7.7 Ghana

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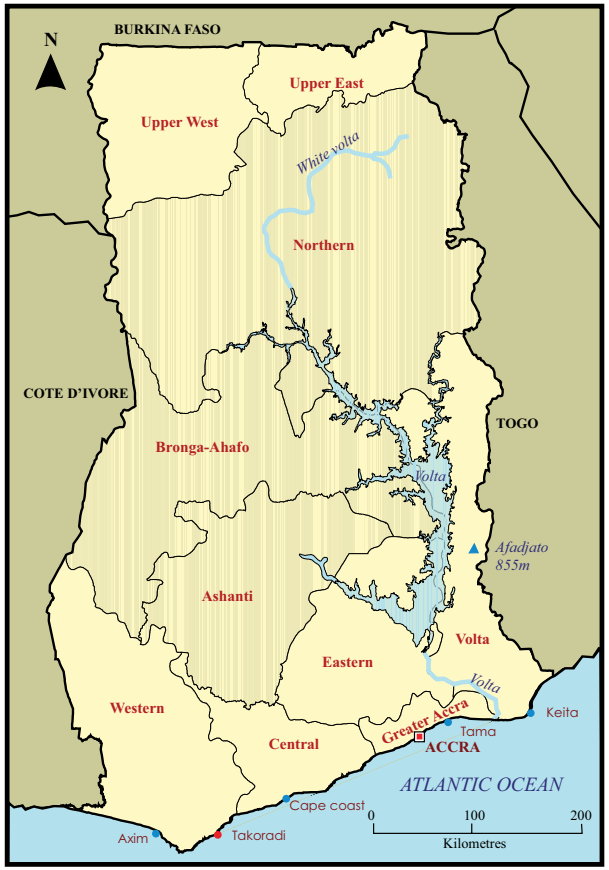

Capital city	Accra
Population (2005 est.)	22,500,000 (1.9% growth)
GDP per capita (USD 2005 est.)	$2 480
Life expectancy at birth (2005 est.)	59.1 years (Males - 58.7, Females - 59.5)
Land and water area	239,460 km^2 (land – 230, water – 8 520)
Length of coastline	539 km
Highest point of elevation	Mount Afadjato 885 m
Mangrove area (2005 est.)	12,400 ha
Marine protected areas (2007 est.)	None recorded
Capture fisheries prod. (2006 est.)	366,919 metric tones
Aquaculture fisheries prod. (2006 est.)	1 150 metric tones

Rivers to the Country's Coast: The Volta River basin dominates the country's river system, including the 8 480 km^2 Lake Volta. This artificial lake is the largest in the world, formed behind the Akosombo hydroelectric dam, it enters the sea at the Volta estuary in the Volta region. The Pra which enters the Gulf of Guinea east of Takoradi rises south of the Kwahu Plateau and flows southward. In the early part of the twentieth century, the Pra was used extensively to float timber to the coast for export. The Ankobra, which flows to the west of the Pra, has a relatively small drainage basin. It rises in the hilly region of Bibiani and flows in a southerly direction to enter the gulf just west of Axim. At one time, the Ankobra helped transport machinery to the gold-mining areas in the vicinity of Tarkwa. Rivers Amisa, Nakwa and Ayesu flows into the sea through lagoons. The Tano enters the sea through a lagoon at the Ghana / Cote d'Ivoire border. The rest are the Butre, Kakum and Densu.

Coastal Climate: The climate is tropical, the eastern coastal belt is warm and comparatively dry and the southwest corner is hot and humid. It becomes progressively drier from south-west to the north-east of Accra. Two-thirds of the coastal area falls within the dry coastal savannah strip where rainfall ranges from 625 mm to 1 000 mm averaging 900 mm per annum. The south western coast falls within

the tropical rain forest with annual rainfall value of over 2 000 mm per annum. There are two rainy seasons, from March to June and from September to October. They are separated by a short cool dry season in July/ August and a relatively long dry season from December to February. The major rainy season is in May/June and the minor one in September/October. June experiences the peak rainfall and January the lowest. Average temperatures are 23 - 24°C in August on the west coast, to 28 - 30°C in December/January towards the central and eastern coast.

The relatively dry coastal climate of the south-east is believed to be caused by the prevailing wind (south-south-westerly in direction) blowing almost parallel to the coast and to a cool current of water immediately offshore as a result of the local annual up welling.

Winds blowing over the coast are the south-westerly monsoon (relatively weak reaching a maximum speed of 5m/s during boreal summer) and the Harmattan (northeast trade winds).

Coastal Geomorphology and Habitats: The coastal area is a low lying plain rising from the Atlantic coast and the altitude is generally low not more than 200 m above sea level except in the east. It has a narrow continental shelf extending outward to between 20 and 35 km, except off Takoradi where it reaches between 80 and 90 km. The Economic Exclusion Zone of 200 nautical miles has a surface area of nearly 200,000 km^2.

The coast consists of low lying plains and sandy shores which is interspersed with rocky shores, numerous lagoons (92 in total), and estuaries. The area is also intersected by several rivers and streams, most of which are navigable only by canoe. Two large capes (Cape Three Points on the west and Cape St. Paul on the east) are important landmarks along the coast. Each of the four coastal regions has different vegetation cover, western-tropical rain forest, Central and Greater-Accra-coastal savannah, and Volta-guinea savannah.

Coastal Currents and Tides: The warm Guinea current flows along the coast of Ghana at the surface in an eastward direction. It is about 370 km wide and takes its source from the North Equatorial Counter current (NECC) and the Canary Current with an estimated velocity close to 100cm/s. The Guinea current is weakest in winter (December - February) and strongest in summer (July - September). At its southern edge it encounters the westward flowing South Equatorial current. A small westward flowing counter current also lies beneath the Guinea current and is believed to be a branch of the cold Benguela current which separates and dominate the Guinea current. The strength of the Guinea current is positively related to up welling seasons in Ghana. The coast experiences diurnal tides with annual average high tide of 1.70 m and low tide of 0.17 m. The lowest tides are experienced during the major up welling (late June to early September).

Figure 1. MFRD researcher downloads data from a tide gauge.

Coastal Observations: Two tide gauges have been installed at Takoradi to measure daily sea level and tides. They are operational and performing well. At the time of publication the tide gauge at Tema is not operational. The tide house was demolished a few years prior and is yet to be reconstructed before a tide gauge can be installed. Sea levels and tides are monitored by the Survey Department. The Marine Fisheries Research Division of the Ministry of Fisheries has eight coastal observing stations at Keta, Tema, Winneba, Elmina, Takoradi,

Cape Three Points, Axim and Half Assini. Coastal climate and weather data are managed by the Ghana Meteorological Agency based in Accra.

Ports and Harbours: Tema harbour (in greater Accra) is the bigger of the two harbours in Ghana. The other is the Takoradi harbour. Both import and export, however the Tema port is utilized more for importation, while the Takoradi port more for exportation. Another port construction has begun at Elmina in the Central region.

Coastal Tourism: It has emerged in recent times as an important foreign exchange earner for Ghana as the coastal area offers rich and varied opportunities for tourism. There are five main types of tourism in Ghana - cultural and heritage, eco-tourism, beach, conference and business, and urban. Tourist resources include beautiful beaches and cliffs, coastal lagoons and estuaries, monuments (forts, castles, lighthouses etc.) and cultural activities. The major coastal attraction sites are Keta, Ada, Ningo, Prampram, Tema, Labadi, Accra, Winneba, Kromantse, Cape Coast, Elmina, Breni-Akyini, Komenda, Sekondi,-Takoradi, Axim and Busua.

Coastal Economy: The economy of Ghana traditionally depends on primary production and exports of cocoa and minerals. Agriculture remains the dominant sector of the economy. About 60% of the labour force is employed in agriculture. The service sector is the second largest employer consisting largely of trade and public sector services. The industrial/manufacturing sector is next in importance. Economic activities in the coastal area include: manufacturing industries, mining, fishing, agricultural activities, tourism and historical monuments. The main historical monuments are the numerous forts and castles along the coast and their significance for tourism lies in their rich and diverse history. The two most prominent are located at Elmina and Cape Coast which have been designated World Heritage sites by the World Heritage Organization. A further 20 of the castles and forts have been designated as World Heritage monuments by UNESCO. However some of them are under threat of being washed away by coastal erosion, especially those at Keta and Prampram.

Coastal Industries: Industries are concentrated in Accra, Tema, Cape Coast and Takoradi and among them are those that: process food, metal products, textiles, chemicals, as well as cement factories and an oil refinery. There is also a thermal plant at Aboaze near Takoradi.

Fisheries: Fish is the country's most important non-traditional export commodity and the fisheries sub-sector accounts for about five percent of the agricultural GDP. In 2002, export earnings from fish and fishery products amounted to nearly 96 million US Dollars. Fishing activities in the marine sector range from artisanal, to semi-industrial, to industrial operations, exploiting both pelagic and demersal fish resources. The artisanal sector alone contributes 75% of fish landings and the rest is contributed by the inshore and industrial sector. Lagoon and estuary fishing are mostly subsistence.

Mineral Resources: In the coastal area the major resources mined include sand, gravel, and quarrying of stone, which continue to be an important economic venture as far as construction and development are concerned. It has been a major cause for coastal erosion. Only few mineral resources such as columbium, tantaliun, kaolin, silica, cassiterite, feldspar and limestone are being explored by some companies along the coast. There are three oil and gas exploration

Figure 2. Fishermen showing effects of algal bloom on fishing nets.

fields along the coast – the salt pond oil and gas fields, the North and South Tano oil and gas fields and the recently discovered oil and gas field at Cape Three Points. Explorations are on going in all fields by international oil companies which have signed agreements with the Ghana government and the Ghana National Petroleum Corporation. Salt production is done manly along the eastern dry savannah belt of the coastline. Extensive production occurs at the Songaw and Sakumo wetlands. Others include at Keta, Gyankai, Laloi, Nyanya, Apabaka, Eture and Ahwin lagoon.

Agricultural Products: The Agriculture sector contributes 45 - 50% of the GDP and about 75% of export earnings of Ghana. It provides a livelihood for about 70% of the population and raw materials for agro-industries. Agricultural products important in the coastal area include livestock and crops such as roots, grains, coconuts, and vegetables such as shallots. Semi-nomadic rearing of cattle is an important livestock activity in the coastal savannah. Livestock include pigs, sheep goats and poultry.

Other Marine Resources: Wetlands and mangrove serve as spawning and breeding grounds for several commercial marine fish species and shrimps. Mangroves provide the local communities with fuel wood, house construction materials, fences and furniture and fish attracting devices. However these resources have been degraded over the years along the coast. Mangrove forests have been cleared to make way for agriculture, fish ponds, salt pans, residential houses, industries and waste disposal.

ADDRESSING KEY COASTAL ISSUES AND HOT SPOTS

Though problems facing the coastal area are numerous and multi-faceted, six key issues seem critical. They are: erosion, pollution, impacts of crop production, impact of fisheries, biodiversity loss and habitat loss.

Erosion has mainly been due to the destruction of coconuts trees that fringe the coastline and serve as wind breakers to Cape St Paul. Sand and pebble extraction, wave action and construction of dams have also contributed to coastal erosion. Twenty-five key areas for erosion

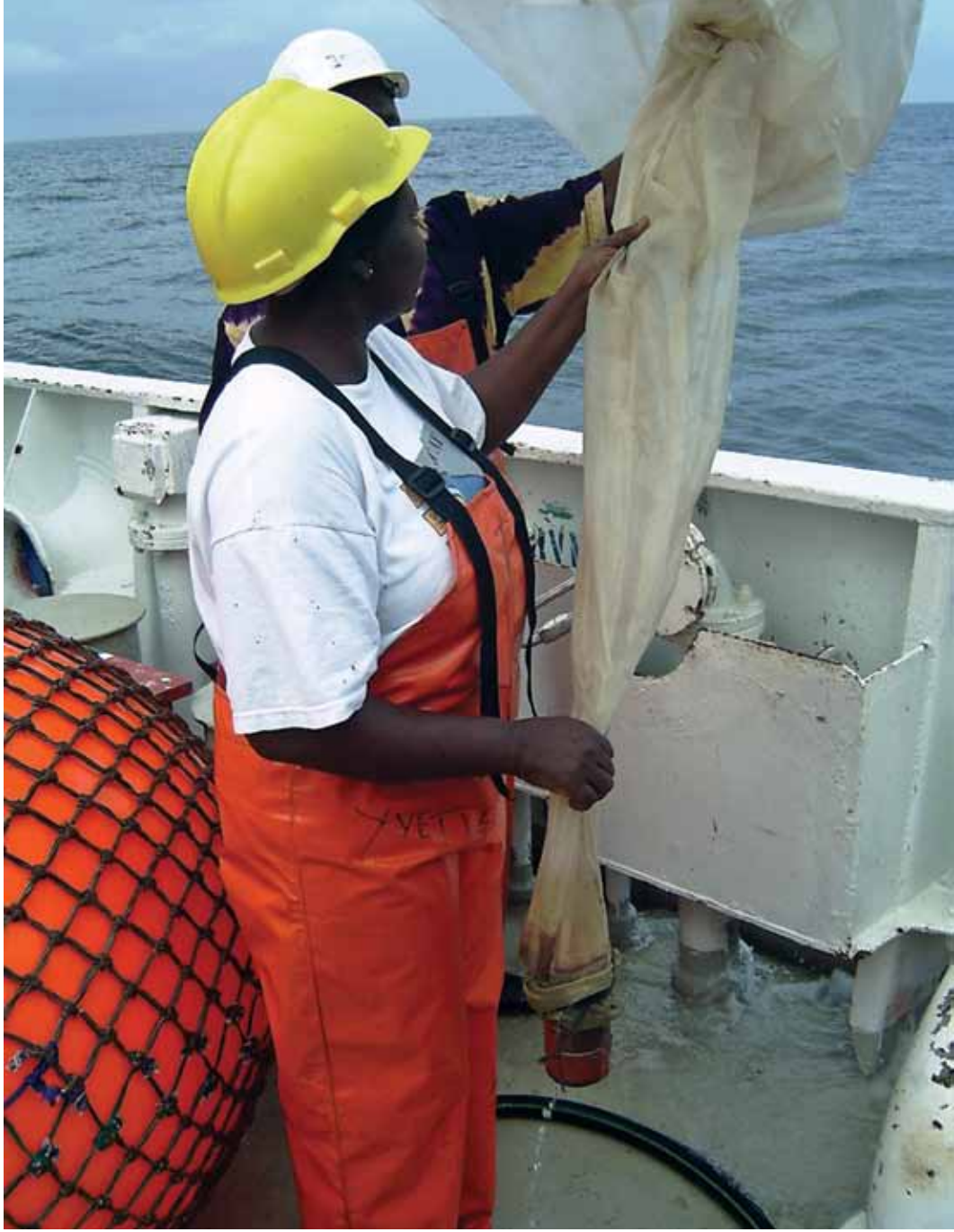

Figure 3. Researcher from MFRD deploys a plankton net during a research cruise.

have been identified and the government has been trying to construct various defence structures, and prosecuting offenders for sand and pebble extractions when caught.

Some of the pollutants affecting the coast include municipal and industrial waste, chemical runoff from agriculture activities, and oil spillage. There have also been a few cases where DDT and mercury had been found in cockles *(Anadara senilis)* in Benya lagoon. The possibilities of oil spillage which can have major repercussions on marine life and coastal tourism has led to the production of a sensitivity map by the Environmental Protection Agency for quick response if an oil spillage was to occur.

Sinking of wells for irrigation in crop production (such as shallots and other vegetables) along the coast is depleting freshwater aquifers, resulting in significant salt water intrusion into these aquifers.

Figure 4. Members of the Ghanian ODINAFRICA project team.

Marine fisheries resources, especially small pelagic fisheries have, suffered serious decline due to over fishing, and violation of fisheries' laws and regulations. However, the fisheries department has established management units to enforce laws and regulations. It is promoting aquaculture and encouraging alternative livelihood to help manage the resources and step up production. Lagoon and estuary fisheries have also suffered depletion.

Biodiversity has suffered great loss as a result of anthropogenic impacts through over-exploitation, habitat damage and pollution. Within the coastal area, biodiversity issues are related to fin and shell fishes, birds, benthic macro fauna, sea turtles, and aquatic plants like sea weeds and seagrass. Coastal mangroves and wetlands have been destroyed to make way for development and settlement expansion.

Finally coastal research has not received the support required to carry out all the necessary research for coastal area management. There are no research vessels, nor basic research facilities and equipment to enable quality coastal research for sustainable management.

DEVELOPMENT AND ACHIEVEMENTS OF THE GNODC

The Ghana National Oceanography Data Centre (NODC) was established in 2002 under the ODINAFRICA-II Project. It was a timely intervention as Ghana was faced with the problems of integrating its ocean data and information management into sustainable coastal area management activities. The Marine Fisheries Research Division (MFRD) established in 1962 as part of FAO technical assistance to Ghana is the host institution. MFRD is mandated to conduct marine environmental and fisheries research and monitoring as part of fisheries resource management in Ghana by giving technical advice to the government concerning rational exploitation of the resources. MFRD has three scientific sections: 1) Environment, Biology; 2) Fish Stocks and Statistics, and 3) Gear Techniques and Improvement.

The principal function of the NODC is to collect, process, stock, archive, and manage oceanographic data and information in the country.

Products and services provided by the GNODC include:

- Data manipulation including raw data entry, spreadsheets and relational database manipulations and data downloading and collection,
- Grid and contour methods
- Image analysis and multi-parameter synthesis in GIS
- Data analysis, provision, and products and services development,
- Updating of meta data and directories, cataloguing and books classifications,
- Electronic transmission of documents and interlibrary loan facilitation,
- Updating and modification of Website
- Consultancy for data acquisition and analysis and systematic identification of plankton
- Collection of ocean and coastal data and information
- Provision of ocean and coastal data and information, such as tide predictions

The NODC supports Integrated Coastal Area Management (ICAM) in Ghana through holistic approaches, including:

- Development and provision of products and services to coastal zone managers and decision makers,
- Ecosystem approaches
- Education and public awareness
- Modelling of coastal processes
- Fore-casting and now-casting
- Community involvement.

The NODC has worked hard to maintain the following databases: sea level and tides data from Takoradi station, medi metadata, collection of ocean data and information sets on CD-ROMS, directory of freshwater and marine professionals and institutions in Ghana, Electronic catalogue holdings and species database (biogeography).

The users of GNODC Products and Services are: policy makers, resource managers, researchers, Non Governmental Organizations, educational institutions, and private companies.

MARINE RELATED PROGRAMMES AND ORGANIZATIONS

The following organizations collaborate with the NODC internationally: GLOSS; GOOS; GCLME; Nansen's Survey; AOML Global Drifter, IOC; WMO, and DBPC

Nationally the following organizations work with the GNODC:

- Environmental Protection Agency (EPA)
- Survey department
- Geological survey department
- Hydrology division–in works and housing
- Meteorological services department
- Ghana National Petroleum Corporation
- Regional Maritime University
- Department of Ocean and Fisheries - University of Ghana
- Ghana Ports and Harbours Authority
- Water Research Institute - CSIR

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