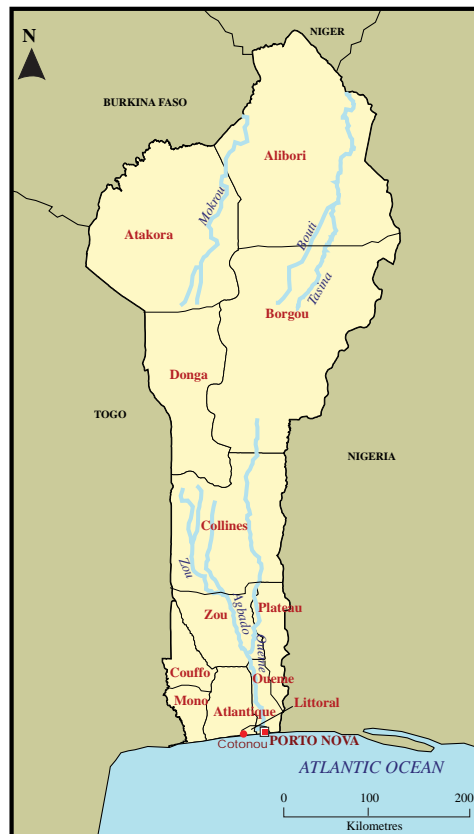


7.1 Benin



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Capital city	Porto Novo (Administrative capital) Cotonou (Economic capital)
Population (2005 est.)	8,500,000 (2.9% growth)
GDP per capita (USD 2005 est.)	\$1 141
Life expectancy at birth (2005 est.)	54.4 years (male - 54.1, female - 56.5)
Total Area	112,620 km ² (land - 110,620, water - 2 000)
Length of coastline	121 km
Highest point of elevation	Mountainous region of Atacora which is greater than 800 m.
Coral reef area (2001 est.)	Coral covering approximately 50 km in length in the western area of continental shelf (Djiman, pers. comm.)
Mangrove area (2005 est.)	1 150 ha
Proposed marine protected areas (2007 est.)	Four sites have been proposed at the time of publication (Djiman, pers. comm.)
Capture fisheries prod. (2006 est.)	38,021 metric tones
Aquaculture fisheries prod. (2006 est.)	415 metric tones

Rivers on the Country's Coast: The principal rivers on the coast of Benin are the Ouémé river (510 km), Couffo river (125 km), and the Mono river (100 km). There are a number of lakes and lagoons which include; Lake Nokoué, Lake Ahémé, coastal lagoons and the Porto-Novo lagoon.

Coastal Climate: The sub-equatorial climate in the South comprises of the following seasons: a long rains season from April to July, a short dry season from July to September, a short rainy season from September to October, long dry season from November to March.

Coastal Geomorphology: The coastal area of Benin includes the southern part of the coastal sedimentary basin and the coastal plain. The zone is located between 6°10' and 6°40' North Latitude and 1°40' and 2°45' East Longitude.

Geomorphology of the coastal area of Benin consists of:

- Ranges separated by valleys of the rivers Mono and Couffo Ouémé
- A coastal plain with a number of different geomorphological features connected to the Ahémé and Nokoué lakes and the sea. In the lower valley (Ouémé), there are also adjoining delta areas
- A continental shelf of 22 kms at the western border and 33 kms at the eastern boarder. It has a gentle slope up to 35 metres deep, then breaking to deeper waters from 35 to 45 metres in depth.

Coastal Habitats: The habitats of the coastal zone include natural ecosystems and those affected by anthropogenic influences. There are several ecosystems including bush scrub and savanna grassland. Bush scrub characterizes the coastal zone and barrier beaches. Savanna grassland is dominant further inland. In the flood plains the dominant species are *Paspalum vaginatum*, *Cyrtosperma senegalensis* and *Cyperus articulatus*, *Typha australis* and *Cyperus striatus*. *Pterocarpus santalinoïdes* Cola and *Cordofolia* are located on the banks of rivers Mono, Ouémé, Couffo and their tributaries. Mangroves are specialised halophiles, and forests are found on the coasts and estuaries with muddy soils, both hydromorphic and asphyxia (Toffi, 1991). They are found on the banks of rivers Mono, the SAZU, the “lake” Ahémé of Aho.

Coastal Currents and tides: Currents of Benin can be described in the following groupings:

Surface currents: warm and to the west-east in direction, the surface currents move at the speed of 1 to 3 knots from the coast of Ghana towards Nigeria

Deep currents: there are three predominant deep currents: the first between 35 - 34m, the second approximately 55 m bearing on Sèmè, and the last circulates at 75 m to greater than 100 m of depth.

Reverse currents: there are two principal reverse currents: The first is periodic and circulates in the South-eastern/North-western direction (S-E/N-W) of Nigeria towards Togo. The other stronger one goes from the coast towards the open sea with a North-eastern South-western component (N-E/S-W).

Local currents: there are other local currents of less importance than the previously described currents. They are the wind driven “Atramessi”, caused by river water under the pressure of the “Afoutou” and the “Gbeya” or “Kpodjohon” which results from the calm winds coming from the continent.

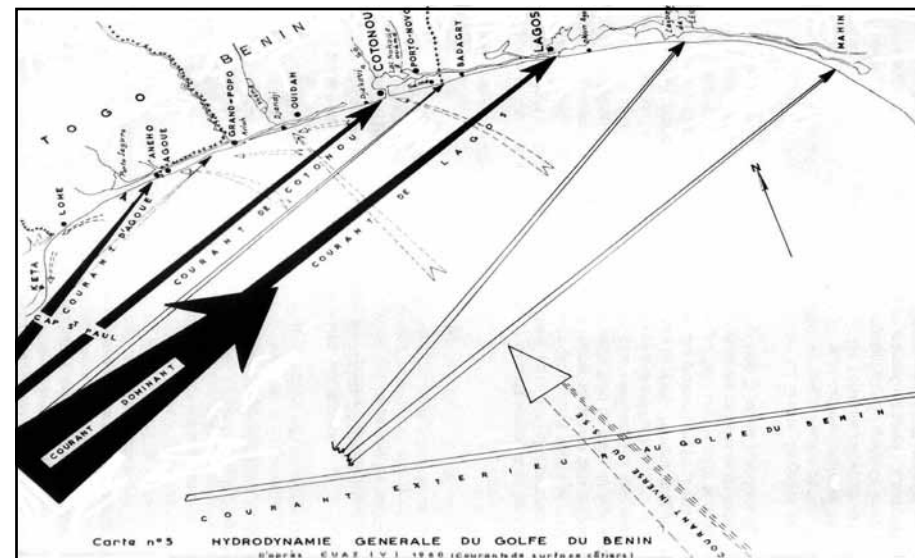


Figure 1. Horizontal circulation of beninese waters (reproduced from Cuaz, 1960).

The tide on Benin’s coast is mixed with a semi-diurnal cycle, between 0.50 and 1.50 m. The extremes observed on the coast are +1.95 and 0.20 m (BCEOM, 1974). This is due to two types of swells:

- 1) long wave occurring far from the coast, with a 180 - 200 m length and an average amplitude of 1.2 m and,
- 2) localized short wave swell due to the influence of local winds and very variable length of approximately 50 m.

Coastal Observations: The coastal observations made by Centre de Recherches Halieutiques et Océanologiques du Bénin (CRHOB) are:

- Regular monitoring of surface temperature through the deployment of thermometers since July 2005 to date.

- Weekly measurements of various physio-chemical parameters of sea water.

Ports and Harbours: The role of the port and the Cotonou Port Authority (CAP) in the current economic development of Benin is significant. The port of Cotonou supports not only Benin, but is an important gateway for the import-export traffic of some landlocked countries in West Africa (Mali, Burkina-Faso, and Niger).

Coastal Economy: The coastal zone is the economic engine of the country, due to its proximity to the main cities, its infrastructure (harbours and airports), and number of important national industries. Tourism, which is significant in the coast, is also very important. Through its beaches and tourist infrastructure, the coast offers close to fifty tourist resorts concentrated especially in the towns of Cotonou, Grand-Popo, Ouidah and Sèmè.

Other activities in the coastal area of Benin which are of considerable economic importance include:

- Exploitation of the sand pits for construction in the district of Ouidah, Grand-Popo, and Sèmè-Kpodji
- Salt production in Ouidah and Large-Popo district
- Installation of the acadjas system of trapping fish in certain lakes (Nokoué, and Ahémé districts)
- Exploitation of petroleum resources in coastal waters. These are transported by inland waterways which is the least expensive mode of transport.

Fisheries: Fishing is a traditional activity, with the species of fresh water (tilapia) and shellfish providing important sources of food for the population. Since the construction of the port of Cotonou in 1960, fishing was principally developed by Ghanaian immigrants who introduced motorized boats which has now industrialized the work. With a total production close to 40,000 tones per annum, industrial and artisanal maritime fishing provided 27% of total production against 73% by freshwater fishing. This production is carried out by an industrial fleet of 10 to 12 trawlers and shrimp harvesters, 850 artisanal open sea fishing boats and 35,000 small fishing boats (Direction des Pêches, 2001, and CRHOB, 2004).

Mineral Resources: Peat, natural gas, oil reservoirs, sand, gravel and clay are all valuable resources used in the coastal area of Benin, in addition to the extraction of water.

Agricultural products: Coconut plantations in coastal areas provide a substantial income to the owners who often undertake other livelihoods such as fishing. Next to the coastal lagoons, food crops (corn, manioc, niébé) are grown but only at small scales. Generally these crops are not very productive in the coastal area. Corn (the principal staple food), manioc, niébé, groundnut and vegetables such as tomatoes are also grown for local consumption.

Other marine resources: Marine cetaceans, sea-birds, mangroves, salt production, and sand are all additional marine resources of the Benin coast, of value for tourism or to the local economy.

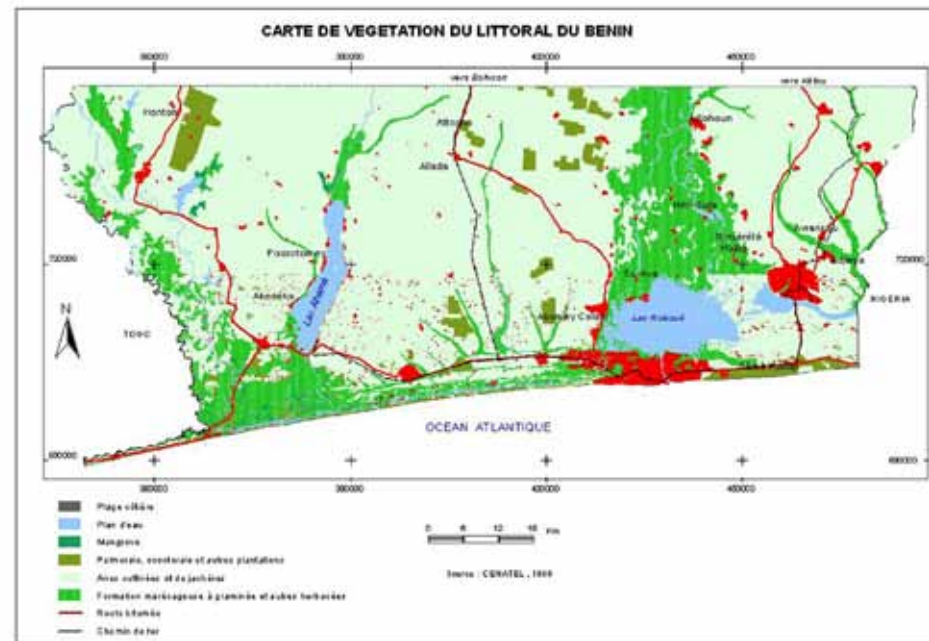


Figure 2. Map of Benin coastal area (LEFI/CENATEL/CRHOB 2003).

ADDRESSING KEY COASTAL ISSUES AND HOT SPOTS

The densely populated coastal area of Benin has been exploited since the 17th century. Even though the historical records of occupation of the area are not conclusive, it is certain that this area has been occupied for nearly ten centuries by the socio cultural groups of Peda, Xwla, Gen and Fon (Pliya, 1980). Current estimates put the density of the rural population on the Benin coast at nearly 200 people per km². This area is one of the largest settlements in the country. (INSAE/ RGPH 2000)

Coastal urbanization is due primarily to the large industrial and tertiary sectors in Cotonou. The population of the main cities (Grand-Popo, Ouidah, Cotonou and Sèmè) is estimated at nearly 1,500,000 inhabitants. The urbanization of Cotonou is more alarming. The city, with approximately 750,000 inhabitants, is the only viable area for urbanization and has expanded rapidly, resulting in significant erosion.



Figure 3. Fishing boats anchored in an estuary in Beninn.



Figure 4. CRHOB researchers prepare oceanographic equipment for data collection.

More broadly, the main issues affecting coastal area of Benin are:

- a. Coastal erosion and the impoverishment of the soil at Sèmè along the coast in East area of the Cotonou port and Grand Popo and Agoué towns in West
- b. Industrial pollution of the sources of fresh and coastal water mainly around Cotonou and Porto-Novo towns
- c. Impacts of increasingly high population density in the coastal zone.



Figure 5. Z. Sohou, Benin Data Manager chats with R. Chuchla of IRD on board RV Suroit during monsoon cruise.

DEVELOPMENT AND ACHIEVEMENTS OF THE NODC

The National Oceanographic Data and Information Centre (CNDO-Benin) is based at the Centre de Recherches Halieutiques et Océanologiques du Bénin (CRHOB), which is the centre that oversees the national research of the coastal area. The centre is overseen by the Benin Centre for Technical and Scientific Research in the Ministry for Higher Education and Scientific Research.

A National Pilot Committee was put in place for the implementation of the NODC activities. The objectives of the CNDO-Benin include:

- To facilitate a network of exchange and filing of oceanographic data and information at the national level
- To promote and facilitate communication among scientists at the national and sub-regional level.
- To disseminate scientific information throughout the country.

Products and services include:

- Analysis, workplans and reports on the management of maritime fisheries, oceanographic and trawling campaigns, protected areas, and marine mammals
- Marine atlases on fish and other products, and coastal and marine mapping products
- National directory of researchers, institutions, and NGO's working in marine sciences and coastal areas
- Bibliographical information on marine and coastal science
- Provision of oceanographic and fishing data and information both in printed and electronic form, such as CD-ROMs, data bases, and through the centre's website
- Research and consultancy on management and protection of fisheries and development of aquaculture
- Document and inter-library loans
- Public information and sensitisation on fisheries and oceanography issues
- Training in data management and oceanographic information.

National Partners

- Direction des Pêches
- Port Autonome de Cotonou (PAC) – E-mail: pac@leland.bj
- Institut Géographique National (IGN)
- Centre National de Télédétection (CENATEL)
- Direction Générale de l'Environnement (DGE)
- L'Agence Béninoise pour l'Environnement (ABE) – E-mail: abepge@bow.intnet.bj
- Institut National de la Statistique et de l'Analyse Economique (INSAE)
- Direction de la Météorologie Nationale (DMN)
- Direction de la Marine Marchande (DMM)

- Direction Générale de l'Eau (DGE)
- Force Navale
- Université d'Abomey-Calavi (UAC)
- NGO's: Nature Tropicale, Littoral, Bénin 21 et Bénin Nature

Marine Related Programmes And Organizations

- Sub-regional and International Oceanographic and Data Centres (Togo, Nigeria, Côte d'Ivoire, Ghana)
- Guinea Current Large Marine Ecosystem (GCLME) project - <http://www.gclme.org>
- Multidisciplinary Analysis of African Monsoon (AMMA) project - <http://www.amma-international.org/>
- Centre des Pêches du Golfe de Moncton (NB-Canada) - <http://www.dfo-mpo.gc.ca>
- Programme Régional d'Océanographie Physique en Afrique de l'Ouest (PROPAO) bringing together Côte d'Ivoire, Ghana, Togo, Benin and Nigeria - <http://www.nodc-benin.org>

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