The Gulf of Guinea Large Marine Ecosystem
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The EU/INCO-DC Project: Impacts of Environmental Forcing on Marine Biodiversity & Sustainable Management of Artisanal & Industrial Fisheries in the Gulf of Guinea

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Abstract

The European Union Gulf of Guinea collaborative research project on the impacts of environmental forcing on marine biodiversity was supported by the International Co-operation with Developing Countries Programme (INCO-DC). It was a natural sequel to three earlier international research projects on environmental variability and pelagic fishery resources in West Africa (Cury and Roy 1991; Bard and Koranteng 1995; Durand *et al.* 1998). At its conclusion, the project was able to provide an assessment of the impacts of upwelling and other forms of environmental forcing on marine biodiversity, with particular reference to demersal fish, and the basis for a fisheries information and analysis system for the sustainable management of fisheries in West Africa. It also facilitated the retrieval of important fisheries and survey data that had previously been inaccessible to scientists in the region. The major achievements of the project were presented at an international workshop on "Sustainable Management of the Fish Resources in the Gulf of Guinea" held in Accra in 1998.

Introduction

In 1989, the Ministerial Conference on Fisheries Cooperation among African States Bordering the Atlantic Ocean requested help from the UN Economic Commission for Africa, the UN Office of Maritime Affairs and the Law of the Sea, and the Food and Agriculture Organisation to formulate a project to initiate the establishment of a sub-regional and regional maritime database. It was envisaged that the development of a regional database within the Ministerial Conference framework, would initiate a programme to provide member states with the strategic information necessary for optimising the exploitation of their maritime resources. The database would be used as a management tool, facilitating policy development and decision making for issues ranging from fisheries resources and their environment, to maritime transport, as well as serving as a legal base for management. The European Union agreed to seek ways of funding the establishment of this database, which became known by its French name of 'base de données régionales maritimes' (BDRM), which translates as Regional Maritime Database (Nauen 1993).

In February 1993, a workshop on the establishment of this regional maritime database was held in Dakar, Senegal (Anon. 1993). Following the meeting, it became clear that the development of BDRM would be more feasible if sub-regional nodes were first established

and subsequently linked up. An example is the Fisheries Information and Analysis System (FIAS) (McGlade and Nauen 1994), operating under the auspices of the Sub-regional Fisheries Commission (CSRP in French) and covering countries in the northern CECAF (Committee for Eastern Central Atlantic Fisheries) region, i.e. Cape Verde, Mauritania, Senegal, Guinea, Guinea Bissau and the Gambia. FIAS has taken the original concept of BDRM and moved it towards a more interactive information manipulation and analysis tool to support fisheries sector planning and management.

A second, sub-regional node of BDRM was formulated for the Gulf of Guinea under the aegis of the European Union's Programme on International Co-operation in Developing Countries. The two-year project was entitled "Impacts of environmental forcing on marine biodiversity and sustainable management of artisanal and industrial fisheries in the Gulf of Guinea" (or Gulf of Guinea Biodiversity Project for short). It goals were to: assess the impacts of upwelling and other forms of environmental forcing on marine biodiversity and the dynamics of artisanal and industrial fisheries; and develop and implement an information and analysis system for the sustainable management and governance of fisheries resources in the Gulf of Guinea. More specifically, the research was aimed at:

- identifying spatial and temporal scales over which environmental forcing can be detected using remotely sensed and field data derived from a variety of sources;
- identifying biophysical habitats along the continental shelf critical to marine fisheries and biodiversity;
- generating testable hypotheses regarding causal relationships between environmental forcing factors and interannual variability in ecosystem behaviour, using output from coupled models and observational records;
- implementing BDRM and FIAS with a Gulf of Guinea focus in research institutes in Ghana and selected centres in the region;
- and establishing an information network for researchers in European member states and in the Gulf of Guinea region.

By focusing on demersal fishery resources, the project built on the *Pêche-Climat* (Cury and Roy 1991), *DUSRU* (Bard and Koranteng 1995) and *CEOS* (Durand *et al.* 1998) projects which had been concerned primarily with environmental variability and pelagic fishery resources.

Components of the Project and Linkages

Given the high level of R&D activity and interest in marine resources in the Gulf of Guinea, it was important that linkages were made with institutions outside the project. The co-ordinator of the Gulf of Guinea Biodiversity Project was Professor Jacqueline McGlade, Head of the University of Warwick's Ecosystems Analysis and Management Group (subsequently transferred to the Centre for Coastal and Marine Sciences of the Natural Environment Research Council), U.K. The other two principal researchers were Dr Kwame Koranteng from the Ministry of Food and Agriculture's Directorate of Fisheries, Ghana and Dr Philippe Cury from the Institut de recherche pour le développement (previously ORSTOM), France. Over the two years, scientists from Ghana, France, U.K. and Côte d'Ivoire worked on the project. The project had a Management Committee which was made

up of representatives from the participating institutions, the European Commission and the United States' National Marine Fisheries Service.

The participation of the National Marine Fisheries Service was to ensure that there were effective links between the project and the Global Environment Facility/UN Industrial Organization (GEF/UNIDO) Gulf of Guinea Large Marine Ecosystem Project based in Abidjan, Côte d'Ivoire which is technically supported by NMFS (see Ibe and Sherman this volume). There were also links with a number of other EU-sponsored research programmes (e.g. Hogarth and McGlade 1998).

Major Achievements

The results and major achievements of the project are detailed in the following sections and chapters of this volume: Environmental Forcing & Productivity chapters 5, 6, 8 and 10; and Fish & Fisheries chapters 14, 16, 18 and 19.

Various environmental and biological data sets were constructed and used in the investigation of nearshore and climatic forcing factors on fishery resources in the Gulf of Guinea (see Demarcq and Aman; Hardman-Mountford and McGlade; Koranteng and McGlade; Roy *et al.* this volume). In particular, an assessment of the response of demersal fishery resources to environmental perturbations and a preliminary biomass budget for the Ghanaian shelf ecosystem were completed. The project brought together databases on the demersal fishery resources in the Gulf of Guinea. These included the trawl fishery data of Côte d'Ivoire, which were compiled, quality controlled and put onto CD-ROM (Ménard *et al.* this volume). The original datasheets from the Guinean Trawling Survey (Williams 1968), which were not available in West Africa and generally considered missing, were also retrieved and brought back to the region (courtesy of Professor Daniel Pauly). These data are now available on CD-ROM for the benefit of the scientific community.

The project supported five PhD and one MSc degrees at UK, French and Ivorian universities. The subjects of investigation ranged from examination of dynamics of the marine environment and the role of climate forcing, discrimination of fish stocks by molecular genetics, dynamics of fish species assemblages, exploitation and management of demersal fishery resources in the Gulf of Guinea, including the assessment of fish stocks and modelling of fishery catches.

The Dissemination Workshop

A critical part of the activities within the project was a workshop, organised in Accra, Ghana on 27-29 July 1998 (Koranteng 1998). The primary objective was to disseminate the findings of the project and relate them to research in other parts of the world. The workshop was attended by 50 scientists from Canada, Côte d'Ivoire, France, Ghana, South Africa, United States of America and the United Kingdom.

In his opening address, the Hon. Johnson Asiedu Nketiah, Deputy Minister, Ministry of Food and Agriculture, Ghana, underscored the importance of the fishing industry in the economies of countries in the Gulf of Guinea. He described the numerous management problems existing in the fishing industry and appealed to the participants to consider the issues of environmental degradation in the sub-region and the human factors leading to it, and

the decline in fish catches and the impact on human populations, especially in the West African sub-region. There were also short addresses by representatives of the GEF/UNIDO Gulf of Guinea LME project, and representatives of the core partners, who underlined the importance of the findings of the project and the opportunities for building international and national awareness of the problems facing the region afforded by the workshop.

Closing the workshop, Mr Mike Akyeampong, Deputy Minister, Ministry of Food and Agriculture noted that as Deputy Minister responsible for fisheries, he had been involved in the work of the FAO Fishery Committee for the Eastern Central Atlantic (CECAF) and in the activities of the Ministerial Conference of Fisheries Cooperation Between African States Bordering the Atlantic, and as such had followed the development of the Gulf of Guinea Biodiversity Project, and was very pleased to see the workshop and project come to fruition.

The research project that culminated in this and other workshops exemplified the scientific collaboration within the EU Fishery Research Initiative under the European Union's Research and Technology for Development programme in the general framework of the Lomé IV Convention.

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