

THE MARINE ENVIRONMENT IN ANGOLA: **Threats and methods of management**

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The Angolan sea is an important centre of marine biodiversity and biomass of zooplankton, fish, sea birds and marine mammals, and supports also an important reserve of oil and gas. Fishing resources are important sources of proteins and employment as well as a significant source of income of foreign currency. Angola has become in recent years a major producer and exporter of oil in Africa. The utilization of the resources can be negatively influenced if management options are not appropriately implemented. The knowledge of the ecosystem, the dynamic of the resources and the factors that have a negative impact on the environment is important to manage the ecosystem on a sustainable way.

HYDROGRAPHIC REGIMES OFF ANGOLA AND THE MAIN RESOURCES

The Angolan coast extends some 800 nautical miles along the southern eastern Atlantic, from 5° to 16° S, to the Cunene river mouth. The coastal area is characterized by a typical tropical regime in the northern part and a more temperate one in the south, where the southward warm Angolan current and the northward cold Benguela current meet and form the Angola-Benguela front, with an average position at 17°S. As pointed by Shannon et al., 1987, this front extends to at least 150 km offshore and shifts about 2° south during the first quarter of the year, and north during the third quarter. Although the front is strongest in the near surface layers, it may extend to a depth of several hundred metres and its dynamics are thought to be influenced by a large cyclonic eddy, the Angolan Dome. The seasonal translocations of the frontal zone are important for the distribution of fish. Da Franca (1968) characterized two different faunal complexes along the Angolan coast, the “Guinea-tropical

fauna” in the northern and central region and the “Benguela fauna” predominant off southern Angola. However, elements from both faunal complexes may occur around 14-15° as suggested by the distribution of some species like the horse mackerels and hakes. The Benguela current is one of the world’s major eastern-boundary current systems, and is rich in pelagic and demersal fish populations, supported by plankton production driven by intense coastal upwelling. According to Hampton et al., 1999, these populations have been heavily exploited by man, particularly since the Second World War. Total fish catches in south-east Atlantic climbed rapidly during the 1950s and 1960s, with the development hake, sardine, anchovy, horse mackerel and *sardinella* fisheries.

The Angolan current influences the tropical regime in the north. The current flows parallel to the coast towards south and transports warm, low saline water. The fauna is dominated by a demersal fish community. The most important species belong to the *Sparidae* family (seabreams). Other groups of importance are the *Scianidae*, hake (*M. polli*) and deep-water shrimps. The deep-water red crab can be found along the coast and seems to be a shared resource with Namibia.

THREATS TO THE ENVIRONMENT

The main threats to the marine environment are related to informal settlements, activities of the oil and gas industry and fisheries.

1. Informal settlements

According to Tappscott (1999), as a consequence of the war, the majority of the population live in west of the country and many of these reside in informal settlements surrounding the urban centres along the coast. The country has a long

coastline and seven of the country’s eighteen provinces front the Atlantic seaboard. Roughly 20% of the total population currently live in the capital city Luanda, while the towns of Benguela, Lobito, Namibe, Cabinda, Sumbe and Tombwa all have growing populations. However, with a climate that is predominantly semi-arid, the coastal region has relatively limited agricultural potential. This implies that in the absence of other income generating opportunities, the population will need to rely increasingly on the sea for their livelihood. With a poor urban infrastructure, there is a very real danger that a rapidly expanding urban population will pose a serious pollution threat, as untreated sewage is discharged into the sea in increasing volumes. A shortage of water is likely to be a further consequence of the rapid pace of urbanization.

2. Oil exploration

As stated by Neto (1997), the bulk of marine pollution is caused by oil activities. According to the National Oil Spill Contingency Plan a major risk of oil spills emanates from shipping activities, including those taking place in ports. Large tankers call at the production facilities to export the crude oil to countries such as the U.S.A. Smaller tankers, including coastal ones are used to transport crude oil from the production facilities to the refinery in Luanda and refined products from the refinery to other Angolan ports or overseas.

3. Fisheries and environmental variability

The marine fisheries in Angola can be divided into artisanal (mainly for horse mackerel and bottom valued species like groupers, snappers seabreams, croakers and spiny lobster), semi-industrial and

industrial, where the main species caught are the horse mackerel, *sardinella*, shrimps and the deep sea red crab. The main impact fisheries can produce to the ecosystem is related to the non-optimal harvesting of resources. Primary cause is fishing over-capacity. In some cases there are too many boats fishing the same resource. There exists also a conflict between the artisanal and industrial fisheries that compete for the same fishing areas and for the same resource, as it is the case for horse mackerel. This can lead to a depletion of the resource below sustainable levels, high by-catch as in the case of deep water shrimp fishery and undersized catches.

Some of the variations that have been observed in the abundance and distribution of the resources are due to major perturbations that occur along the coast. The upwelling area along the coast is sensitive to environment variability and changes, but at the present, the capacity and ability to predict and understand these processes is very limited. The variability in the environment can lead to changes in the coastal ecosystem, from altered wind field and rainfall to changes in the coastline morphology.

METHODS OF MANAGEMENT OF THE MARINE RESOURCES

Angola's marine fisheries are managed and developed in terms of the Fisheries Act of 1992, which covers, *inter alia*, such aspects as planning, licensing, surveillance and enforcement. However, and according to Neto, 1997, in Angola the marine resources and their environment have been less studied than elsewhere in the Benguela region, and the history of fisheries research is too recent to provide strong scientific foundation for the proper analysis of the trends in population sizes. There are limited national data for long term retrospective analysis of major fluctuations in the marine ecosystem, large deficiencies in the understanding of fundamental life history characteristics (e.g. stock delineation, location of spawning grounds, distribution of ichthyoplankton, nursery grounds, migrations patterns) of

commercially important fish stocks, and no population models which to evaluate management options.

As pointed by Morant (1999), environment aspects of exploration and production operations (routine management) in Angola are regulated by the Ministry of Petroleum in collaboration with the National oil company Sociedade de Combustiveis de Angola U.E.E (SONANGOL). With the forthcoming adoption of the General Environmental Law (GEL), increasing responsibility for the implementation of national environmental policy will rest with the Ministry of Fisheries and Environment. The Ministry of Petroleum has engaged assistance of the International Maritime Organization (IMO) and the International Petroleum Industry Environmental Conservation Association (IPIECA) in the formulation of a National Contingency Plan for the prevention and management of oil spills. The companies comprising the Angolan oil exploration and production are provided assistance with the formulation of the oil spill contingency plan. A data base will be established containing coastal sensitivity maps, inventories of equipment, contact information for key response personnel, information on dispersants, etc.

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