7.2 Cameroon

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Capital city	Yaoundé
Population (2005 est.)	17,800,000 (1.9% growth)
GDP per capita (USD 2005 est.)	$2 299
Life expectancy at birth (2005 est.)	49.8 years (male - 49.4, female - 50.2)
Total Area	475,440 km^2 (land - 469 440, water - 600)
Length of coastline	402 km
Highest point of elevation	Mount Fako (Mount Cameroon) 4 095 m
Mangrove area (2005 est.)	250,000 ha
Marine protected areas (2007 est.)	7.31 km^2 (0.09% of total territorial waters)
Capture fisheries prod. (2006 est.)	137,232 metric tones
Aquaculture fisheries prod. (2006 est.)	340 metric tones

Geographic Location: Cameroon is located in West Africa, bordering the Bight of Biafra between Equatorial Guinea and Nigeria (6^{0}N, 12^{0}E). It is bounded on the north by Chad, on the east by Central African Republic, on the south by Congo, Gabon and Equatorial Guinea, on the west by Nigeria and on the Southwest by the Atlantic Ocean, with total land boundaries 4,591 km (Central African Republic 797 km, Chad 1,094 km, Congo 523 km, Equatorial Guinea 189 km, Gabon 298 km, Nigeria 1 690 km) and Economic Exclusive Zone (EEZ) about 15,000 km^2.

Rivers on the country's Coast: (Table 1 shows various Cameroonian rivers which flow to the Atlantic Ocean)

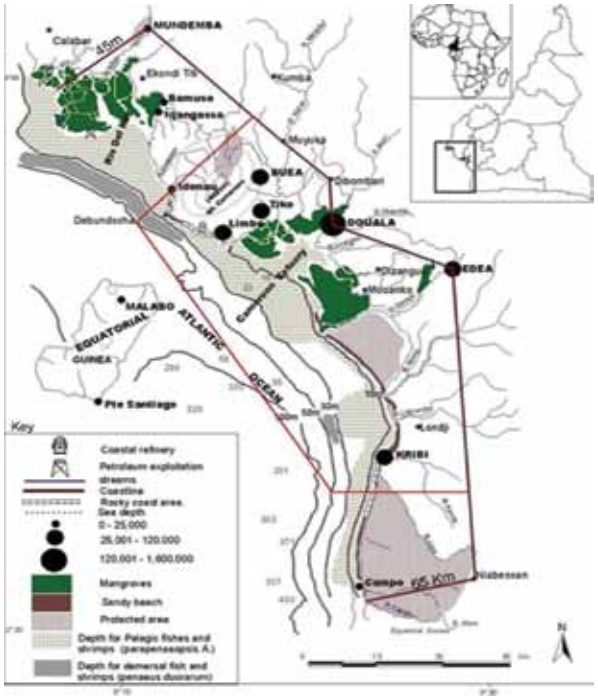

Figure 1. Characteristics of the coastal zone of Cameroon (Folack, 2003).

Table 1. Catchments area and estimated annual discharge (1974 - 1989) of the main coastal rivers in Cameroon (from IRGM, Yaoundé).

River	Catchment area (km^2)	Discharge (m^3 s-1)	
		Maximum	Minimum
Mungo	2 420	636	27.5
Wouri	3 250	1 425	49.0
Nyong	26 400	376	25.7
Sanaga	131 500	7 570	171.0
Ntem	26 350	764	50.0
Ndian		246	
Meme		300	

Coastal Climate: The climate of the coastal region is equatorial, with a regular alternation of dry (three months) and rainy seasons (nine months). This regime is marked by a permanent presence of the monsoon winds of the Guinean type, which account for very high humidity (often at saturation). Frequent and abundant rains, heavy haze and low evaporation rate characterise the coastal zone. The air temperature is high and steady. However, the configuration of background relief and orientation of the coast with regards to influx of the monsoon winds creates remarkable disparity in the quantity of rainfall, as well as other climatic parameters. The coast near Mount Cameroon experiences the most abundant rainfall: Debundscha, at the foot of Mount Cameroon, has an annual average rainfall of 11,000 mm. This is due to the orographic effect of the imposing volcano, as well as the orientation of the coast, which is perpendicular to the main oceanic influence. These rains reduce to the west and east, but remain quite high, measuring 4,000 to 6,000 mm in the Rio-del-Rey mangrove region and 4,000 to 5,000 mm in the Douala mangrove region.

Coastal Geomorphology: The coastal zone is characterized by three sedimentary basins: Campo Kribi, Douala and Rio-del Rey from the south to the north. These basins are rich in hydrocarbons and exploited by several petroleum companies.

Coastal Currents and Tides: Water circulation is slow, resulting in high rates of sedimentation. The tides are semi-diurnal and can reach amplitudes of 0.5 to 2.7 m, depending on the location. Their most spectacular effects are felt in the estuarine complexes of the mangroves where the waves penetrate deeply (Morin et al., 1989). Tidal influence can extend as far as 40 km in the Wouri, 20 km in the Mungo; riverine penetration is retarded by the narrowness of the creeks. The propagation of the waves and ebb tides are enormous, but poorly understood. The currents generally observed are those related to tides. At the level of Mabeta, Keita et al. (1991) measured current speeds varying between 0.5 and 1.4 m s^{-1} for the flux, and 0.5 to 3 m s^{-1} for the reflux. Observations of sea swells made by Chaubert and Garrand (1977) from November 1974 to November 1977 at Cape Limboh (Limbe) show that those from the south-south-west sector are of distant origin. They are generated by the “westerlies” of the South Atlantic (Guilcher 1954) and are little influenced by the dominant, but weak, south-westerly wind. The swells are diminished by the obstacle constituted by the Malabo South Island

and the expansion of the continental shelf in the south-west (up to 80 km wide). Consequently, the sea swells are generally weaker than on the rest of the west African coast which is more exposed. At Cape Limboh, the minimum amplitudes is 1.91 m and the maximum only 2.8 m. The strongest sea swell (226 m long) is generally experienced in the southern sector from June to September; the weakest swells occur from November to April.

Ports and Harbours: There are three main coastal ports in Cameroon: Douala, Limbe and Kribi. Kribi is a small port located at the mouth of the river Kienke mainly serving timber exportation. Douala is the bigger commercial port and is located on the river Wouri, 20 km from the sea. Limbe is the only sea port, which is focused on transport of passengers and goods to Malabo and Nigeria.

Figure 2. Coastal erosion impacts the Cameroon coastline (photo credit: Mr Jules Romain Ngueguim).

Figure 3. Cutting of the mangrove ecosystem for firewood to smoke fish (photo credit: Mr Jules Romain Ngueguim).

DEVELOPMENT AND ACHIEVEMENTS OF THE NODC

The National Oceanographic Data Centre (NODC) Cameroon was created on 28th February, 2001 with the aim to:

- Improve on capacity building of oceanographic data and information management
- Facilitate access to data and exchange with other African states and national partner institutions
- Coordinate networks of national institutions involved in management of coastal and marine areas

The centre is hosted by the Specialized Research Centre for Marine Ecosystems (CERECOMA) based in Kribi. CERECOMA is an operational structure of the Institute of Agricultural Research for

Figure 4. Installation of Tide Gauge at Port SONARA (photo credit: Frédéric Simon, 22 June 2008).

Development (IRAD). IRAD is under the Ministry of Scientific Research and Innovation (MINRESI). A National Project Management Committee (NPMC) of 10 members was established in order to coordinate project activities in Cameroon. Beneficiaries of the products and services include: port services; coastal engineering; fisheries services; tourists; coastal management services; scientific research; university lecturers and students; NGO's, and civil society.

Figure 5.Tide gauge installed at Port SONARA (photo credit: Frédéric Simon, 22 June 2008).

The products and services include:

- Production of almanac and field guides e.g. guide to coastal and marine fishes in Cameroon
- Electronic and printed outreach materials e.g. posters, CD-ROMs such as the natural and anthropogenic characteristics of the coastal zone of Cameroon
- Maintenance of online databases, directories, bibliographies and catalogues e.g. directory of marine and freshwater professionals in Cameroon, catalogue of marine and coastal biodiversity in Cameroon
- Website development and maintenance
- Mapping products such as those required for the creation of a marine protected area

MARINE RELATED PROGRAMMES AND ORGANIZATIONS

The followings organizations are considered as secondary data sources for aquatic research and fisheries after the Specialized Research Centre for Marine Ecosystems (CERECOMA).

Institutions	Missions/Objectives	Types of data generated or to be generated
MINEPIA (Ministry of Livestock, Fisheries and Animal Husbandry)	Follow up law implementation Training and equipment for fishermen	Fishery statistics; typology of fishing gear and landing sites
Kudu Project on marine turtles conservation	Protection of marine turtles Improvement of livelihood of coastal population	Spawning area maps, migration information, statistics on marine turtles conservation and migration
INC (National Institute of Cartography)	GIS and elaboration of coastal maps	Coastal maps production, zonation maps, maps of risk areas and natural hazards, coastal towns master plans
MINDAF (Ministry of Domain and Land Affairs)	Land management	Record and database (statistics on land use) in coastal zone
MINEP (Ministry of Environment and Nature protection)	Follow up law implementation on environment issues	Data base on environmental impact assessment for all projects to be settled in the coastal area; delivering of authorisation to these projects
GCLME (Guinea Current Large Marine Ecosystem) Project	Restore the health of the GCLME	Country Coastal profile, pollution and hotspots maps, maps of nutrient load to coastal zone, water quality, fisheries and biodiversity, training
Douala Port Authority	Port management	Data on port traffic and goods
SONARA	Petroleum refinery	Sea level measurement, statistics on fuel production
SNH (National Hydrocarbon company)	Petroleum exploration and exploitation	Map of potential crude oil reserve zones, statistics on oil production and commercialisation
ENVI-REP Cameroon	Protection of natural resources and its environment	Environmental impact assessment, biodiversity, integrated coastal management, pollution monitory, resource management

Figure 6. Office equipped with tide gauge components including pressure and temperature sensors (photo credit: Frédéric Simon, 22 June 2008).

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Figure 7. Participants at the Kribi ICAM workshop (August, 2006).

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