

Diversity and Stability of Demersal Species Assemblages in the Gulf of Guinea

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Abstract

The structure of demersal fish assemblages on the continental shelf and upper continental slope of the Gulf of Guinea is described. Community structure is determined primarily by depth and type of sediment on the seabed. Changes in the composition of the identified species assemblages over a 25-year period are examined. The dynamics of the assemblages are influenced by physico-chemical parameters of the water masses, mainly temperature, salinity and dissolved oxygen, which are periodically modified by the seasonal coastal upwelling that occurs in the western Gulf of Guinea. Increased industrial trawling in coastal waters and environmental forcing jointly influenced the changes in the composition and relative importance of species in the assemblages. Irresponsible fishing operations (like the use of explosives) that lead to habitat alteration and other anthropogenic activities (like oil and gas exploration) which have the potential to cause environmental changes pose a threat to biodiversity in continental shelf waters of the Gulf of Guinea.

Introduction

Knowledge of species aggregation and diversity is an important tenet of the ecosystem management concept and approach that are receiving favourable consideration in recent times in the management of living natural resources. In fisheries, defining the aggregation of species in the ecosystem is the basis for managing species by the management unit approach (Tyler, Gabriel & Overholtz, 1982).

The structure of species assemblages has been established for several exploited fish populations around the world. In the Gulf of Guinea, Fager & Longhurst (1968) and Longhurst (1969) worked out the assemblage structure of demersal species on the continental shelf using data from the Guinean Trawling Survey of 1963-64 (Williams, 1968). Villegas & Garcia (1983) mapped demersal fish communities on the continental shelf of selected countries in the sub-region using data and information from a number of trawl surveys. Assemblage is

defined here as "an association of coexisting species with similar environmental tolerance, possibly trophic relationships, but not totally interdependent" (Bianchi, 1992).

In the last three decades, significant changes have occurred in the biological and physical components of the Gulf of Guinea marine ecosystem and in nearshore forcing factors that could have affected species associations and status of marine biodiversity in the sub-region (Koranteng, 1998). Koranteng (1998) showed that the period between 1963 and 1992 could be broken down into three climatic periods each of which had distinct environmental characteristics in the Gulf of Guinea. In the first period (i.e. 1963-1972), sea temperatures (surface and bottom) were relatively high, salinity was low and the thermocline was below its long-term average depth. Between 1972 and 1982 (the second climatic period), there was a global decline in sea temperatures and a rise in salinity. In the final period (1982-1992), temperatures