of its beautiful colors and shape (GEF/TDA/EEAA/RSG, 1977).

Gastropoda

Some species of the following families are well known to the local community in the Red Sea:

Family Fasciolatidae
Family Muricidae
Family Tritonidae
Family Tonnidae
Family Strombidae

Bivalves

- Family Ostreidae is considered important from the commercial point of view all over the world.
- Family Aviculidae: is also important in the Red Sea.
- Family Tridacnidae: which are considered as the biggest bivalves in the world, are represented in the Red Sea by two species: Tridacna maxima and *T. rudis*.
- Family Pectinidae

Crustacea

In the Red Sea crustaceans constitute an important part of the fisheries. In 1997 the catch of Penaeidae alone reached 639 tons which represents 1.1% of the whole Egyptian fisheries from the Red Sea. The following are the most important families in the Red Sea: Family Penaeidae and Family Panuliridae (GEF/TDA/EEAA/RSG, 1977).

Sea turtles

The hawksbill followed by the green is the commonest species of turtle found in the Egyptian Red Sea (Figure 30).The hawksbill (*Eretmochleys imbricata*) are found throughout the Red Sea. Nesting beaches are found along the entire length of the Egyptian Red Sea coast and islands. Important nesting locations include the Siyal Islands off Hamata (inside Wadi Gemal–Hamata National Park) and Ras Banas. In Egypt, this species nests in summer. (Source: USAID, LIFE Red Sea Project).

The green turtle (*Chelonia mydas*) have been reported from most areas of the Egyptian Red Sea, but nesting occurs only at a few sites. Important nesting beaches in Egypt's Red Sea region are the Wadi Gemal Hamata Protected Area, Ras Banas, and the islands of Sarenka, Zabargad, Syial, and Rawabiel. In Egypt, nesting occurs during summer.

Figure 30. Hawksbill Turtle

Dugongs, whales and dolphins

The population size of dugongs in the Egyptian Red Sea coast is not known; they have been recorded from the Sinai to the Sudan border, but are commonly sighted only south of El Quesir. Moderate numbers are reported around the Tiran Islands, and also other parts of the Egyptian Red Sea coast including the Hurghada area, where there are extensive feeding pastures (i.e. seagrass beds). In the Red Sea, dugongs appear not to have been utilised by humans in an intensive manner. At least 12 Whales and dolphins species are reported from the Egyptian Red Sea, for example the killer whale, false killer whale, Risso's dolphin, spotted dolphin. Cetacean diversity in the Red Sea seems to be relatively low. (GEF/TDA/EEAA/RSG, 1997).

Shorebirds and Seabirds

There are more than 470 bird species in Egypt, most of which are non-breeding migrants. Only about 150 species are considered as resident breeding population (Baha El Din 1999). A total of 16 species of global conservation concern have been recorded in Egypt. Among these species, the white-eyed gull *Larus leucophthalmus*, is the most important for the Egyptian Red Sea islands as they hold the largest breeding population known in the world (PERSGA/GEF, 2003). Birds are threaten because of human disturbance, introduced predators, habitat destruction, pollution and over-fishing.

Endemic species

For some groups, endemism in the Red Sea is moderate, for example corals (6.3%), echinoderms (5.3%, cf. 12.1%. in the Gulf) and algae (9%). Levels of endemism for fish are variable. Triplefins (Trypterygiidae) have levels greater than 90%, and levels for some other families are also high (30-50%). These include butterflyfishes (Chaetodontidae), parrotfishes (Scaridae), blennies (Blennidae) and pufferfishes (Tetradontidae) (GEF/TDA/EEAA/RSG, 1997).

Exotic species

An obvious entry point to the Red Sea is the Suez Canal. Because of the prevailing water flow, far fewer species have migrated into the Red Sea from the Mediterranean than vice-versa, most of those which have are restricted to northern parts. Fouling organisms encrusted on the hulls of ships or in ballast water entering the Red Sea via the Gulf of Suez is one source of exotic species. In other parts of the world such species (e.g. *Sargassum muticum*) have altered the local ecology. The arrival of non-native planktonic species may be of even greater concern. For example, research in Australia has shown that the introduction of such species can significantly alter local community structure (GEF/TDA/EEAA/RSG, 1997).

3.1.4 Sensitive and vulnerable coastal environments

3.1.4.1 Environment-Sensitivities, particularly to oil pollution

The Red sea, the Gulf of Suez and the Gulf of Aqaba, is endowed with high biodiversity. It represents a lot of different environmental ecosystem with more than 10 thousands sea organisms. Among them are fish of over 1,000 species, hard coral over 250 species, soft coral 100 species, birds over 300 species, mammals about 300 species, algae over 500 species, sea grasses 11 species, mangrove 2 species and sea turtles 4 species. In addition, the Red Sea, the fringe areas of the Gulf of Suez and the Gulf of Aqaba and adjacent land territories are a habitat more than 2,000 kinds of invertebrate animals such as mollusca, crabs echinoderm, worms and hundreds of wild animals, desert plant and salt marsh plants. Figure 31 shows the environmental

sensitivities of the northern Red Sea and the Gulfs (EEAA/JICA, 2009). According to NOSCP (EEAA, 1997), the environment-sensitivities of Egypt's Red Sea are as follows (Figure 31):

Coral Reefs

Coral reefs are considered as priority areas for protection due to their very high species diversity, their uniqueness and their considerable economic importance for the tourist industry and fisheries. Extensive coral reefs are found in the Red Sea, the Gulf of Aqaba and a part of the Gulf of Suez. The dominant reef type is the fringing reef extending almost continuously along the coast. Mostly the fringing reefs are narrow extending only a few tens of meters from the shore. In some areas, especially further south, they commonly extend 1 km to seaward. The coral reefs in the Gulf of Suez are poorly developed. There are little or no corals in the northern half of the Gulf. From Ain Sukhna to the strait of Gubal only patchy fringing reefs are found with a limited coral diversity.

Coral reefs are threatened by small chronic oil spills in particular, but larger acute oil spills may also affect coral reefs. Observed biological impacts of oil spills in reef areas range from mass mortality of fish and invertebrates to apparently no effects.

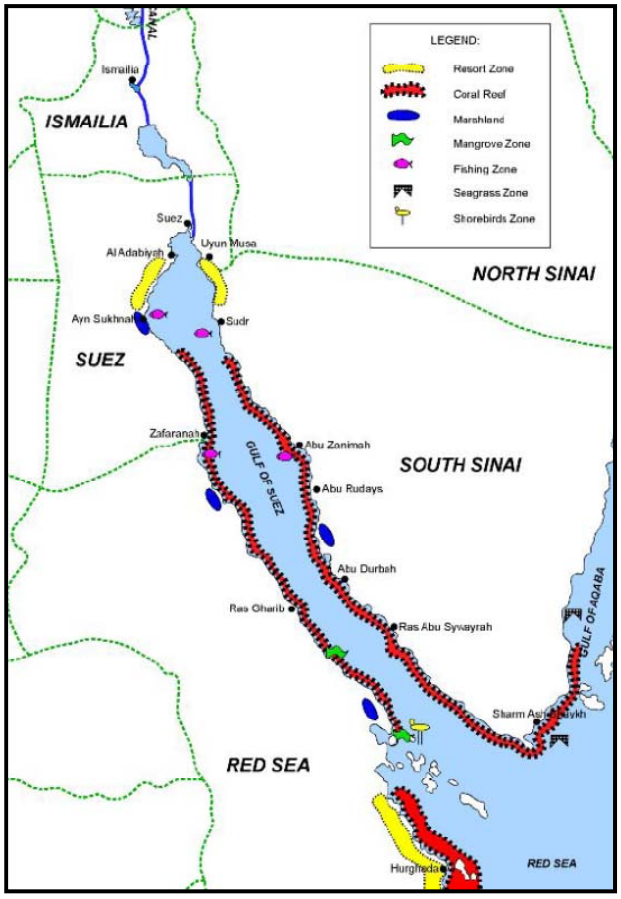


Figure 31. Environmental Sensitivities of the Northern Red Sea and Gulfs (Egypt). (source: (EEAA/JICA, 2009)

Generally oil floats over the reef. However oil components may come in contact with corals in a number of ways:
. Some reefs are exposed to the air during low tides. Oil can come in contact with corals and cause severe damage on such reefs;
· Waves breaking on the reefs may create droplets of oil that are distributed into the water-column;

· Weathering processes cause oil to sink;
· Oil components can dissolve in water to some extent which exposes the corals to potentially toxic compounds. However, toxic concentrations are only encountered in the uppermost part of the water-column;
· Sand landing on an oil slick during sand storms can cause the oil to sink; and
· The use of chemical oil dispersants will increase the dispersion of the oil into the water, thus increasing the potential for contact with the corals.

Mangroves

Mangroves are well known for being particularly sensitive to oil spills and are considered as priority areas for protection. Mangroves are encountered in the Red Sea region, particularly in the southern part. There are only a few isolated mangrove stands in the northern Red Sea. Mangroves typically grow in more or less anaerobic sediments. They receive oxygen through aerial roots protruding from the sediment surface. There are pores on the aerial roots through which oxygen passes. This root system makes mangroves highly susceptible to oiling. Oil slicks may enter mangroves when the tide is high and are deposited on the aerial roots and sediment surface as the tide recedes. The pores in the aerial roots become clogged by the oil and, if many roots are oiled, the respiratory system collapses and the trees die. Mangroves can also be killed due to toxic effects of oil components, especially low boiling aromatics. The toxicity of oil gradually decreases because the toxic aromatics evaporate. Toxic effects therefore mainly arise from newly spilled oil. Oil easily gets trapped in the mangroves and usually persists for a very long time. The oil is subject to microbial degradation which may be a rather rapid process in aerobic environments. However, if the oil is buried within the anaerobic sediments, bio-degradation proceeds very slowly.

Saltmarshes

Saltmarshes are also sensitive to oil pollution. There are various types of saltmarsh vegetation. Marshes are extremely productive and are valuable habitats for many species. They are essential habitats for numerous birds, both as roosting and breeding sites for resident species and stopover and feeding grounds for migrants. Large reed marshes are found in the coastal lakes along the Mediterranean shore. However, these marsh areas are enclosed within the lakes which are only connected to the sea through narrow gaps

Bird Sites

The coasts of Egypt are situated along extremely important migration routes for birds and there are very important wintering areas for water birds along the coast.
The migrating birds pass a number of internationally important bottlenecks along the Mediterranean and Red Sea Coast (Zaranik, Ras Mohammed, Suez, Ain Sukhna and Gabel Zeit). Very large concentrations of migrants can be found in the spring and autumn in these areas including a high percentage of the world population of several species.

The islands in the Red Sea are important breeding grounds for birds, especially gulls and terns, including the globally threatened White-eyed Gull (Larus leucophthalmus). This species only breeds on the Red Sea Islands.
The mangroves in the Red Sea are important habitats for birds. Many migratory and wintering shore birds use the mangroves for food and shelter, which is, otherwise, extremely scarce along the arid Egyptian Red Sea coast.
Waterbirds are perhaps the most prominent victims of oil spills at sea. There are three types of effects:
· Effects caused by the sticky nature of oil. Stains of oil on the plumage may destroy the insulating and water repelling property which may ultimately cause the death of the bird; · Toxic effects after the ingestion of oil during preening, ingestion of oiled prey, inhalation of oil fumes or absorption of oil through skin or eggs; and · Indirect effects resulting from destruction of bird habitats or food resources. The sensitivity to oil for various groups of birds differs considerably.

The risk of oil pollution to bird species not normally associated with water is, of course, much lower than that of waterbirds. However, certain migrating non-water birds, such as birds of prey and storks, can be affected. During migration birds often land to rest along the shoreline or to soak their feet in the tidal zone to cool down.

Turtles

Sea turtles are listed as globally threatened species and they are very sensitive to oil pollution. Nesting sites are particularly vulnerable and are therefore considered to be priority areas for protection.
Turtles are vulnerable to oil, eggs and juveniles being the most sensitive stages. The hatching are especially at risk when they dig their way out of the nest and enter the water. If oil is stranded on a nesting beach the juveniles inevitably have to cross an oiled part of the beach and they become smeared in oil. This may cause skin irritation and surface lesions which may weaken them. In severe cases they may die.

During their first period in the sea the young juveniles stay in surface waters and the risk of encounter with oil slicks is therefore high. Young turtles which have been exposed to oil in water may suffer from a wide number of injuries. These injuries may eventually cause the death of the animal. The eggs are also very vulnerable to oil when buried in the sand. Fresh crude oil on the sand surface significantly affects the hatching success of eggs. If eggs are exposed to a light dosage of oil mixed in sand, the hatchlings become considerably smaller in terms of weight and size than normal. Fortunately, in cases of stranding of oil on the beach, direct oiling of eggs is not likely except during storms because the eggs are usually laid above the high tide mark. Adults may experience skin irritation or surface lesions if coated with oil. They may also consume tar balls which coat their mouth hampering feeding ability.

Marine Mammals

There are no documented accounts of oil spill impacts on dugongs, but as the
dugong is a globally threatened species, dugong habitats should be protected from oil spills. The dugong is a rare resident of the Egyptian part of the Red Sea. The main areas for dugongs are large sea-grass beds on which they feed.

Sea-Grass Beds

In most cases oil will flow above the sea-grass without causing damage. However sea-grass beds may be affected if oil is brought in contact with sea-grass. Various types' sea-grass beds can be ranked with respect to sensitivity to oil. Generally, toxic concentrations of oil components are confined to the uppermost parts of the
water column beneath an oil slick. Larvae, eggs, juveniles and adults at risk are those
encountered in the upper water masses. However, in cases where oil is actively dispersed by the application of dispersants, the risk of toxic effects in deeper water increases. In addition the toxicity increases.

3.1.5 Sensitive areas and the need for protection

3.1.5.1 Marine protected Areas in Egypt

Protected areas and endangered species have a high priority for protection during an oil spill. The Law concerning Natural Protectorates (the Law No. 102 of 1983) created the framework for the establishment of natural protectorates in Egypt. The National Parks Department of EEAA is responsible for implementation of the Law No. 102 and supervising the national network of parks.

According to the Law 102/1983, all fauna and flora found in the Protected Areas is strictly protected. The law prohibits "any activity or practice leading to the destruction, degradation and spoiling to the natural ecology or any harm to the terrestrial, aquatic or plant life or causes any damage to the aesthetics of the area." There are at present six protected areas along the Egyptian Red Sea (Figure 32).

Ras Mohammed National Park

This south Sinai Park protects Ras Mohammed Peninsula and the coral reefs along the southern Sinai coast eastward to the Gulf of Aqaba. Included within the area is Tiran Island, which is an Important Bird Area. The island is a large crescent-shaped island situated at the mouth of Aqaba. Mangroves are found on the peninsula and Tiran Island. As the island is a military and mined areas so access is restricted. Seabirds breed in the mangrove at Ras Mohammed. The tidal flats along the Gulf of Suez coast are feeding and roosting sites for seabirds.

Nabaq Protected Area

This protected area in south Sinai includes the terrestrial and marine environment along the southern Gulf of Aqaba coast. The most extensive mangrove in the northern Egyptian Red Sea is included in the reserve and is considered the most northerly mangrove in the world. The mangrove and the associated tidal flats are a breeding habitat for seabirds, as well as an important feeding and roosting site.

Abu Galum Protected Area

This marine and terrestrial protected area is situated on the Gulf of Aqaba coast between Dahab and Nuweiba. The area protects the coral reefs, beaches, the coastal plan and mountains. Other than Osprey, no other seabirds are known to be breeding in this area.

Gabel Elba Protected Area

It is the largest Protected Area in the country comprising 30,000 km2 in the southeast corner of the Eastern Desert from the borders with Sudan to north of Shalatteen. Gabel Elba is a marine and terrestrial protected area including extensive fringing reefs, a number of small islands, mangroves and sandy and rock beaches. Seabirds are said to breed on the islands that are the least known the country. The largest mangrove stand in the country occurs south of Shalateen at Abu Sha'ab and has never properly been surveyed for breeding seabirds.

Wadi El Gimal-Hamata Protected Area

It is a marine and terrestrial reserve encompassing some 40 km of coastline south of Marsa Allam from Wadi Gimal south to Lahmi Bay. Included within the reserve is a large stand of mangroves at Hamata, coral reefs, seagrass beds and islands, including Wadi Gimal and the Qulân island chain.

Red Sea Island and Mangroves Protected Area

A decree extended the boundaries of the Gabel Elba Protected Area to include all the islands along the Red Sea coast from the borders with Sudan north to Hurghada, as well as all the mangroves along the Red Sea coast. This is now being managed as separate protected areas. This reserve includes the islands off the coast of Hurghada, Zabargad island and the other islands to the south not part of the other protected areas, as well as all coastal mangroves from north of Hurghada south to Wadi Gimal. The management of this area is currently under development and is being zoned into different sectors that will be managed by separate units.

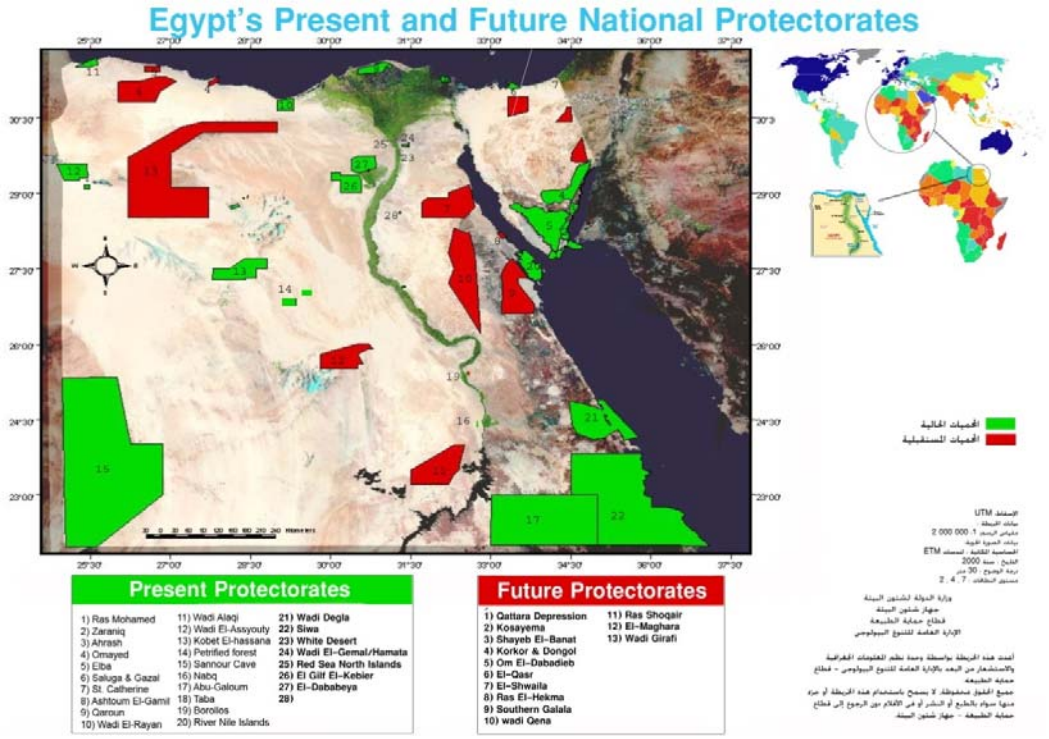


Figure 32. Egypt's present and future national protectorates
(source: EEAA, 2006)

3.2 Resources of economic importance

3.2.1 Living resources

Fisheries

The fish population in the Red Sea shows specific differences in different locations according to the type and slope of the bottom, depth of water and also the type of coral formation present in the area. For example, among the 126 fish species identified in the Gulf of Suez and the 139 species identified in Hurgada, only 25 species are common in the two areas. The paucity in number of species in the Gulf of Suez is most probably due to the type of bottom and the relatively limited depth beside the scarcity of corals. However, the number of the commercially interesting ones compensates the paucity of
the number of species. On the other hand, south of Hurgada, and in the open sea, the number of the identified species is higher, "about 340" most of them belong to the coral reef community (Kamel, 1998).

Some Red Sea fish species migrated through the Suez Canal to the Mediterranean and vice versa. In fact, about 30 fish species from the Red Sea were recorded in the commercial catch of Eastern Mediterranean, and a fewer number of species of Mediterranean origin were observed in the Red Sea (Kamel, 1998).
The fish population in the Egyptian part of the Red Sea comprises two main groups, Coral reef fishes and open sea fishes, in both more than 400 species were recorded. Some species are restricted to the Red Sea only. The most common fish families are *Synodontidae, Serranidae, Carangidae, Lutjanidae, Sparidae, Mugilidae, Scombridae, Thunnidae, Acanthoridae, Siganidae, clupeidae* and many others (Kamel, 1998).

According to the special condition of the Red Sea, numerous coral species are well developed, the most common genera are: *Acropora, Astreopora, Echinopora, Favia, Goniopora, Galaxea, Herpolitha, Leptastrea, Leptoria, Mycedium, Oulophyllia, Pavona, Pocillopora, Porites, Seriatopora and Turbinaria, only Coscinarea* is particular to Safaga island and Red Sea.

Many types of reefs are found along the coast, each of which has its special characteristics, (Fringing reef, barrier reef, coral banks and atolls). They are different in structure, connection with main land, slope and height. Each of these forms has specific fauna.
On the other hand, Lagoons, bays and the mouths of wadis are very typical structures of the Red Sea. These structures provide a good environment for the growth of juveniles "nursing grounds" and particularly suitable areas for fishing activities (Verandah nets and Beach seine), like in Abu Soma Bay, Qoraat Hartway Lagoon and Mouth of Wadi Al-Gemal (Kamel, 1998).

The fisheries of the Red Sea are based on a long-standing traditional (artisanal) fishery where coral reefs spread along the Red Sea Coast and Gulf of Aqaba, with relatively shallow fishing grounds (maximum 70 m depth) with flat sandy bottoms in the Suez Gulf, the only area suitable for trawling. The narrow, reef-rich continental shelf of much of the coastline is suitable only for artisanal fishing with hook and line or inshore set net (FAO Fishery Country Profile, 2003).

There are four fisheries centres along the Suez Gulf, six along the Red Sea Coast and three along the Gulf of Aqaba. There are only two developed fishing ports (Suez and Hurghada). The fishing fleet in 2001 was composed of 78 trawlers and 83 purse seiners in the Suez Gulf, and 711 boats using longline and hooks along the whole fishing ground, in addition to about 128 trawlers working outside Egyptian territorial waters, around the Gulf of Aden. (FAO Fishery Country Profile, 2003).

The catch in the Gulf of Suez constitutes 44 percent of the total landing of Egypt's Red Sea fisheries, while the Red Sea proper contributes 34 percent and 21 percent comes from outside Egyptian territorial waters. Catches from the Gulf of Aqaba comprise less than one percent of the total landings. Major pelagic stocks include horse mackerel, round herring, Indian mackerel and sardines. Demersal species supporting trawl fisheries include shrimps, golden snapper, striped snapper, lizardfish, red mullet and thread-fin bream (Barrania, 1997) while reef fish, predominately the high value groupers (Serranidae) and emperors (Lethrinidae) are the most important species for the artisanal fishery. There is a marked differentiation in catches down the coast which is due primarily to different habitats, but also reflects different gear usage and market demands (De Young, 2006).
The Red Sea fish production statistics in 2007 are presented in Table 10, while the production between 1992 and 2007 is shown in Figure 33.

Table 10.Red sea fish production by species and locations in 2007
(source: General Authority for Fish Resources Development)

Sources	Suez Gulf				Internt'l Water		Red sea							Aqba Gulf		Total in ton
Species	Ataka	Salkhana	Ras Ghareb	Tour	Ataka	Branies	Ataka	Ghrgada	Branies	Safaga	Quseir	Abu Ramad	Shlatien	Noiba	Dahab	
Bogue	1473	-	-	637	-	-		-	-	-	-	-	-	-	-	2110
Brushtooth lizasrdfish	1157	7	-	1	18	87	494	1	1386	-	-	-	-	-	-	3151
Caranx spp	-	-	9	-		-	25	1314	355	112	246	77	131	-	-	2269
Catfishes,upsidedown	-	-	-	-	3	-	38	-	38	-	-	-	-	-	-	79
Chub mackerel	474	-	-	540	-	-	-	-	33	-	-	-	-	-	-	1047
Common carp	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Crabes nei, marine	46	151	2	-		21	1	1	89	-	-	-	-	-	-	311
Cuttlefish, common	179	50	4	28	2	21	95	4	277	-	216	-	-	-	4	880
Emperors (Scavengers)	17	16	16	80		17	47	1341	400	124	238	80	192	56	96	2720
European seabass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Groupers nei	61	2	8	199	2	15	17	1382	256	115	380	80	185	31	68	2801
Indian mackerel	205	14	-	656	-	-	3			-	-	-	-	-	-	878
Kawakawa	144	16	-	21	3		28	34	146		246	-	-	-	-	638

Largehead hairtail	-	-	-	-		-	-	-	-	-	-	-	-	-	-	0
Meagre	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Mullets nei	302	337	2	-	-	-		78	159		246	-	1	-	-	1125
Narrow - barred spanish mackerel	-	4	1	-	-	-	-	119	167	-		32	74		8	405
Red mullet	385	-	-	25	7	17	43	94	417	-	-	-	-	-	-	988
Red porgy	34	1	7	16	-	-	9	285	159	113	-	28	145	4	20	821
Saddled seabream	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Sardinellas nei	36	8	-	545	-	-		278	1326	-	-	-	-	-	-	2193
Sea cucumbers nei	-	-	-		-	-	-	-	-	-	-	-	-	-		0
Sharks, rays, skates, etc	41	2	-	-	-	-	72	-	-	-	-	-	-	-	-	115
Shells nei, marine	-	-	-	75	-	-	-	-	150	-	-	-	13	-	-	238
Shrimps nei, Penaeus	437	8	-	1	3	27	40	1	413	-	20	13	-		-	963
Sigans	5	2	18	-	-	11	-	156	275	114	236	-	43	-	-	860
Silverside (Sand smelts)	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Snapper nei			1	91	1	-	12	119	183		244	34	70	4		759
Sole, common	-	-	-	-		-	-	-	-	-	-	-	-	-	-	0
Sphyraena spp	81	13		-	1	-	42	-	297	-	-	-	-	-	-	434
Spotted seabass	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Threadfin breams	432	-		-	19	82	483	3	1259	-	-	-	-	-	-	2278
Tylosurus spp	-	9	3	-	-	-	-	120	157	-		23	63	-	-	375
Anchovy	3651	16														3667
Others	5975	99	51	1193	16	-	158	2229	2730	225	1368	289	538	6	4	14881
Total	15135	755	122	4108	75	298	1607	7559	10672	803	3440	656	1455	101	200	46986

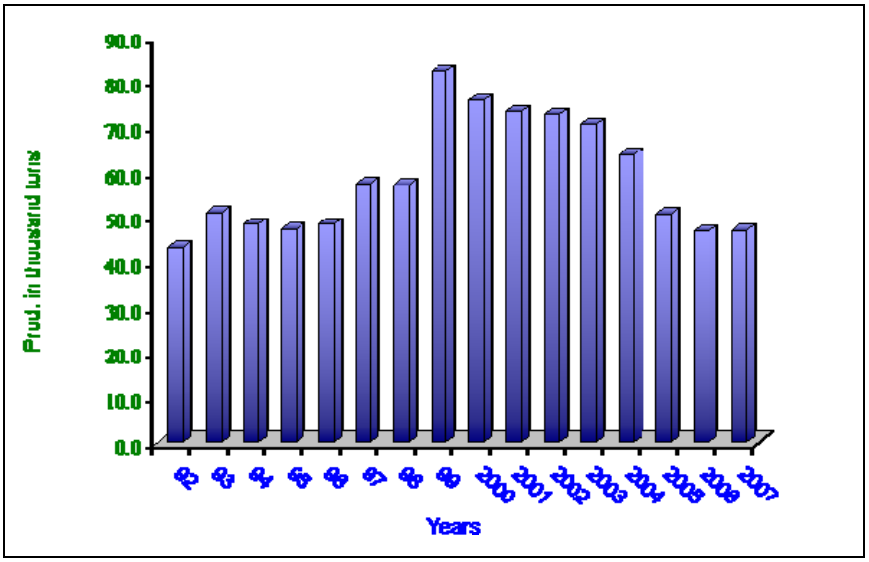


Figure 33. The Red Sea fish production between 1992 and 2007
(Source: General Authority for Fish Resources Development, 2007)

The classification of marine fishing vessels according to power and gears in 2007 is shown in Table 11, while the number of marine fishing vessels using different gears in 2007 is presented in Figure 34.

Table 11.Classification of marine fishing vessels according to power and gears in 2007
(source : General Authority for Fish Resources Development)

Engine power	Red Sea					Total
	Trawling	Purse seine	Long line	Others	Total	
Up to 10 hp.	-	-	5	22	27	27
10 : 20	-	-	23	41	64	64
20 : 30	-	-	79	158	237	237
30 : 50	-	-	246	280	526	526
50 : 100	-	2	129	11	142	142
100:150	-	-	49	-	49	49
150:200	3	4	3	-	10	10
200:250	18	18	3	-	39	39
250:300	4	7	-	-	11	11
300:400	4	13	-	-	17	17
400:500	66	49	-	-	115	115

500:600	**23**	**20**	**-**	**-**	**43**	**43**
600:700	**1**	**-**	**-**	**-**	**1**	**1**
700:800	**2**	**-**	**-**	**-**	**2**	**2**
More than 800	**70**	**3**	**-**	**-**	**73**	**73**
Total	**191**	**116**	**537**	**512**	**1356**	**1356**

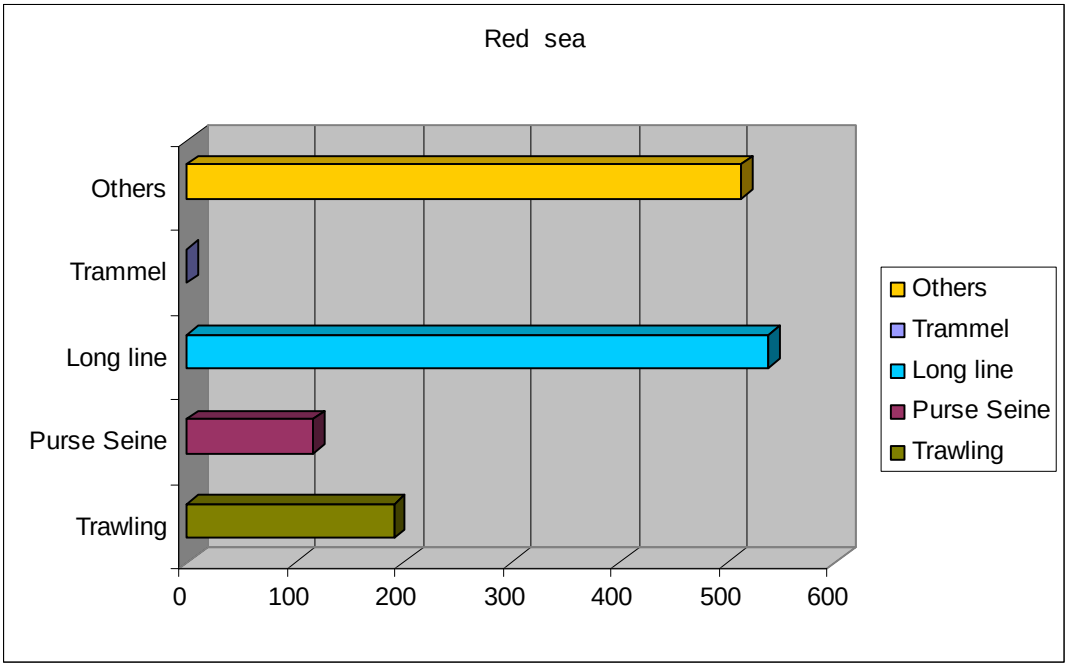


Figure 34. Number of marine fishing vessels using different gears in 2007
(Source: General Authority for Fish Resources Development, 2007)

3.2.2 Tourism

Tourism in Egypt has long been a driving engine of growth and one of the largest sources of foreign currency. The tourism sector is a significant contributor to GDP and employment, with direct shares of 3.5% and 12.6% respectively.

Egypt's tourism sector has regained momentum and realized an outstanding performance over the last few years in terms of volume, value-added and foreign revenues. Tourist inflows to Egypt reached 9.7 million in 2006/07, up by 11.6% from the previous year, and generated a total of US$ 8 billion in revenues against US$ 3,4 in 2002/03. Tourist revenues represent about 25 percent of the total national foreign currency income. International tourist nights amounted to 96.2 million nights, with an average length of stay of 9.8 nights per visitor. Over 80% of Egypt's inbound tourists come from Europe.

On the supply side, the Egyptian tourism sector has seen numerous developments in different areas, such as marketing, ICT infrastructure and human resources, in line with the Ministry of

Tourism's efforts to promote Egypt as a worldwide tourist destination. New tourism niche areas – such as sports tourism, health and therapeutic tourism,
shopping tourism and residential tourism – have evolved as a result of ongoing efforts to upgrade the quality of the sector.
Tourism investments in 2006/2007 amounted to LE4.13 billion, of which 83.5% were private sector investments. The Ministry of Tourism is targeting 14 million foreign arrivals by 2011/12, predicting the generation of 1.2 million new jobs, and aiming to attract private sector investments of LE41.8 billion over the coming five years. Long-term expectations for Egypt's tourism sector remain optimistic, and it is believed that Egypt will continue to be the region's largest tourist destination. Recreational tourism continues to dominate the Egyptian market accounting for approximately 86% of all visits. The study area is one of the major destinations offering the recreational tourism product in Egypt and contributing by 23% of the tourist nights and 29% of tourists visiting Egypt
Massive investment in infrastructure and services has seen in the Red Sea area transformed into a major regional tourism destination. Tourism contributed to the balanced development of the Red Sea region since its beginning in 1988. Tourism significantly gave the opportunity to enable the local community to benefit from the standard facilities, public health positively enhance the behavior patterns, attract foreign developers interested in creating new development as a result of tourist influences. Over the past few years, tourism promotion has not only improved the image of the study area but has also fed into its economic activities, education system, public services and even public attitude.

Tourism, as an export industry, played a major role in the balance of payments in the economic development on the regional and national levels. The foreign tourism balance is defined as the difference between foreign tourist and money spent by nationals abroad. Competitive development of domestic tourism also contributes positively to this balance.
Tourist expenditure on goods and services in the study area generates new incomes and outputs which, in turn, produce further expenditure and incomes in other economic sectors. The effect of this initial expenditure on the economic system on the regional and national levels can be evaluated by the use of the "multiplier' technique. The multiplier coefficient is the ratio of direct and secondary changes within the economy to the direct initial change itself. The nature of tourist spending (in hotel services in travel and consumption of goods) will also have a significant effect as will the availability of suitable local products and services. Multiplier coefficients of tourist expenditure are range from 1.2 to 3.4.
Tourism is the fastest growing sector within the Red Sea area's economy as a major contributor to its GDP. The Government's vision is to increase the number of tourists from 2827307 million visiting the area in 2006 to 5 million per annum by 2017. In 2007, tourism industry in the study area generates 1.82 LE billion, up of 22% increase over the previous year. . The Red Sea has begun to establish a unique tourism industry that is highly favored by Europeans, particularly Russians, Germans, Polish, French, Netherlands tourists.

According to the latest tabulation, the approximate total value of projects in the study area is currently LE 10.1 billion, of which Hurghada accounts LE 6.24 billion. The investments in tourism industry in the study area are expected to exceed LE 5 billion over the next 5 years with the launch of several new projects.

The local economy has pushed forward by tourism development with steady growth in business travel and frequent trade shows and conferences successfully buffering hotels and other tourist establishments from suffering as much as in other tourist destinations.

The existing tourism demand in the Red Sea area tends to be seasonal, with a peak period during the cooler months between September and March. The majority of visitors are foreign visitors and the domestic visitors forming a small fraction of the visitations (only 6% of tourist arrivals). The location of Hurghada city in the southern section of study area makes it one of Egypt's foremost vacation destinations that offer visitors a memorable experience. This region has the potential to attract a large tourist market and yet, the type of tourism that the study area currently receives is not fulfilling this potential.
The Red Sea area has emerged in recent years as a regional tourism hub attracting visitors year-round from all over the world. According to statistics of the Red Sea Governorate 2007 and Ministry of Tourism 2007, the study area is targeting to attract 10 million visitors by 2017. The total tourist arrivals was 3,461,516 tourist arrivals in 2007, up by an increase 22.6% of the previous year 2006 (counted 2,827,307) against 522,000 in 1996, registering a growth of nearly 540 % in ten years. The average length of stay jumped 30 % to reach 8.2 days. The total room nights are more than 27.7 million in 2007 against 4.7 in 1996.

4. CASE STUDIES OF MARINE BIOINVASIONS

4.1 General (GEF/UNDP/IMO/IOI, 2009)

While ballast water is crucial to the safe operation of ships, studies have shown that when ballast water is taken on board, the organisms living in that water are also drawn in to the ballast tanks. Depending on the duration of the voyage and other factors, many of these organisms are then able to survive the journey, and are subsequently released live into the waters of the destination port when the ballast water is discharged. Thus, ballast water serves as a vector for the transfer of species from one part of the world to
another. Where this new area is outside of its natural geographic range, the species which has been transferred is commonly known as an **alien** species (alternative terms are non-native or non-indigenous). If the environmental conditions in this new geographic area are suitable, the alien species may then not only survive, but may establish and spread, in many cases causing, or with the potential to cause, harm to the
local environment, economy, or human health. Such species are generally called **invasive alien species.**

Invasive alien species are now generally recognized as one of the greatest threats to biodiversity globally. They also have serious economic, environmental and health impacts and, as a result, place major constraints on development. In marine and coastal environments, invasive species have been identified as one of the four greatest threats to the world's oceans along with:
• land-based sources of marine pollution,
• over-exploitation of living marine resources,
• physical alteration/destruction of marine habitats.

Ballast water is of particular concern as a vector for the introduction of invasive alien species both because of the large quantities of ballast water being used and discharged into new

environments around the world, but also because of the huge variety and numbers of species which it may transfer.

It is estimated that some 3–5 billion tonnes of ballast water is transferred throughout the world each year with an individual ship carrying anything from several hundred litres to more than 130,000 tonnes of ballast water, depending on the size and purpose of the vessel. Since just one cubic metre of ballast water may contain up to 50,000 zooplankton specimens and/or 10 million phytoplankton cells, and the majority of marine
species include a planktonic phase in their life cycle, there are literally thousands of different marine species that may be carried in ships' ballast water – basically anything that is small enough to pass through a ship's ballast water intake ports and pumps. This includes bacteria and other microbes, small invertebrates and the eggs, cysts and larvae of various species, including most fish, although not all of these will survive in the ballast tank because it is a hostile environment with considerable disturbance, lack of food and light.

Closely associated with ballast water are ballast sediments. When a ship takes on ballast water it also takes on material contained in the water. In turbid or shallow waters this often includes solid material. When this material enters the ballast tank it settles to the bottom as "sediment" and provides a substrate for a variety of marine species, notably dinoflagellates. According to the Ballast Water Management Convention
sediments are defined as "Matter settled out of ballast water within a ship".

"Ballast water is thus recognised as one of the principal vectors of potentially invasive alien species, and is estimated to be responsible for the transfer of between 7,000 and 10,000 different species of marine microbes, plants and animals globally each day."

4.2 Invasive species: Transboundary elements

The number and severity of outbreaks and infestations of invasive species (i.e. species purposefully or accidentally introduced in non-native environments) is growing worldwide, and invasions of marine habitats are now occurring at an alarming rate "ecological roulette". Exotic and invasive species have been identified as a major threat to marine ecosystems, with dramatic effects on biodiversity, biological productivity, habitat structure and fisheries (UNEP-GRID, 2008; Figure 35).

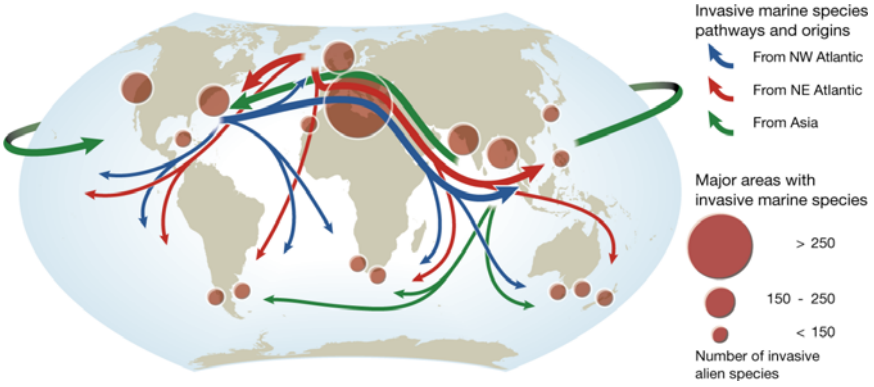


Figure 35 .Major pathways, *concurrent with major shipping routes,* and origins of invasive or toxic species infestations in the marine environment (UNEP-GRID, 2008)

Invasive Alien Species (IAS) can cause significant irreversible environmental and socio-economic impact at the genetic, species and ecosystem levels.

4.2.1 Impacts of marine invasive species

Invasive species have transformed marine habitats around the world. The most harmful of these invaders displace native species, change community structure and food webs, and alter fundamental processes, such as nutrient cycling and sedimentation.

Bioinvasions result in considerable economic effects through direct economic losses and management/control costs, while dramatically altering ecosystems supporting commercial and recreational activities. Effects on aquatic ecosystems result in decreased native populations and modified water tables. These ecological changes in turn impact many recreational and commercial activities dependent on aquatic ecosystems. Common sources of aquatic invasive species introduction include ballast water, aquaculture escapes, and accidental and/or intentional introductions, among others. Alien invasives have damaged economies by diminishing fisheries, fouling ships' hulls, and clogging intake pipes. Some can even directly impact human health by causing disease. Although only a small fraction of the many marine species introduced outside of their native range are able to thrive and invade new habitats, their impact can be dramatic. (Molnar et al., Spalding, 2008.)

The impacts of invasions may be seen locally, but the drivers of biological invasion are, to an increasing degree, global. Unfortunately, there is a paucity of information on invasive species at the global scale. The Convention on Biological Diversity (CBD) has identified the need for "compilation and dissemination of information on alien species that threaten ecosystems, habitats, or species, to be used in the context of any prevention, introduction and mitigation activities" (CBD 2000). Most data have been compiled at local, national, or regional scales. Data that do exist often do not have consistent formats or definitions, and are therefore not easily comparable. Many datasets also lack information regarding ecological and economic impacts, and are therefore unable to inform risk assessments or to catalyze effective policies across national borders (Molnar et al., Spalding, 2008.). Once alien species become established in marine habitats, it can be nearly impossible to eliminate them.

4.3 The current situation in the Red Sea Egypt

The opening of the Suez Canal in 1869 created the first salt-water passage between the Mediterranean and Red Sea. Red Sea species invade the Mediterranean biota, and not vice versa; this phenomenon is known as the Lessepsian migration (after Ferdinand de
Lesseps, the French engineer) or Erythrean invasion. The construction of the Aswan High Dam across the Nile River in the 1960s reduced the inflow of freshwater and nutrient-rich silt from the Nile into the Eastern Mediterranean, making conditions there even more like the Red Sea and worsening the impact of the invasive species (Galil and Zenetos, 2002).

Suez Canal is an open gate for Red Sea water to run into the Mediterranean. Every year, five to ten new species from the Red Sea, and even the Indian Ocean, are discovered in the Mediterranean. So far, at least 10% of all fauna found in the Levant basin are of Indo-Pacific origin.

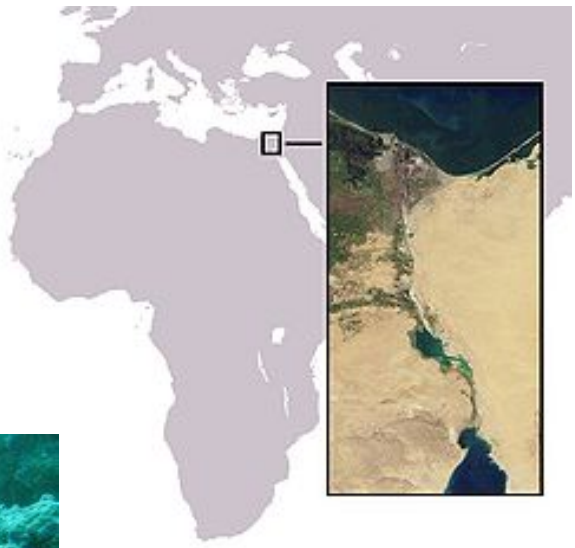


Figure 36 . The Suez Canal and *Fistularia commersonii*, a lessepsian migrant.
(Source: Wikepedia (http://en.Wikipedia org.Wiki/Files/Canal_de_Suez.jpg)

Invasive species originating from the Red Sea and introduced into the Mediterranean by the construction of the canal have become a major component of the Mediterranean ecosystem and have serious impacts on the Mediterranean ecology, endangering many local and endemic Mediterranean species. Up to this day, about 300 species native to the Red Sea have already been identified in the Mediterranean Sea, and there are probably others yet unidentified (Figure 36).

The Suez Canal supports a diversified benthic algal flora; 133 species of benthic algae are now known from the Canal, as compared with only 24 in 1924.The vertical and horizontal distribution of algae is considered in relation to hydrographic factors. The number of Red Sea species decreases from Suez to Port Said in the littoral zone. On
the other hand, bottom algae predominantly belong to Red Sea flora. Thirty of the species of algae found belong to the Indo-Pacific flora; half of these are new records to the Canal. Several of these Indo-Pacific algae have recently become established in the Eastern Mediterranean, whereas only two of the Mediterranean macro-algal flora (viz. n and n) have been found in the Gulf of Suez. Two seagrasses, n and n, are recorded for the first time in the Canal. Only n has found its way into the Mediterranean via the Suez Canal, but none of the Mediterranean seagrasses is found either in the Canal or in the Red Sea.

The Scyphozoa jellyfish, *Rhopilema nomadica*, has proliferated in an astonishingly short span of time. This jellyfish was first collected in the Mediterranean in 1977. By the mid-1980s huge swarms were appearing each summer along the south-eastern Levant coast. The massive swarms of these voracious planktotrophs, some stretching 40km, adversely affect fisheries. When drawn near shore, these swarms have blocked water intake pipes of power stations. Swarms of Rhopilema may have precipitated the population increase of the commercially important

carangid fish Alepes djeddaba, whose juvenile's shelter among the jellyfish's tentacles. Other abundant invaders are exploited commercially. An early Erythrean invader, the swimming crab *Portumnus pelagicus*, was recorded from Port Said in 1898. This crab soon became abundant and in the early 1900s it was offered in the markets of Port Said, Alexandria and Haifa. Erythrean fish are now nearly half the trawl-catch along the Israeli coast, and Erythrean penaeid prawns make up most of the shrimp catches along both Egyptian and Israeli coasts. Growth of some invasive populations to the point that they are harvested commercially is an excellent index of how prevalent they have become (Galil and Zenetos2002).

Box 1. Case Study: Exotic Invasive Seaweed *Caulerpa prolifera* in Suez Canal

The Suez Canal extends 172 km from Port Said in the north to the Suez in the South. About 80 km south of Port said it passes through Lake Timsah, some 5 km long and then after a further 15 km, through the 25 km of the Bitter lakes. *Caulerpa prolifera* start increasing their cover along the coast of the Suez Canal at different depths and from different types of substrates in spring and continued to increase into autumn, with maximum cover in winter. The seasonality patterns have been correlated with changes in light, temperature, desiccation and grazing. A rapid spread and high abundance of the invaded *Caulerpa prolifera* were observed on sandy or muddy sea bottom in shallow protected area of the Great Bitter Lakes. *Caulerpa prolifera* changes the ecology of area by reducing the abundance of native marine fauna and flora (Gab- Alla, 2007).

nvasive species of the algal genus *Caulerpa* have garnered much attention in recent years as they have the potential to supplant native vegetation, thereby altering the structure and function of the subtidal marine landscape. *Caulerpa prolifera* (Forsskal) *Lamouroux* is a green alga, widespread species in tropical and subtropical seas. It is a relative of the Mediterranean invasives of *Caulerpa taxifolia* and *Caulerpa* racemosa and commonly occurring, native, rhizophytic algal species along the Mediterranean. Suez Canal began to be colonized by this seaweed (*Caulerpa prolifera*) as exotic invasive species since few years ago, after 2000, where this species was not recorded before in the Suez Canal. Lately, the progression of *C. prolifera* has been very rapid, expanding to cover most sandy substrate of Suez Canal, nowadays. This species has a record of stress on marine habitats with a great impact on different species and communities of algae, seagrasses, marine invertebrates and fishes. The presence of toxic secondary metabolites explains why *C. prolifera* is avoided by other marine biota (Gab- Alla, 2007).
The manifestation of a negative interaction of *C. prolifera* on *Halophila stipulacea* is consistent with other studies done using other species of seagrass (Talpin et al., 2005) and/or other members of the Caulerpa genus. The bulk of this prior work comes from the Mediterranean where exotic species of Caulerpa have been invading native seagrass beds (e.g., de Villele and Verlaque, 1995; Meinesz et al., 1993b; Boudouresque and Verlaque, 2002; Ceccherelli et al., 2002; Belsher et al., 2003), Also, Talpin et al. (2005). *C. prolifera* is an invasive species in Suez Canal; its interaction is similar to those observed in Mediterranean. In both Suez Canal and Mediterranean, interactions with *Caulerpa sp*. Resulted in a decrease in seagrass abundance under a variety of situations. In addition, anthropogenic alterations to coastal systems of Suez Canal may alter the outcome of these interactions (**Gab- Alla, 2007).**

Box 2. Success story: Crown of thorn starfish - Predator Outbreaks

Crown of thorn starfish (*Acanthaster planci*) classified under phylum Echinodermata. And they feed on coral reefs. In normal circumstances, they don't exceed small numbers of 10m², but in some cases they increase greatly in number and accumulate over each other until 50 starfish /m² that caused great problems because they feed on coral reefs, causing their death.

Acanthaster planci was rarely observed prior to the 1990s. In 1994 there was a moderate outbreak (200 individuals) at Ras Mohammed in south Sinai. It was estimated that the 20 - 30 cm sized starfish caused a loss of 20-30 % of total live coral cover. From 1995 to 1998 the populations of starfish appeared to increase in density, with records of up to five starfish per 10 m2 (Salem 1999). In 1998 a further outbreak of approximately 250 to 300 small (7 -15 cm) individuals occurred at Ras Mohammed, but the greatest outbreak (10,000 individuals) occurred around Gordon reef, near Tiran island. EEAA efforts have diminished the impact of the starfish by organising the collection of over 60,000 *A. planci* between 1998 and 1999.

In 2001, great efforts were exerted from protected areas staff. NGOs and volunteers from Sharm El-Sheikh, Dahab and Hurghada, collected 150,000 starfish. In 2002 and onwards, their numbers have decreased dramatically, and the coral reefs also recovered, exhibited by an increase in growth rate (10cm/year) (EEAA, 2007 & 2008).

Crown of throns causing coral bleaching

Collecting Crown of throns by hand

5. LEGAL, POLICY AND INSTITUTIONAL ASPECTS

5.1 International and regional obligations

5.1.1 The International Response

According to GEF/UNDP/IMO/IOI (2009), growing recognition of the impact of invasive species generally has seen a widespread response to the issue in the form of legal instruments, as well as programmes aimed at developing practical, technical solutions.

The Convention on Biological Diversity (CBD) (1992), for example, provides a comprehensive basis for measures to protect all components of biodiversity against invasive alien species. Moreover, in 1995, Contracting Parties to the CBD adopted the "Jakarta Mandate on Marine and Coastal Biological Diversity", which included alien species as a thematic issue. The goal of the programme of work under the Jakarta Mandate is: "to prevent the introduction of invasive alien

species into the marine and coastal environment, and to eradicate to the extent possible those invasive alien species that have already been introduced." Initiatives more specific to ballast water have been on the agenda of a wide range of international organizations for the last 30 years. Today, a very wide range of key stakeholders, including shipping, ports, environmental groups, tourism bodies, public health organizations, seafood producers, etc. are working on various aspects of the problem both individually, within their own countries and regions and in international forums. At the forefront of the international initiatives is the International Maritime Organization (IMO). IMO has been working through its Member States to tackle the problem of ballast water since 1973 when, at the conference to adopt the MARPOL Convention, the ballast water problem was raised. The conference adopted a Resolution which noted that "ballast water taken in waters which may contain bacteria of epidemic diseases, may, when discharged, cause a danger of spreading of the epidemic diseases to other countries", and requested the IMO and the World Health Organization (WHO) to "initiate studies on that problem on the basis of any evidence and proposals which may be submitted by governments".

IMO then established a Ballast Water Working Group under the Marine Environment Protection Committee (MEPC) and has been actively engaged in seeking a solution to the ballast water problem. Activities have included:

• the development of a preliminary set of Guidelines in 1991 – subsequently replaced in 1997 by anupdated version: the "Guidelines for control and management of ships' ballast water to minimize the transfer of harmful aquatic organisms and pathogens" (Assembly Resolution A.868(20));
• the development of an international legal instrument – the International Convention for the Control and Management of Ships' Ballast Water and Sediments – which was adopted by consensus at a Diplomatic Conference at IMO Headquarters in London on 13 February 2004;
• the development of guidelines for the implementation of the Convention;
• since March 2000, implementation of the GloBallast Programme, a GEF-UNDP –IMO programme providing technical assistance in this area.

The Ballast Water Management Convention

The Ballast Water Management Convention sets out the general rights and responsibilities of Contracting Parties in its preamble and articles, with regulations on more specific technical matters in the Annex – for example, the application and exceptions to the Convention, treatment standards, Ballast Water Management Plans (BWMP), recording requirements, and the designation of special areas with differing
requirements.

5.1.2 Regional Response

Jeddah Convention and Protocols

The Jeddah Convention of 1982, formally titled "Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment," provides an important basis for environmental cooperation in the Region. It was the result of a Regional Intergovernmental Conference, supported by the United Nations Environment Programme. The Regional Intergovernmental Conference also adopted a "Programme for the Environment of the Red Sea and Gulf of Aden (PERSGA)," and established a Secretariat for the Programme in Jeddah. In addition, the

Conference produced two important instruments: (a) an "Action Plan for the Conservation of the Marine Environment and Coastal Areas in the Red Sea and Gulf of Aden"; and (b) a "Protocol Concerning Regional Cooperation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency." The provisions of the Jeddah Convention are complemented by those of MARPOL and the Basel Conventions.
Djibouti, Egypt, Jordan, Palestine, Saudi Arabia, Somalia, Sudan and Yemen are Parties to the Jeddah Convention. Table (12) is a register of the multilateral agreements to which Egypt is a signatory including the International and Regional Conventions directly linked to the assessment report such as

- *Ballast Water Convention*
- *Convention on Biological Diversity*
- *UN Convention on the Law of the Sea*
- *UNEP Regional Seas Conventions.*

Table 12. Register of the Multilateral Agreements to which Egypt is a Signatory

Environmental Category	Name of Multilateral Environmental Agreement	Date of Ratification(R)	Date of Entry Into Force(E)	Date of Signature(S)
Biodiversity and Natural Resources	Convention on Wetlands of International Importance Especially as Water Fowl Habitat (RAMSAR)	09/09/1988	09/09/1988	
	Convention on International Trade in Endangered Species of Wild Flora and Fauna (CITES)	04/01/1978	04/04/1978	
	Convention on Biological Diversity (CBD)	02/06/1994		
	Protocol Concerning Mediterranean Specially Protected Areas	08/07/1983		
Oceans and Seas (Conservation and pollution prevention, management)	BWM Convention	13/02/2004		
	Regional Convention for the Conservation of the Red Sea and Gulf of Aden Environment (Jeddah)		20/08/1990	
	United Nations Convention on the Law of the Sea	26/08/1983		
	Agreement Relating to the Implementation of Part XI of the United Nations Conventions on the Law of the Sea of 10 December 1982			22/03/1995
	Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea relating to the Conservation and Management of Straddling Fish Socks and Highly Migratory Fish Stocks			05/12/1995
	United Nations Convention on Conditions for Registration of Ships	09/01/1992		
	International Convention for the		22/07/1963	

	Prevention of Pollution of the Sea by Oil			
	International Convention Relating to Intervention on the High Seas in Cases of Oil Pollution Casualities		**04/05/1989**	
	Protocol Concerning Cooperation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency	**24/08/1978**	**23/09/1978**	**16/02/1976**
	Protocol Relating to Intervention on the High Seas in Cases of Pollution by Substances Other than Oil		**04/05/1989**	
	Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter	**30/06/1992**		
	Protocol to the Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, 1972			
	Protocol of 1978 Relating to the International Convention for the Prevention of Pollution from Ships, 1973		**07/11/1986**	
	Convention for the Protection of the Mediterranean Sea Against Pollution (Barcelona)	**24/08/1978**	**23/09/1978**	
	Amendment to the Convention for the Protection of the Mediterranean Sea Against Pollution			**10/06/1995**
	Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft	**24/08/1978**	**23/09/1978**	
	Amendment to the Protocol for the Prevention of Pollution of the Mediterranean Sea by Dumping from Ships and Aircraft			**10/06/1995**
	International Convention on Civil Liability for Oil Pollution Damage	**03/02/1989**	**04/05/1989**	
	Protocol of 1992 to Amend the International Convention on Civil Liability for Oil Pollution Damage, 1969	**21/04/1995**		
	Protocol Concerning Regional Cooperation in Combating Pollution by Oil and Other Harmful Substances in Cases of Emergency		**20/08/1990**	
	International Convention on Oil Pollution Preparedness, Response and Cooperation	**29/06/1992**		
	Protocol on the Prevention of Pollution of the Mediterranean Sea by Transboundary Movements of Hazardous Wastes and their			**01/10/1996**

	Disposal			
	Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	**08/01/1993**	**05/05/1992**	**13/02/1992**
	Amendment to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	**13/12/2003**		**22/09/1995**
	Stockholm Convention on Persistent Organic Pollutants (POPs)	**02/05/2003**	**17/05/2004**	**17/05/2002**

Besides, Egypt ratified the **Mediterranean MOU on PSC**.

5.2 National policies and legislation

5.2.1 Environmental Law (Law No. 4/1994) amended by the executive statute of Act 9/2009

The Environmental Law (the Law No. 4) was drafted with a view not to replace previous environment-related legislations but to complement these legislations and to address any legal gaps or needs that are not adequately addressed by these previous laws like the Law No. 48. The Law No. 4 and its executive regulations define the roles and responsibilities of EEAA, which include regulation of air pollution, control of hazardous substances, management of hazardous waste and control of discharges to marine waters. Though the Law No. 4 gives EEAA diverse legal tools to implement and enforce these provisions, the environmental standards of water quality which are set up to raise the administrative target in many countries are not defined. Meanwhile, the Law No. 4 stipulates specific quality standards for ambient air and noise.

The key features of Law No. 4 may be summarized as follows:

· It re-establishes EEAA under the Cabinet of Ministers as the highest national authority in charge of the environment;
· It requires all new projects and activities to submit an environmental impact assessment (EIA), and gave EEAA the final responsibility of approving them;
· It gives EEAA the power to inspect and enforce the law;
· It establishes an environmental fund and mandated EEAA with the proposal of economic incentives for the protection of the environment;
· It addresses gaps in the previous laws (Law No. 48) concerning air pollution, noise, industrial and municipal discharges to the marine environment, hazardous wastes and sanitary landfilling; and
· Finally, it increases significantly the fines and penalties for violations.

According to the Law No. 4, EEAA has the responsibility of formulating the general environmental policy as well as the plans for environmental protection and to follow up on their implementation in coordination with the competent administrative authorities. In addition, the Agency is responsible for strengthening environmental relations between Egypt and other countries, and regional and international organizations.

In specific, the Law No. 4 mandates EEAA with the following:

· Prepare draft laws and decrees related to the fulfillment of its objects and express its opinion on proposed legislation related to the protection of the environment;
· Prepare studies on the state of the environment, formulate the national plan with the projects included for the protection of the environment, prepare the estimated budgets for each as well as environmental maps of urban areas and areas to be developed and lay down the criteria to be observed when planning and developing new areas as well as the criteria targeted for old areas;

· Lay down the criteria and conditions, which owners of projects and establishments must observe before the start of construction and during the operation of these projects;
· Conduct field follow-up of compliance with the criteria and conditions that are binding to agencies and establishments and take the procedures prescribed by law against those who violate such criteria and conditions;
· Lay down the principles and procedures for assessing the environmental effects of projects;
· Lay down a plan for environmental training and supervise its implementation;
· Prepare the draft budgets required for the protection and promotion of the environment;
· Propose economic mechanisms to encourage different activities and procedures for the prevention of pollution; and
· Coordinate with the Ministry for International Cooperation to ensure that projects funded by donor organizations and countries are in line with environmental safety considerations.

5.2.2. Natural Protectorates (Law No. 102/1983)

The Nature Protectorates Law (the Law No. 102/1983) addresses the protection of the marine environment including that of the Gulf of Aqaba announced as one of the nature reserves by the Prime Minister decree No. 33/1996, as well as the Red Sea protected islands south of Hurghada. The protectorates encompass the waters with one nautical mile around such islands and mangrove forests.

The provisions of this Law have addressed the protection of the marine environment declared as nature reserves in the Red Sea, Gulf of Aqaba and Red Sea islands. Provisions related with water quality in natural protectorates are in place in the articles of Law No. 102, as follows:

· Polluting nature protectorates waters from any source including land or marine sources should be prohibited; and
· The Law mandated EEAA with the protection of marine environment and processing of violations.

5.2.3. Environmental Impact Assessment

The Environmental Impact Assessment (EIA) is a major legal tool which EEAA is given under the Law No. 4 to exercise its law enforcement for comprehensive environmental protection. It is implemented through its Executive Regulations (Prime Ministerial Decree No. 338 of 1995), which came into full implementation in 1998.

EIA is defined as a technical study which clarifies potential environmental impacts resulting from the project and is undertaken by the investor or his representative. Through the study, different impacts of the project are analyzed and measures and alternatives for the different elements of the project are proposed, leading eventually to the elimination or mitigation of these impacts to the lowest extent possible.

The study is taken into consideration by relevant administrative authorities when deciding whether to grant or reject a license to a project. EIA process comprises a number of procedures determined by the Law No. 4 and its Executive Regulation, as well as EIA Principles and Procedures Guideline issued by EEAA, ensuring environmentally sound and sustainable development choices, besides the ability to identify any environmental consequences in the first stages of the planning process.

The Law and Executive Regulation require an EIA for new projects and expansions and renovations of existing ones. Sectoral ministries and Governorates are the competent administrative authorities for EIA in Egypt, as they possess the executive powers in relation to development authorization. The Central EIA Department of the EEAA is responsible for supervising the screening process, managing the review of EIA reports, taking decisions on the acceptability of EIA reports and giving an opinion on the development and proposals for mitigation measures.

Specific objectives of each EIA undertaken under the Law No. 4 are described as follows:

· Providing sound basis for the decision-making process of project component design;
· Ensuring project implementation with full awareness of environmental factors;
· Increasing public awareness of the timing and forms of any potential environmental impacts; and
· Facilitating public participation in the decision-making process.

Facilities subject to EIA conditions are classified according to the following four criteria:
· Type of activity;
· Natural resources used;
· Facility location; and
· Type of energy used.

The general guidelines has been issued in 1995 and describe in detail the screening method, which is based on three lists of project types:

· White list projects with minor impacts (Category A);
· Gray list projects which may result in substantial environmental impacts (Category B); and
· Black list projects for which complete EIA is mandatory due to the magnitude and nature of their potential impacts (Category C).

The guidelines include two screening forms, form A for white list projects and form B for gray list projects. For gray list projects, EEAA may require a scoped EIA, as specified by EEAA on the basis of the information presented by the developer in form B. In 2001, the

EIA classification system was updated to include some modifications to the division between the three categories A, B, and C, varying in the severity of possible environmental impacts, as well as the expansion of the lists of facilities in each category to include additional ones, with the purpose of minimizing errors in categorization.

5.2.4 Environmental Protection Fund

One of noteworthy topics in the Law No. 4 is an Environment Protection Fund (EPF) established under the Article 14. The resources of the EPF will be drawn from:
· State budget allocations; · Grants and donations by national and foreign agencies for protecting and promoting the environment; · Fines and compensations by court rulings or which are agreed upon for damages affecting the environment; and · Resources from the Protectorate Fund established by the Law No. 102 of 1983.
The Article 7 of the Executive Regulations of the Law No. 4 also lays down the following sources of income:
· EEAA's share of the 25% dues imposed on travel tickets issued in Egypt in Egyptian currency (according to the Article 1 of the Law No. 5 of 1986 and the Prime Minister's Decree No. 697 of 1986) with a minimum of 12.5 % of the total proceeds;
· The returns from experimental projects undertaken by EEAA; and
· Remuneration for services rendered by EEAA to third parties.

The Fund is allocated in order to achieve its objectives. The Article 8 of the Executive Regulations list 13 objectives including the following which are relevant for the NOSCP:

· Confronting environmental disasters; and
· Confronting pollution from unknown sources;

EEAA is responsible for administering the national funds for oil spill response which will be available from the Environmental Protection Fund. These funds will be available specifically for providing the financial support for responding to oil spills in which the polluter is unknown.

5.3 Legal Setting Associated with Oil Pollution

5.3.1 Provisions of Law No. 4

In terms of water quality, the Environmental Law (Law No. 4) aims to control the water quality of marine and coastal waters, because the Law No. 48/1982 has already set provisions for other waters like rivers and lakes. Therefore, the Law No. 4 lays numbers of provisions to control water pollutions in coastal and marines, especially oil pollutions to be caused by sea-based and land-based sources.

Sea-Based Pollution Sources

In the Chapter 1 (pollution from ship) of the Law No. 4, the section 1 (oil pollution) states oil pollution caused by sea-based sources like oil tankers, commercial ship, platforms for oil extraction, etc. From above articles, owners of ships, sea rigs/platforms and companies working in digging, exploitation and exploration for oil at the sea are imposed by the following obligations.

· Not dumping or discharging any oils or oil mixtures into the sea;
· Prompt reporting of spills or leakages resulting from facilities, boats, ships or tankers by the captain or owner of such or by affiliated companies;
· Taking measures and precautions required for preventing the spread of pollution by oil after the occurrence of a pollution incidence;
· Preparing marine platforms and facilities working in oil exploitation and exploration by devising appropriate plans and measures required for marine environment protection from oil pollution risks;
· Oil tankers shall keep oil registers and make it available for inspection;
· Foreign ships using Egyptian ports or sailing through the special maritime zone shall be equipped with pollution mitigation facilities; and
· Taking all sufficient precautions for the prevention or mitigation of pollution impacts before or after the occurrence of breakdowns in a ship or one of its equipment and promptly notifying competent administrative authorities immediately about discharges resulting from such breakdowns in a ship or one of its equipment.

Land-Based Pollution Sources

At the same time, the Chapter 2 of the Law No. 4 (land-based pollution) stipulates regulations about various pollutions including oil pollutions to be generated from land-based sources like industrial and domestic wastewater facilities.
Establishments have to comply with the effluent standards (including oil and greases) for wastewater discharged. EEAA has the competence to carry out periodical monitoring for compliance checks.

According to Article 1 of the Law, the following establishments are regulated as the land-based sources:

· Industrial establishments;
· Tourist establishments;
· Establishments used for electrical power generation and production;
· Mines, quarries and establishments operating in the field of oil exploration, drilling, and transportation;
· All infrastructure projects; and
· Any other establishment, activity or project which may have a noticeable impact on the environment.

5.3.2 Water Quality Standards for Oil and Greases

Law No. 48/1982 has set up the environment standard in terms of oil pollution. According to the article 40 of the ministerial degree for this law, Nile and canals should maintain less than 0.1 mg/l of oil and greases. Meanwhile, the decree by the Ministry of Health and Population (in 1996) has stipulated less than 0.1 mg/l of oil and greases as the standard quality for swimming purpose.

To mitigate oil pollutions in Egypt, the Law No. 4, the Law No. 48/1982 and others have set numbers of effluent standards including oil and grease. These effluent standards are applied for the wastewater discharged from establishments.

5.3.3 National Oil Spill Contingency Plan

Through the Article 25, Law No. 4 provides the legal and institutional basis for formulating and updating of Egypt's National Oil Spill Contingency Plan (NOSCP). The Article 25 does not specify any particular type of environmental disaster but it is acknowledged by all concerned that such events include major oil spills. The definition of "environmental disasters" in the Article 1 of the Law reads: "Accidents due to natural or man-made actions that lead to severe damage to the environment and require resources beyond local capabilities to confront.

The NOSCP will, in effect, form a component of the Environmental Disasters Contingency Plan which, under the Article 25, has to be prepared by EEAA. This Plan will have to be approved by the Cabinet of Ministers and Prime Ministerial decree.

The Environmental Disasters Contingency Plan envisaged by Law No. 4 comprises the following elements:

· Determining the different kinds of environmental disasters and the agencies responsible for their occurrence or expected occurrence;
· Establishing a Central Operations Room for receiving the reports about environmental disasters and following up the receipt and dispatch of accurate information with a view to mobilizing the necessary response action,
· Forming a task group to respond to the disaster. The Head of the task group will be delegated power to respond to the disaster, in co-operation and coordination with other concerned agencies.

In relation to oil spills, all these elements will be addressed in the NOSCP.

5.4 National Policy and Strategy

5.4.1 General Environmental Policy

5.4.1.1 National Environmental Action Plan (1992)

The National Environmental Action Plan (NEAP) of 1992 is the first document to provide the tools for ensuring that “Egypt’s economic growth becomes a sustainable one”.

It firmly asserts that “Protecting the environment, among other aspects, is one of the key imperatives imbedded in the concept of sustainable development”.

5.4.1.2 Policy Directive of MSEA (1998)

The Policy directives of the Ministry of State for Environmental Affairs (MSEA) were issued in 1998 and updated in 2002 and represent a good start towards establishing an environment management system based on specific programs and outputs that would enable MSEA and EEAA to set specific targets and report on the achievement of those targets. The updated policy directives are as follows:

· Strengthening partnership at the national level through full coordination with the national entities that have their environmental projects or their activities have impacts on the environment;
· Supporting bilateral, regional and international agreements in the environmental field;

· Enforcing the Law No. 4 for the protection of environment and the Law No. 102/83 for nature protection;
· Implementing environmental protection projects through national, bilateral, multilateral funds;
· Supporting integrated environmental management systems;
· Supporting the multilateral environmental agreements to which Egypt is a signatory;
· Integrate the use of marked based instrument in the field of protection of environment;
· Transfer and adoption of environmentally friendly technologies;
· Encourage foreign investments in the area of environmental protection through involvement of private sector and
· Support to the policy of the decentralization of environmental management.

5.4.1.3 Updated National Environmental Action Plan (NEAP) (2002)

The Updated National Environmental Action Plan (NEAP) of 2002 covers the period from 2002 to 2017. This document is designed to represent Egypt's agenda for environmental actions over the next 15 years. It is also designed to complement and integrate with existing sectoral plans for economic growth and social development. The
updating of the NEAP utilized a participatory and consultative approach, whereby several workshops and meetings with stakeholders were conducted to explore their interests, assess assets and resources and formulate issue-specific working groups to reach a consensus on the issues and priorities as well as directions for future actions.

The NEAP 2002 presents a brief account of the State of the Environment by providing information on the following issues:

· Water Resources
· Air Pollution
· Land Issues: Agriculture and Human Settlements
· Marine Environment
· Waste
· Biological Diversity
· Bio-safety and biotechnology

The NEAP includes programs and projects that address the aforementioned environmental issues. It also discusses the necessary measures for institutional development. It is viewed as a diagnostic document with qualitative analysis of the environmental issues but with little quantitative analysis for setting priorities, including a plan of strategic actions.

5.4.1.4 EEAA Five-Year Action Plan

EEAA Five-Year Action Plan is based on the NEAP 2002 and the policy directives. EEAA developed its five year action plan, which includes the following:

· Integrated solid waste management program to achieve sound management of solid waste and healthcare waste in all governorates of Egypt;
· Pollution Abatement Program to protect River Nile and water resources and air quality of Greater Cairo;

· Environmental education, training and awareness program to increase public awareness of environmental program and develop human resources within the field of environment;
· Environmentally friendly technology transfer and support Egyptian exports program to promote the use of environmentally technology in all economic activities;
· Environmental information and Monitoring system program to enhance the use of information technology specially in the field of environmental management;
· Nature conservation and protecting biodiversity program to conserve national biodiversity;
· Capacity development of EEAA and RBOs program to support the institutional structure of environmental management at the national level;
· Afforestation and Green area expansion program to support governorates and NGOs in establishing nurseries and carrying out greening projects;
· Regional Branches Offices of EEAA Program to support renovation and establishing

new RBOs at the governorates level; and
· Environmental Protection Fund Program.

5.5 Policies Associated with Oil Pollution

Particular documents stating comprehensive descriptions for the management policy specializing in oil pollution are not found in Egypt. The policies for oil pollution issues handled in this Project are contained in various field of the environment, like water quality management, coastal and marine resources management, and disaster prevention management but mainly in coastal water management.
General principles and policies for oil pollution associated with oil pollution are enumerated,below:

5.5.1 General Principles for Protecting Coastal and Marine Environment

The “Egypt State of the Environment Report (2004)” refers to the following principles to be pursued in the seas and coastal zone management in Egypt. For addressing the problems in coastal and marine environment, EEAA states a number of general principles to be monitored:

These principles are:
· Marine pollution threatens all state sectors, and therefore, marine pollution prevention is a collective responsibility, not restricted to one entity;
· Each sector is required to prevent the sources from marine pollution resulting from its activity, in accordance with local laws and according to and in compliance with international and regional conventions;
· Each sector is responsible for protecting its investments from marine pollution hazards and is required to raise its preparedness to address marine pollution to the level corresponding to the hazards such sector causes or is exposed to; and
· Encouraging private sector participation in marine pollution prevention and establishing specialized companies for that purpose.

5.5.2 General Direction for Protecting Coastal Water

The "National Environmental Action Plan 2002" presents the direction and management scheme for protecting coastal waters, as below:

Pollution of coastal areas originates from land-based resources including towns and cities, industries, construction, agriculture and tourism. The contaminants that pose the greatest threat to the marine environment are sewage, chemicals, sediments, litter, plastics, and oil. Some of the materials are toxic and tend to accumulate in living
creatures. Pollution also originates from sea-based activities, like shipping, accidental spills of oil and chemicals and offshore activities. Therefore, the protection of coastal waters should be conducted along the following directions:

· An integrated management scheme to address marine pollution from land-based and sea-based sources are required;
· This scheme should provide a framework within which the role of each stakeholder is identified; and
· In order to assist decision making at all levels, further measures should be considered.

These include establishing a database system for coastal water quality and sources of pollution, producing maps for different coastal water and marine environment in Egypt and expanding appropriate monitoring and assessment programs.

5.5.3 Management Scheme of Coastal Water

The MWRI developed a sustainable management scheme for coastal waters in Egypt. Anintegrated plan for managing and protecting coastal water quality is the output of this program. The expected results of implementing this plan are the improvement of water quality that will have positive economic and financial returns on the cost of the program formulation and implementation. The activities of this scheme include:
· Update and extend existing contingency plans;
· In collaboration with relevant authorities, develop a system to control sources of pollution;
· Set criteria for brine disposal to the marine environment; and
· Support wider ratification and implementation of relevant shipping conventions and protocol.

5.6 Integrated Coastal Zone Management

5.6.1 Current ICZM Institutional Context

Egypt recognized, longtime ago, the importance of the preservation and use of the coastal zone in sustainable manner. Emerging issues as the associated risks with climate change and sea level rise threatening the low lying areas including the Nile delta are carefully considered, along side with the impact of the increase land based activities. Therefore, Egypt was convinced that the planning and management of its coastal zone with a view to their preservation and sustainable development requires a specific integrated approach. Accordingly t*he* ***'Framework Programme for the Development of National ICZM Plan for Egypt was created in 1996'*** *and the National Committee for Integrated Coastal Zone Management was established.*

The national environmental organization is the Ministry of State for Environmental Affairs, the Egyptian Environmental Affairs Agency (EEAA) which is charged with overall environmental issues including ICZM, monitoring and regulatory process. EEAA is continuously developing the capacities and partnerships necessary to strengthen its presence in the Governorates.
At the sector level, many line ministries have a department or unit mandated with environmental management issues. These environmental departments/units vary in terms of their capacities and experiences.

5.6.2 The 'Framework Programme for the Development of National ICZM Plan for Egypt, 1996'

With the passing of the Law for Environment (No. 4/1994) and in recognition of the excessive development of the coastal zone and the impacts from various sources, the "EEAA" was given responsibility to initiate and co-ordinate national integrated coastal zone management activities. This initiative was a major output of the combined national (EEAA) and international (DANIDA / DGIS) efforts that generate **the 'Framework Programme for the Development of National ICZM Plan for Egypt, 1996'.**
Four main coastal issues were identified in the **Framework**:

- Shoreline erosion and flooding
- Irrational land use
- Water pollution
- Deterioration of natural resources and habitats

Accordingly developed objectives of the **Framework** were outlined as follows:
The long-term objective is to have in place a functioning national coastal management strategy (plan), provides clear guidance for actions and activities in the coastal zones of Egypt. This plan should become (within 5-10 years) a binding document, ensuring sustainable use of coastal resources based on integrated decision-making involving line ministries, agencies and the various stakeholders.
The **Framework** pointed out that within the long-term objective, medium- and short-term objectives are to be developed.
The medium term objective is to develop national strategies or plans, focusing on the key issues
The short term objectives are to identify the most vulnerable coastal areas and quickly develop a set of urgent measures that could be taken in order to bring to a halt irreversible environmental degradation
One of the achievements concerning the Red Sea in Egypt was the development of Integrated Coastal Zone Management Action Plan for the Egyptian Red Sea (GEF/TDA/EEAA/RSG, 1998).
The Integrated Coastal Zone Management Action Plan for the Egyptian Red Sea provides guidelines and determines what action is needed to put tourism and other human uses of the Egyptian Red Sea coast onto a more sustainable basis. This action plan is a major component of the Egyptian Red Sea Coastal and Marine Resource Management Project which is an innovative tourism / environmental management project.
A process is sets out in the action plan for determining options and priorities for the use and management of resources along the Egyptian Red Sea coast over the next 5-10 years. The 'model' is transparent, so that this or similar frameworks can also be used to suit future requirements, such as changing resource needs and human pressures or evolving institutional and legislative arrangements.

The ICZM Action Plan is a sub-national plan within the existing National Coastal Zone Management Strategy, giving recommendations for optimal use of the coastal and marine resources along the Egyptian Red Sea coast. It is based on the approach set out in the **Inception Report** (Core Report 1). For its primary building blocks, the ICZM Action Plan uses information from the **Baseline Report** (Core Report 2), which is a compilation of baseline data obtained from planning, marine environmental and ecological surveys as well as from other available information. The Baseline Report is descriptive and indicates the present status of Egypt's Red Sea resources and management structures.
Core Report 4 is a **Reef Recreation Management (RRM) Action Plan**. It provides a basis for future reef recreational zoning and monitoring in the Hurghada-Safaga area and also provides public education and awareness programmes.

Arab Republic of Egypt
Tourism Development Authority / Egyptian Environmental Affairs Agency / Red Sea Governorate

Red Sea Coastal and Marine Resource Management Project

Funded by the Global Environment Facility / World Bank

REPORT 6
INTEGRATED COASTAL ZONE MANAGEMENT ACTION PLAN FOR THE EGYPTIAN RED SEA

WITHIN THE CONTEXT OF THE FRAMEWORK PROGRAMME FOR THE DEVELOPMENT OF A NATIONAL ICZM PLAN FOR EGYPT

July 1998

Core Report 5 is a **Coastal and Marine Protected Area (CMPA) Strategy**. This outlines targeted GEF support for specific areas and actions that help realise the goals of the National Biodiversity Strategy, National Coastal Zone Management Strategy and other national initiatives.

This action plan help maximise benefits for Egypt's human, natural and cultural heritage through the implementation of small-scale demonstration coastal marine protected areas. These involve both broadscale ecosystem-based guidance and targeted, geographic area specific actions. The RRM and CMPA action plans are actually components of coastal zone management, but are also considered separately in view of their special importance.
Core Report 6 (this document) is the **Integrated Coastal Zone Management (ICZM) Action Plan for the Egyptian Red Sea**. It reflects the views and suggestions made by the Project Management Group, Technical Advisory Committee, World Bank and others on the Preliminary CZM Plan (Core Report 3), which was drafted in December 1998. In addition new findings are integrated from the guidance and recommendations provided in Core Reports 4 and 5.
Core Report 7 is a **Project Evaluation Report**, for reviewing the GEF Project history and accomplishments to date in order to provide a constructive platform for implementation of the ICZM Action Plan and other project outputs.

5.7 National Institutions

The key national institutions in Egypt which play a role in ballast water management are:

5.7.1 Ministry of State for Environmental Affairs (MSEA) and the Egyptian Environmental Affairs Agency (EEAA)

In Egypt, the environmental policy is set formally by the Ministry of State for Environmental Affairs (MSEA) and Egyptian Environmental Affairs Agency (EEAA) is the executive arm of the MSEA.

The mandate of MSEA is to achieve a harmonized balance between the needs of developing the State, while protecting her natural resources. MSEA is required to address the cumulative impact of environmental problems that have accumulated over the past 40 years, mobilizing investments and building human capacities.

MSEA has established the National Environmental Action Plan (NEAP). It includes plans to deal with these requirements, which has to be implemented through line ministries in collaboration with major stakeholders, such as NGOs and the private sector.

The Environmental Law (Law No. 4) provides a variety of mandates for **EEAA**. Given its coordinating and horizontal role among all related ministries, EEAA is put under the responsibility of the Council of Ministers, and the Minister is assigned to oversee the work of the agency and chair EEAA Board of directors.

5.7.2 Ministry of Transport-Maritime Transport Sector "MTS"

Egypt is a maritime country that has a remarkable geographical location on the junction of three continents and has coasts up to 2000 km on the Mediterranean and the Red Sea which allowed its connection with the foreign world since ancient ages. Moreover a vital artery – Suez Canal- passes through its land linking the East to the West which is Suez Canal.
The foreign seaborne trade volume of Egypt represents about 90% of the Egyptian foreign trade volume. Since the maritime transport process became a complicated industry it was indispensable to develop this industry through a well-defined strategic goal

The Sector strategy

The effective contribution in the Egyptian national economy and the Egyptian foreign trade through creating efficient cadres capable of influencing the decision makers in the

field of maritime transport on the international level.

MTS Objectives

Setting the objectives and the policies of the authorities, bodies and entities, following up their application and coordinating between them.

Developing the Egyptian sea ports in order to cope with the progress of the maritime transport industry and to acquire the necessary competitiveness through updating their infrastructure and facilities as well as transforming the role of the ports from being just a gateway or a passage to become one of the links of the multi-modal transport chain and a distribution center.

Coordinating with the governmental bodies, ministries, ports authorities, maritime chambers and port users in order to unify, revise and scrutiny the resolutions, laws and regulations.

Raising the efficiency of the maritime transport personnel according to the international standards to be able to provide labor to the foreign countries.

Applying the information technology in the Maritime Transport Sector.

Achieving the safety of navigation in the territorial waters according to the international standards as well as preventing and combating maritime accidents and pollution.

Encouraging the participation of the private sector in the maritime transport activities and the ownership of vessels and floating units.

Following up, anticipating and consequently coping with the world maritime transport development, in order to increase the Egyptian transit trade volume.

Main Tasks

Developing the maritime transport facilities in order to cope with the world development in the field of maritime transport industry.

Developing the necessary plans for organizing the work process and achieving the optimal level of efficiency in order to serve the national economy.

Ensuring the territorial waters safety and providing the labor capable of coping with the scientific and technological development in the field of maritime transport industry.

5.7.2.1. Red Sea Port Authority

The Red Sea Port Authority is responsible for the operation of several ports located along the coast of the Red Sea.

Ports Under Red Sea Port Authority Jurisdiction

Adabiya, Ataqa, Safagah, Hurghadah, Nuweibah, Sharm El Sheikh, El Tour, El Qusseir, Abou Zenimah, Abou El Ghouson, Wadi Feran, Ras Shukheir, Ras Sedr.

5.7.2.2 Port State control

Port State Control (PSC) is the inspection of foreign ships in other national ports by PSC officers (inspectors) for the purpose of verifying that the competency of the master and officers on board, and the condition of the ship and its equipment comply with the requirements of international conventions (e.g. SOLAS, MARPOL, STCW, etc.) and that the vessel is manned and operated in compliance with applicable international law.

PSC responsibilities

- Reviewing ports compliance to security requirements according the criteria of International Convention for the Safety of Life at Sea (SOLAS) and those of
- International Ship and Port Facility Security Code (ISPS Code) and issuing compliance certificates to such ports;
- Exercising control of ships in territorial waters, the exclusive economic zone and the continental shelf in accordance with the provisions of the maritime law, the law of environment protection as well as international regulations and conventions in force;
- Inspecting foreign ships in ports to check the availability of the conditions stipulated in international conventions concerning safety of life at sea, load lines and the protection of marine environment from pollution.

The responsible agencies in Egypt

1- Port Authority performs operational aspects & Environmental inspection of BWM on ships.
2- Egypt maritime safety agency.

Inspection protocols

Egypt ratified Memorandum of Understanding (MoU) of Mediterranean 1997, Inspection under resolution A (A.787) & (A.882).

- Frequency of inspection: every 6 months at least.
- Inspecting foreign ships in Egypt Red Sea ports to check the availability of the conditions stipulated in international conventions concerning safety of life at sea, load lines and the protection of marine environment from pollution (15% of foreign ships calling ports).
- Reporting requirements: compulsory.

Enforcement mechanisms: Prime ministerial decree no.898 /2002.

Box 3. Regional initiative concerning Port State Control

Port State Control in the Red Sea and Gulf of Aden

Port State Control (PSC) is the means established by IMO by which ports are authorized to inspect foreign (and national) ships to ensure that they meet required safety, construction, equipment and manning standards, and if necessary to detain the ships that fail to meet requiredstandards. Effective PSC requires close coordination between different parts at the regional level. In recent years, a few shipping disasters, causing alarming damage to the environment triggered the concern of several countries about protection of their coastal resources. Such concern initiated the first Memorandum of Understanding on Port State Control between the European Countries, known as Paris MoU. Subsequently, several other Memoranda of Understanding on Port State Controlhavebeenconcluded. The International Maritime Organization (IMO) is playing a major role in formulation of such MoUs. These include: Latin American MoU (Latin American region), Asia-Pacific MoU (Asia-Pacific region), Caribbean MoU (Caribbean region), Mediterranean MoU (Mediterranean region), Indian Ocean MoU (Indian Ocean region), West and Central African MoU (West and Central African region), Black Sea MoU (Black Sea region) and the Arab States of the Gulf Region MoU. US Coast Guards, though not a signatory to any of the MoUs, carries out port State control for compliance with the US Code of Federal Regulations and other International Maritime Conventions.

Six of PERSGA member states are parties to different MoUs: Djibouti, Sudan and Yemen are parties to the Indian Ocean MoU, Egypt and Jordan are parties to the Mediterranean MoU, and the Kingdom of Saudi Arabia is a party to the Arab States of the Gulf Region MoU. In 2002 a Workshop was convened by PERSGA in Jeddah, attended by PERSGA member states, Eritrea, representatives of ROPME member states and the IMO. At the Workshop the advantages of membership of one MoU on PSC for the region were stated. It has been recognized that while the states within the RSGA are members of three different MoUs on PSC and that two of these states are not members of any MoU, harmonizing their systems of ship inspections is not sufficient, which may not assist with the control of sub-standard shipping at a regional level.

6 STAKEHOLDERS SUPPORT

An effective ballast water policy must necessarily involve a wide range of stakeholders so that they can be involved in – and support – the reform process. Without their support, ballast water management measures are unlikely to be successful. The likely stakeholders involved in this process are listed in Table 13.

Table 13. Relevant Stakeholders

Institution	Relevant Areas of Responsibility
Maritime Sector	
Ministry of Transport	-Coordination and control of shipping including maritime safety and environmental aspects. -Flag and Port state control and certificates. -Ship registration services and permits. - Implementation of shipping related conventions and legislation. -Development of the NBWM plan -Responsible for the operation of several ports

Red Sea Ports authority	-Responsible for the elaboration and implementation of port ballast water management plans -Provision of relevant infrastructure, e.g. port reception facilities. -Assist in elaporation and implementation of port BWM plans -Monitoring of routes of vessels that most frequently visiting its port and reporting the BW discharges from those vessels.
PSC	-Reviewing ports compliance to security requirements according the criteria of SOLAS and ISPS Code) and issuing compliance certificates to such ports -Exercising control of ships in territorial waters, the EEZ and the continental shelf in accordance with the provisions of the maritime law and other national and international regulations
Suez Canal Authority	-Responsible for the operation in the Suez Canal -Assist in elaporation and implementation of port BWM plans Monitoring of routes of vessels that most frequently crossing it and reporting the BW discharges from those vessels.
Shipowners and agencies	-Responsible for the procedures and activities on board ships. Must inform ship masters about the requirements of the ports to be visited, including port, maritime, health, immigration and customs authority regulations.
Shipyards, ship builders, naval architects, etc.	-Adaptation of ships and the building of new ships, according to the principles internationally adopted for dealing with ballast water.
<u>Environmental Sector</u>	
Ministry of Environment	-Overall coordination and management of invasive species problems, including monitoring and response plans. -Implementation of biodiversity (CBD..) and environmental conventions and legislation.
EEAA	-Assist the ministry on its responsibilities, particularly in monitoring through its RBO in Suez and Hurghada -Evaluating of environmental Resources and damages that come under invasion. - Develop national plan regarding the marine invasive species - Establish a database for invasive species, pathways, registered cases -Management and protection of marine living resources including biodiversity and endangered species; coastal zone management;

	and protected areas.
<u>Ecology and Monitoring Activities</u> **Universities and Research Institutes: <u>such as</u>** ***-National Institute of Oceanography and Fisheries*** ***-Department of Oceanography-Suez Canal University*** ***-Department of Oceanography-Alexandria University***	- Correctly identified invasive species - Studies of marine ecology particularly in the harbours areas - Studies of marine environmental aspects of the Red Sea particularly in the harbours areas - Developing a data base for environmental aspects Studies of marine ecology particularly in the harbours areas - Apply RST and GIS - Coordinating with regional (as PERSGA) and international agencies
<u>Tourism Sector</u> **Ministry of Tourism** ***Tourism Development Authority***	-Encourage all development projects to monitor (visually) oil pollution and other discharge from ongoing vessels and report to the Port Authority -Adapt adequate measures to be applied in the tourism marinas (in Tourism development centres) through provision of reception facilities
<u>Ministry oh Health</u> **Public health authority**	Supervision and evaluation of sanitary control activities in ports
Fishing and aquaculture industry	Monitoring ballast water discharge from ships at fishing areas for the early detection of introduced species and notifying the port authorities.
Environmental NGOs	Raising awareness of the public regarding the effect of ballast water on the marine environment and encourage their role in monitoring and reporting

7. CONCLUSIONS AND RECOMMENDATIONS

The primary purpose of the ballast water status assessment is to provide the basis for informed decisions makers on what needs to be done with respect to ballast water management within the country.

This report has clearly presented relevant and update information on shipping and focuses on the Red Sea ports in Egypt, the marine and coastal environments including analysis of the threat posed by ballast water, marine bioinvasion with case studies, legal, policy and institutional aspects.

However, the following are **<u>the gaps identified</u>** in the information base:

1. Information regarding the management of ships ballast water and sediments in the Egypt's Red Sea ports.
2. Information on the ecology of the ports *per se* are not available
3. The procedure by which the Port Authority is dealing with the ballast water in practice is not clear
4. There is no clear information on the existence and efficiency of the reception facilities in Egypt's Red Sea Ports.
5. There is no detailed information on invasive species, particularly tracking their paths from ports of origin to discharge port.

The following are the **main recommendations** generated from the assessment study:

1. To avoid redundancy, it is strongly recommended that responsibilities corresponding to the relevant areas of the national institutions detailed in table 12, are to be highly considered and carried out instantly and efficiently.
2. The vitalization through the implementation of the various conventions, protocols..etc, particularly the BWM convention. Therefore, issuance of national laws and regulations in this regard become mandatory.
3. The Ministry of Transport/Maritime Sector through their specialized authorities have to convey all regulation regarding the ballast water to maritime sectors, ships' masters, ships owners through their agents at Egypt's Red Sea ports, and to ensure the compliance with regulations including reporting regularly to the port authorities, and particularly in case of incident discharge.
4. The Ministry of Transport/Maritime Sector is encouraged to develop and adopt at a national level the NBWM strategy.
5. Provision of port facilities for ballast water deemed necessary both from environmental and legal (compliance with international conventions) perspectives.
6. A data base is to be established regarding the invasive species, this to be supported through the regular monitoring of these species particularly in the ports basins including detailed environmental studies.
7. Establishment of research groups to conduct research studies and to assist in the monitoring process.

8 NATIONAL SOURCES OF INFORMATION

8. 1 National Experts prepared the report:

1-Prof. Dr. Mahmoud Khamis EL SAYED – National Expert – Professor of Oceanography.
2- Eng. Kamal H ELKAZZAZ National Focal Point – Port Authority.
3-Chem. Gehan Mohamed Elsayed EL SAKKA- M. Sc. Oceanography – team leader.
4-Mr. Mohamed El Helw - Environmental related issues.
5-Mr. Mohamed Farouk - Legal related issues.
6- Mr. Yasser IBRAHIEM- Maritime related issues.
7- Ms. OMNIA Abdalkader SADIK- Maritime related issues.
8-Ms Nermeen M FATHY- Maritime related issues.

8. 2 Sources of Information

7.2.1.Web sites (National Level)

Maritime sector website : www.mts.gov.eg
Red Sea Ports authority website : www.rspa.gov.eg
Ministry of State for the Environment: www.msa.gov.eg
Egyptian Environmental Affairs Agency: www.eeaa.gov.eg
Ministry of Tourism: www.mot.gov.eg

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ANNEX 1. REGISTERED SHIPPING COMPANIES IN EYPT

1	MISR Edco Shipping	Owner, Manager	Egypt	Alexandria
2	Egyptian International	Owner, Manager	Egypt	Giza
3	Arab Petroleum Pipelines	Owner, Manager	Egypt	Alexandria
4	National Navigation Co	Owner, Manager	Egypt	Cairo
5	Egyptian Navigation Co	Owner, Manager	Egypt	Alexandria
6	Suez Canal Authority	Owner, Manager	Egypt	Ismailia
7	Federal Arab	Owner, Manager	Egypt	Alexandria
8	Port Said Shipyard	Shipbuilder, Repairer	Egypt	
9	MISR Insurance Co	P&I, Insurance, Low	Egypt	Giza
10	Consultant -Marine Ind & Trade	Consultants, Surveyors	Egypt	Cairo
11	Alexandria Shipyard	Shipbuilder, Repairer	Egypt	Alexandria
12	Marco Nasri Law Firm	P&I, Insurance, Low	Egypt	Alexandria
13	Elsabahi, Prof Dr Yehia	P&I, Insurance, Low	Egypt	Port Said
14	Egyptian Ins Supervisory Authy	Maritime Organisation	Egypt	Cairo
15	General Arab Insurance Fed	Maritime Organisation	Egypt	Cairo
16	Central Bank of Egypt	Other	Egypt	Cairo
17	National Bank of Egypt	Other	Egypt	Cairo
18	Global Surveyors – Egypt	Consultants, Surveyors	Egypt	El Manshia
19	Marine Technical Svcs Ltd	Consultants, Surveyors	Egypt	Alexandria
20	Canal Naval Construction Co	Shipbuilder, Repairer	Egypt	Port Said
21	Egyptian Shipbuilding	Shipbuilder, Repairer	Egypt	
22	Timsah Shipbuilding Co	Owner, Manager	Egypt	Ismailia
23	Tidewater Marine Egypt	Towage, Salvage	Egypt	Cairo
24	Maridive SAE	Owner, Manager	Egypt	Alexandria
25	Pace Shipping Services SA	Consultants, Surveyors	Egypt	Port Said
26	MISR (Alexandria)	P&I, Insurance, Low	Egypt	Alexandria
27	MISR Ins (Suez Canal)	P&I, Insurance, Low	Egypt	Ismailia
28	Port Said Eng Works SAE	Marine Equipment	Egypt	Port Said
29	Denton Wilde Sapte – Cairo	P&I, Insurance, Low	Egypt	Cairo
30	Eldib Advocates – Alexandria	P&I, Insurance, Low	Egypt	Alexandria
31	Eldib Advocates - Port Said	P&I, Insurance, Low	Egypt	Port Said
32	Eldib Advocates - Port Tawfik	P&I, Insurance, Low	Egypt	Suez
33	Eldib Advocates – Cairo	P&I, Insurance, Low	Egypt	Cairo
34	Basco Engineering & Trading	Marine Equipment	Egypt	Cairo
35	Suez Shipyard	Shipbuilder, Repairer	Egypt	Suez
36	Belayim Petroleum Co (PETROBEL	Port Authority	Egypt	Cairo
37	MISR Insurance Co (N Cairo)	P&I, Insurance, Low	Egypt	Cairo
38	MISR Insurance Co (M&W Delta)	P&I, Insurance, Low	Egypt	Tanta
39	Nippon Kaiji Kyokai-Alexandria	Maritime Organisation	Egypt	Alexandria
40	El Salam Maritime Transport	Owner, Manager	Egypt	Cairo
41	New Marine Shipping Co Ltd	Consultants, Surveyors	Egypt	Alexandria
42	SGS Egypt Ltd	Consultants, Surveyors	Egypt	Giza
43	Matthews-Daniel (Egypt)	Consultants, Surveyors	Egypt	Cairo

44	Global Oilfield & Mining	Marine Equipment	Egypt	Cairo
45	Ferromisr	Marine Equipment	Egypt	Cairo
46	China Class - Port Said	Maritime Organisation	Egypt	Port Said
47	Radio Holland Egypt-Alexandria	Marine Equipment	Egypt	Alexandria
48	Lloyd's Register – Alexandria	Maritime Organisation	Egypt	Alexandria
49	Lloyd's Register - Port Said	Maritime Organisation	Egypt	Port Said
50	Lloyd's Register – Suez	Maritime Organisation	Egypt	Port Tawfik
51	Alexandria Port Authority	Port Authority	Egypt	Alexandria
52	Cooperative des Petroles	Owner, Manager	Egypt	Cairo
53	Assiut Shipping Agency	Owner, Manager	Egypt	Port Said
54	Red Sea Port Authority	Port Authority	Egypt	Port Tewfik
55	Arab Contractors	Shipbuilder, Repairer	Egypt	
56	El Moez Maritime Co	Owner, Manager	Egypt	Suez
57	ABS Europe - Port Said	Maritime Organisation	Egypt	Port Said
58	ABS Europe – Cairo	Maritime Organisation	Egypt	Cairo
59	ABS Europe – Alexandria	Maritime Organisation	Egypt	Alexandria
60	HCH Suez	Owner, Manager	Egypt	Giza
61	Suez Oil Co (SUCO)	Port Authority	Egypt	Cairo
62	ABB LLC – Egypt	Marine Equipment	Egypt	Cairo
63	AMCO – Alexandria	Marine Equipment	Egypt	Alexandria
64	Timsah Intl Marine Services	Towage, Salvage	Egypt	Cairo
65	International Marine Services	Towage, Salvage	Egypt	Cairo
66	Zakher Marine Intl Oilfield	Owner, Manager	Egypt	Alexandria
67	Sinai Manganese Co SAE	Port Authority	Egypt	Cairo
68	Red Sea Ports Authority	Port Authority	Egypt	Suez
69	Port Said Port Authority	Port Authority	Egypt	Port Said
70	SUMED-Arab Petroleum Pipelines	Port Authority	Egypt	Alexandria
71	Damietta Port Authority	Port Authority	Egypt	Damietta
72	Suez Canal Authority	Port Authority	Egypt	Ismailia
73	Arab Petroleum Pipelines Co	Port Authority	Egypt	Alexandria
74	Western Desert Petroleum Co	Port Authority	Egypt	Cairo
75	Suesso	Port Service	Egypt	Cairo
76	El Menia Shipping Agency	Port Agent	Egypt	Port Said
77	Egyptian General Petroleum Co	Port Authority	Egypt	Cairo
78	El Nasr Mining Co	Port Authority	Egypt	El Hamrawein
79	Red Sea Port Authority	Port Authority	Egypt	Hurghada
80	Mersa Matruh Port Authority	Port Authority	Egypt	Mersa Matruh
81	Nuweibah Port Authority	Port Authority	Egypt	Nuweibah
82	Suez Oil Co (SUCO)	Port Authority	Egypt	Cairo
83	Red Sea Port Aupthority	Port Authority	Egypt	Suez
84	Dekheila Port Authority	Port Authority	Egypt	Alexandria
85	Egyptian General Petroleum Co	Port Authority	Egypt	Cairo
86	Egyptian General Petroleum Co	Port Authority	Egypt	Cairo
87	Suez Canal Authority (PA)	Port Authority	Egypt	Ismailia
88	National Marine Services	Owner, Manager	Egypt	Alexandria

89	Inchcape Shipping – Cairo	Port Agent	Egypt	Cairo
90	Saybolt Egypt	Consultants, Surveyors	Egypt	Alexandria
91	El Mohandes Jotun SAE	Marine Equipment	Egypt	Cairo
92	Caleb Brett-Egypt	Consultants, Surveyors	Egypt	Alexandria
93	Pan Arab Shpg Co - Alexandra	Marine Equipment	Egypt	Alexandria
94	Moteurs Leroy-Somer - Egypt	Marine Equipment	Egypt	Cairo
95	Egypt Govt	Owner, Manager	Egypt	Cairo
96	MISR Gulf Shipping & Offshore	Owner, Manager	Egypt	Alexandria
97	Trust Marine	Owner, Manager	Egypt	Suez
98	ABB Turbochargers – Egypt	Marine Equipment	Egypt	Cairo
99	International Associated Cargo	Owner, Manager	Egypt	Cairo
100	Global Surveyors-Cairo	Consultants, Surveyors	Egypt	Heliopolis
101	Global Surveyors-Port Said	Consultants, Surveyors	Egypt	Port Said
102	Noble Denton Cairo	Consultants, Surveyors	Egypt	Cairo
103	Germanischer Lloyd – Egypt	Maritime Organisation	Egypt	Alexandria
104	Germanischer Lloyd - Port Said	Maritime Organisation	Egypt	Port Said
105	Germanischer Lloyd – Suez	Maritime Organisation	Egypt	Port Tewfik
106	Bureau Veritas – Alexandria	Maritime Organisation	Egypt	Alexandria
107	Canal Harbour & Great Projects	Towage, Salvage	Egypt	Ismailia
108	Mideast Shipping Services	Port Agent	Egypt	Alexandria
109	Mideast Shipping Services	Port Agent	Egypt	Port Said
110	Hyundai HI – Egypt	Marine Equipment	Egypt	Cairo
111	Petrojet	Owner, Manager	Egypt	Cairo
112	International Maritime Ctr-Cai	Maritime Organisation	Egypt	Cairo
113	Barwil Egytrans – Alex	Port Agent	Egypt	Alexandria
114	Barwil Egytrans - P Said	Port Agent	Egypt	Port Said
115	Barwil Egytrans – Suez	Port Agent	Egypt	Suez
116	MISR Petroleum Co	Owner, Manager	Egypt	Cairo
117	Gulf Agency – Alexandria	Port Agent	Egypt	Alexandria
118	IMC Ind & Machinery Consultant	Marine Equipment	Egypt	Alexandria
119	Gulf Agency – Alexandria	Port Agent	Egypt	Alexandria
120	Global Surveyors – Damiet	Consultants, Surveyors	Egypt	Damietta
121	El Salam Shipping & Trading	Owner, Manager	Egypt	Cairo
122	Maridive Survey Div Dsol	Marine Equipment	Egypt	Cairo
123	Sigma Paints (Egypt)	Marine Equipment	Egypt	Cairo
124	Redsea Mediterranean Marine	Consultants, Surveyors	Egypt	Port Said
125	Redsea Mediterran - Alexandria	Consultants, Surveyors	Egypt	Alexandria
126	Redsea Mediterranean - Suez	Consultants, Surveyors	Egypt	Port Tawfiq
127	Det Norske Veritas Petroleum	Consultants, Surveyors	Egypt	Alexandria
128	Orascom Trading Co	Marine Equipment	Egypt	Cairo
129	UNIMAS	Owner, Manager	Egypt	Alexandria
130	Ansaldo Middle East	Marine Equipment	Egypt	Cairo
131	Penta-Ocean – Egypt	Towage, Salvage	Egypt	Giza
132	Abedos Maritime Co	Maritime Organisation	Egypt	Alexandria
133	RINA Egypt – Cairo	Maritime Organisation	Egypt	Cairo

134	Mapso – Cairo	Marine Equipment	Egypt	Cairo
135	ISI – Egypt	Consultants, Surveyors	Egypt	Cairo
136	Mahoney Shipping	Owner, Manager	Egypt	Alexandria
137	Salamarine – Alexandria	Port Agent	Egypt	Alexandria
138	Salamarine - Port Said	Port Agent	Egypt	Port Said
139	Dominion Shpg Agcs - Port Said	Consultants, Surveyors	Egypt	Port Said
140	Egypt Trade Maritime Services	Owner, Manager	Egypt	Alexandria
141	Hamza & Sons	Owner, Manager	Egypt	Port Said
142	Memnon Tours	Owner, Manager	Egypt	Cairo
143	Monim Abdel Samea MA	Owner, Manager	Egypt	Suez
144	Pyramids Maritime Services Co	Owner, Manager	Egypt	Suez
145	Solus Ocean Systems	Marine Equipment	Egypt	Cairo
146	Alexandria Port	Owner, Manager	Egypt	Alexandria
147	International Fast Ferries Co	Owner, Manager	Egypt	Giza
148	Timsah Shipbuilding Co	Towage, Salvage	Egypt	Alexandria
149	Romalex Marine SAE	Owner, Manager	Egypt	Alexandria
150	Suez Canal Shipyard	Shipbuilder, Repairer	Egypt	
151	Egyptian Drilling	Owner, Manager	Egypt	Cairo
152	Shalkami Shipyard	Shipbuilder, Repairer	Egypt	
153	United Engineers	Shipbuilder, Repairer	Egypt	
154	National SB el Shakani	Shipbuilder, Repairer	Egypt	
155	Egyptian Gen Co Irrigation	Shipbuilder, Repairer	Egypt	
156	Port Said Engineering Works Co	Towage, Salvage	Egypt	Port Said
157	Khalaf YS	Owner, Manager	Egypt	Cairo
158	Sayed Nasr Navigation	Owner, Manager	Egypt	Cairo
159	Red Sea Navigation Co	Owner, Manager	Egypt	Port Tawfiq
160	Schneider Electric Egypt	Marine Equipment	Egypt	Cairo
161	Mission to Seafarers-P Said	Other	Egypt	Port Said
162	Maadiya Port	Port Authority	Egypt	
163	El Meks	Port Authority	Egypt	
164	Dakrouri MAA	Owner, Manager	Egypt	Giza
165	Egypt Ship Suppliers Assoc	Maritime Organisation	Egypt	Alexandria
166	Sharaf Maritime & Trading Corp	Marine Equipment	Egypt	Port Said
167	TAMS	Marine Equipment	Egypt	Alexandria
168	INTERSHIP Intl Shpg Enterprise	Marine Equipment	Egypt	Port Said
169	Sphinx Shipping Agency	Port Agent	Egypt	Port Said
170	Fairtrans Marine Trdg & Fwdg	Port Agent	Egypt	Port Said
171	Farama Shipping Agency	Port Agent	Egypt	Port Said
172	Hellenic Register – Egypt	Maritime Organisation	Egypt	Alexandria
173	Sokhna Port Dev Co	Port Authority	Egypt	Cairo
174	Multi Advanced Technology	Consultants, Surveyors	Egypt	Alexandria
175	Octopus Maritime Trading	Owner, Manager	Egypt	Cairo
176	Salem MAH	Owner, Manager	Egypt	Suez
177	Neptune Maritime	Owner, Manager	Egypt	Port Said
178	Pace Shipping Services Network	Port Agent	Egypt	Alexandria

179	Esso Suez Inc	Port Service	Egypt	
180	Suez Oil Co (SUCO)	Port Service	Egypt	
181	Rashied Maritime Services	Owner, Manager	Egypt	Cairo
182	National Shipping & Investment	Owner, Manager	Egypt	Alexandria
183	MACON - Modern Service Office	Consultants, Surveyors	Egypt	Alexandria
184	Dominion Shpg Agcs - P/Tewfik	Consultants, Surveyors	Egypt	Suez
185	Dominion Shipping Agcs - Cairo	Consultants, Surveyors	Egypt	Cairo
186	Dominion Shpg Agcs -Alexandria	Consultants, Surveyors	Egypt	Rushdy
187	Ocean Marine Services Egypt	Owner, Manager	Egypt	Cairo
188	International Naval Works	Owner, Manager	Egypt	Alexandria
189	Octopus Maritime & Trading	Consultants, Surveyors	Egypt	Alexandria
190	Kadmar Shipping Co	Ship Chandler	Egypt	Alexandria
191	Salamarine – Damietta	Port Agent	Egypt	Damietta
192	El-Salawi AR	Owner, Manager	Egypt	Alexandria
193	International Shpg Ent-PTawfiq	Marine Equipment	Egypt	Port Tawfiq
194	Michael Marine Services	Port Agent	Egypt	Port Said
195	Yasser Fahmy Hydraulic Eng	Marine Equipment	Egypt	Cairo
196	Dan Reefer SAE	Marine Equipment	Egypt	Alexandria
197	Nabil Farag Law - P'Said	P&I, Insurance, Low	Egypt	Port Said
198	Middle East Survey & Control	Consultants, Surveyors	Egypt	Alexandria
199	MECON	Consultants, Surveyors	Egypt	Alexandria
200	Arab Commercial Office (ACO)	Marine Equipment	Egypt	Cairo