7.5 Arab Republic of Egypt



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Capital city	Cairo
Population (2005 est.)	72,800,000 (1.7% growth)
GDP per capita (USD 2005 est.)	$4 337
Life expectancy at birth (2005 est.)	70.7 years (male - 68.5, female - 73.0)
Land and water area	1,001,450 km^2 (land - 995 450, water - 6 000)
Length of coastline	2 450 km
Highest and lowest point of elevation	Highest: Mount Catherine (2,629 m) Lowest: Qattara Depression (-133 m)
Coral reef area (2001 est.)	3 800 km^2
Mangrove area (2005 est.)	500 ha
Marine protected areas (2007 est.)	6 994.94 km^2 (9.91% of total territorial waters)
Capture fisheries prod. (2006 est.)	375,894 metric tones
Aquaculture fisheries prod. (2006 est.)	595,030 metric tones

Geographic Location: The Arab Republic of Egypt is located in the north-eastern corner of Africa and south-western Asia. It is bounded on the north by the Mediterranean Sea, on the east by Palestine and Israel, on the south by Sudan, and on the west by Libya, with total land boundaries 2 665 km (Gaza Strip 11 km, Israel 266 km, Libya 1 115 km, Sudan 1 273 km). The country is about 1 085 km from north to south and about 1 255 km from east to west. It has a total area of 1,001,450 km^2, with land area 995,450 km^2 and water area is 6 000 km^2. The coastline is about 2 450 km.

Rivers on the Country's Coast: The Nile River is the longest river in the world, stretching for 6 738 km. The Nile flows from south to north and is formed by three major tributaries: the White Nile, the Blue Nile and the Atbara. The Nile splits into two branches, the Rosetta Branch to the west and the Damietta to the east. Lake Nasser is a man-made lake created by the construction of the Aswan High Dam, which was opened in 1971 and built to regulate the flow of the Nile River, and thus benefit the region's inhabitants. However, technological interventions such as dams often affect and disrupt local ecosystems.



Figure 1. Cairo, the capital of Egypt, is situated on the Nile river delta (Photo credit Aloha Earth).

Coastal Climate: Except for the Mediterranean coast the country experiences a desert climate, which is hot and dry most of the year, especially in the summer months (June to August). Winter is from December to February with average temperatures of 20°C to 26°C (68°F to 79°F). The Egyptian summer is hot and dry in most of the country, and humid in the delta and along the Mediterranean coast. In the coastal region average annual temperatures range from a maximum of 37°C (99°F) to a minimum of 14°C (57°F). Wide variations of temperature occur in the deserts, ranging from a maximum of 46°C (114°F) during daylight hours, to a minimum of 6°C (42°F) after sunset. During the winter season desert temperatures often drop to 0°C (32°F). The Mediterranean coast and southern region are the most humid and have an average annual rainfall of about 200 mm.

Coastal Geomorphology and Habitat: The Mediterranean coast of Egypt extends to 900 km and can be divided into three sections: 1) a western section - the Mareoties coast, between Sallum and Abu Qir (550 km); 2) a middle section - a delta coast between Abu Qir and Port Said (180 km), and 3) the eastern section - the Sinai coast, between Port Said and Rafah (240 km). The geomorphology of the Mediterranean coastal area along the Nile delta extends from Abu - Qir head land in the west to Port Said at the east, and lies between longitudes 30^0 - $32^020'$ and latitudes $31^010'$ - $31^038'$ north. The main geomorphological features of the Nile Delta coastal area can be divided into the following units: beach, sand dunes, lagoons, salt marshes and sabkhas salt flats.

Coastal Currents and Tides: The currents along the Mediterranean coast are mainly thermohaline and wind driven, namely the North Atlantic Current directed eastward which varies in velocity between 1.5 and 2.5 knots. Along the Egyptian Red Sea coast the current is mainly driven by tides and vary semi diurnally between north and south. It varies in speed between 1.2 and 4 knots. Tides along the Mediterranean coast are limited, with a maximum tidal range of about 0.55 m and are mainly semi diurnal. Along the Red Sea coast the tides are semi diurnal and varies in range between 0.0 m at the nodal points near Ras-Gharb and Mersa-Alm and up to 2.5 m in between.

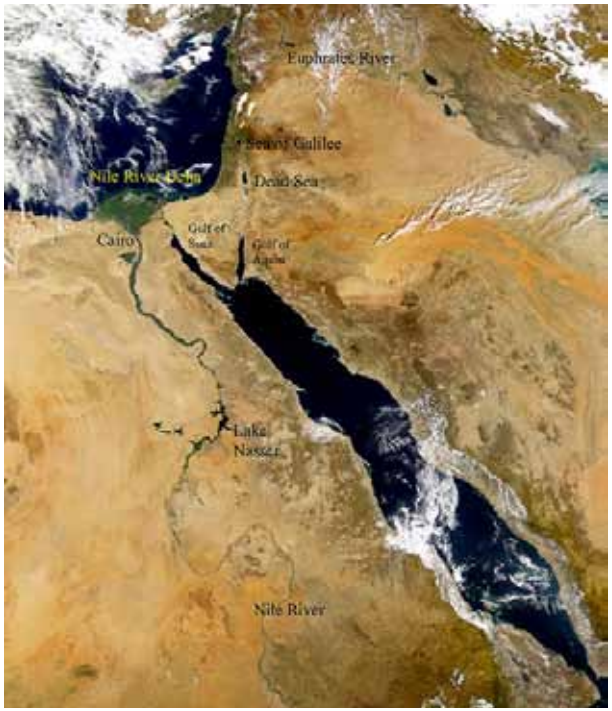


Figure 2. The Nile River, the longest river in the world (image credit NASA - http://disc.gsfc.nasa.gov/).



Figure 3. Old tide gauge at Alexandria Port.

Coastal Observations: At Alexandria Port there is a tide gauge that has been working for 70 years, as well as a new meteorological station.

Ports and Harbours: Egypt's geographic location adds an important aspect to the maritime transport sector. There are 41 ports in Egypt that service commercial, fishing, mining, and petroleum industries, as well as tourism. Among the most important ports are: 1) Alexandria which is the biggest port in Egypt; 2) Dekheila which is a natural extend to Alexandria port; 3) Damietta which has the largest container terminal and most sophisticated equipment in the Middle East, 4) Said, and 5) Suez port located at both ends of the Suez Canal.

Coastal Economy: Coastal tourism accounts for 50% of the national tourism industry. There are many marine national coral reefs along the Egyptian Red Sea. In addition there are several national parks and reserves along the Mediterranean and Red Sea coast (Ras Mohamed, Elba, Nabq, Red Sea Islands, Abu Gallum, Lake Brullus, Ashtum El-Gamil, El-Omayed, Zaranik, Lake Qarun, and Nile Islands).

Fisheries: The fisheries resources along the Egyptian Mediterranean coast are commercial fisheries, while the fisheries resources along the Egyptian Red Sea are artisanal and commercial fisheries (benthic, pelagic fish, shrimp and bivalves). The artisan fishery is concentrated between the coral reef and the shore, while the commercial fishery is composed of demersal fish, shrimp and bivalves.

Marine fisheries are an important source of protein for the coastal population. The production of marine fishes, lake fishes, and Nile river



Figure 4. One of the NIOF Research Vessels.

fish were 130,748; 144,033 and 97,710 tones respectively in 2007. Accordingly, the production of aquaculture is 635,517 tones for 2007, representing 63% of the total production of fisheries in Egypt (GAFRD, 2007).

Other Marine Resources: Touristic and other marine resources include coral reef and mangrove areas, sea cucumber in the Red Sea, as well as sponge in Mediterranean.

Mineral Resources: Egypt is famous for its numerous mineral resources in its mountains and deserts. The principal minerals are iron ore, phosphates, salt, manganese, limestone, gypsum, and gold.

Agricultural products: Cotton, rice, wheat, corn, sugarcane, sugar beets, onions, and beans are the principal crops. Increasingly, a few modern operations are producing fruits, vegetables and flowers, in addition to cotton, for export. Approximately one-third of Egyptian labour is engaged directly in farming, and many others work in the processing or trading of agricultural products. Nearly all of Egypt's agricultural production takes place in some 2.5 million hectares (6

million acres) of fertile soil in the Nile Valley and Delta. Some desert lands are being developed for agriculture, including the ambitious Toshka project in Upper Egypt, but some other fertile lands in the Nile Valley and Delta are being lost to urbanization and erosion. Warm weather and plentiful water permit several crops a year. Land is worked intensively and yields are high (Travel Docs, 2008).

ADDRESSING KEY COASTAL ISSUES AND HOT SPOTS

The Egyptian Mediterranean and Red Sea coast receives large amounts of industrial, agricultural, sewage waste water without treatment, and coastal waters suffer from pollutants in some areas including: Eastern Harbour, Abu-Qir Bay, El-Mex Bay, and Western Harbour. The Red Sea coast is subjected to oil pollution which has potential affects on coral reefs communities, and may affect the tourism industry in future.

Alexandria is the second largest city in Egypt containing more than one third of the national industries and is considered to be the principal seaside summer resort on the Mediterranean. The coastal zone is presently experiencing two main problems resulting from natural and human activities: beach erosion and pollution. Most of the Alexandria coast is rocky and has very little or no beach. Significant erosion occurs along most of Alexandria beaches as a result of the combined effects of sediment starvation, coastal processes and potential sea level rise.

One of the most serious threats to the coastal zone comes from inland pollution sources including lakes and sewage pipelines. As a result of increasing population and industrial development, poorly untreated industrial waste, domestic sewage, shipping industry waste, and agricultural runoff are being released to the coast. With continued rapid expansion of industry and population, changes in water quality would have potential consequences for the large growing population of the Alexandria region. Recommendations for environmental recovery and restoration are proposed for the preservation of Alexandria resort beaches and harbours, and in order to facilitate the development of environmental and tourist activities in the future (Frihy et al., 1996).

The Red Sea coast of Egypt has seen major resort facilities created over the last 20 years. Improper design and non-environmentally friendly sea shore recreation facilities have been constructed by some developers. These include hard structures; earth embankment jetties; digging of lagoons and landfill of coastal areas. All of these improper coastal development activities create harmful impacts on the ecosystem, including: 1) changing the depositional-hydrodynamic regime through the blocking of littoral currents by protruding structures; 2) creating down-drift erosion to the neighboring beaches, 3) deteriorating water quality and 4) degrading the marine biota and habitat. Moreover, these actions usually put additional costs on developers either through direct restoration costs, or through fines received for improper construction (Frihy et al., 2006).

DEVELOPMENT AND ACHIEVEMENTS OF THE NODC

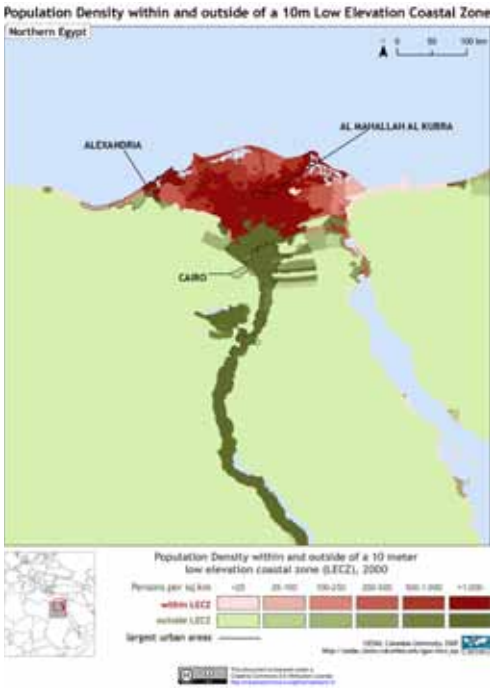


Figure 5. Population density in and around the Nile River and delta (figure credit CIESIN - http://sedac.ciesin.columbia.edu).

Egyptian National Oceanographic Data and Information Centre (ENODC) was established at the National Institute of Oceanographic and Fisheries (NIOF), Alexandria, Egypt, in 1977 in accordance with the resolution adopted by the Intergovernmental Oceanographic Commission (IOC) of UNESCO 1961 as well as the reports of the Ministry of Scientific Research, National Institute of Oceanography, Egypt. The ENODC became part of the ODINAFRICA-III project at the end of 2004. ENODC receives data observed by NIOF and branches. These cover most of the coastal area of Egypt, Meteorological Agency, Fisheries Agency, universities and other organizations in Egypt addressing Oceanographic data and information collection. Through data exchange ENODC

also acquires foreign data through the International Oceanographic Data and information Exchange system (IODE).

ENODC receives worldwide physical-chemical oceanographic data from government agencies, academic institutes, and other organizations and projects in Egypt and internationally. Data is processed, archived, and made available to the public. ENODC's data holdings provide global coverage of basic oceanophysical and hydrophysical properties such as temperature, salinity, ocean current, tides, currents, geomagnetism, gravity and bathymetry.

ENODC's master data files hold numerous individual data submissions that undergo ENODC quality control procedures and are stored in standard World Ocean Database format. Data in these files are available as copies of specified date subsets on magnetic tapes, floppy disks, CD-ROMS or printed form.



Figure 6. NIOF Alexandria branch.



Figure 7. NIOF Central Laboratory.

The main objectives of the Centre include:

- Prepare and maintain a metadata data base of all national data holdings
- Coordinate the collection and archival of ocean data in Egypt
- Receive, manage and diffuse oceanographic data and products
- Publicize data and products available in Egypt
- Develop and maintain a home page on ocean data and products
- Promote the exchange of ocean data and products at all levels
- Establish a network of all stakeholders to facilitate exchange of data and products
- Provide appropriate training in marine data and information management
- Organise training workshops seminars for the benefit of the marine community
- Coordinate local participation in overseas training activities
- Participate in the activities of the IODE programme of the IOC of UNESCO

Products and services available at the NODC include:

- Predicted tide data for locations in Egypt, e.g. Alexandria, for the period 1993 - 2000, and the Mediterranean
- Production of national taxonomic inventories and checklists, e.g. Egyptian Mediterranean Fishes, Mediterranean Polychaetes, Red Sea Fishes, and Copepoda in the Gulf of Aqaba
- Hydrographic studies of lagoons and near shore waters e.g. lagoons near Hurgada
- Circulation, current and tide studies of ocean and near shore waters, e.g. physical oceanography data for Red Sea (1990 - 2000) and circulation study of the Levantine Basin
- Survey studies e.g. exploratory drilling site Hurgada
- Topography and physio-chemical studies, e.g. characteristics of the Egyptian Mediterranean shelf waters off Sinai
- Dissemination of various reports, bibliographies and studies, e.g. bibliography
- of the physical oceanography of the Mediterranean sea,
- environmental pollution and chemical parameter, biodiversity,
- fisheries and microbiology

MARINE RELATED PROGRAMMES AND ORGANIZATIONS

The following organizations are collaborating with the NODC, or can provide directly data sources for aquatic researches and fisheries.

- Egyptian Environmental Affaires Agency (EEAA)
- Alexandria University
- Institute for Graduate Studies and Research (IGSR)
- College of Maritime Transport and Technology (AASTMT)
- Arab Academy of Science and Technology and Maritime Transport (AAST)
- Cairo University
- Ain Shams University
- Egyptian Universities network
- Tanta University
- Mansoura University
- Helwan University
- Minia University
- Menofia University
- South Valley University
- Al-Azhar Al-Sharif University
- International Academy for Media Science
- 6 October University)
- German University in Cairo
- Higher Institutes of King Mariout
- Alsun Academy
- MSA University
- Central Metallurgical Research and Development Institute (CMRDI)
- Egyptian Petroleum Research Institute (EPRI)
- Electronics Research Institute (ERI)
- National Authority of Remote Sensing and Space Sciences
- National Research Centre

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