REGIONAL SEAS

UNITED NATIONS ENVIRONMENT PROGRAMME

Environmental management problems in resource utilization and survey of resources in the West and Central African Region

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PREFACE

Ten years ago the United Nations Conference on the Human Environment (Stockholm, 5-16 June 1972) adopted the Action Plan for the Human Environment, including the General Principles for Assessment and Control of Marine Pollution. In the light of the results of the Stockholm Conference, the United Nations General Assembly decided to establish the United Nations Environment Programme (UNEP) to "serve as a focal point for environmental action and co-ordination within the United Nations system" (General Assembly resolution (XXVII) of 15 December 1972). The organizations of the United Nations system were invited "to adopt the measures that may be required to undertake concerted and co-ordinated programmes with regard to international environmental problems", and the "intergovernmental and non-governmental organizations that have an interest in the field of the environment" were also invited "to lend their full support and collaboration to the United Nations with a view to achieving the largest possible degree of co-operation and co-ordination". Subsequently, the Governing Council of UNEP chose "Oceans" as one of the priority areas in which it would focus efforts to fulfil its catalytic and co-ordinating role.

The Regional Seas Programme was initiated by UNEP in 1974. Since then the Governing Council of UNEP has repeatedly endorsed a regional approach to the control of marine pollution and the management of marine and coastal resources and has requested the development of regional action plans.

The Regional Seas Programme at present includes eleven regions [1/] and has over 120 coastal States participating in it. It is conceived as an action-oriented programme having concern not only for the consequences but also for the causes of environmental degradation and encompassing a comprehensive approach to combating environmental problems through the management of marine and coastal areas. Each regional action plan is formulated according to the needs of the region as perceived by the Governments concerned. It is designed to link assessment of the quality of the marine environment and the causes of its deterioration with activities for the management and development of the marine and coastal environment. The action plans promote the parallel development of regional legal agreements and of action-oriented programme activities[2/].

At the third session of UNEP's Governing Council (1975), a number of West and Central African States requested UNEP to study the problems of marine and coastal pollution of their region. As a result of that request, UNEP's exploratory mission visited fourteen States of the region during 1976. The mission's report identified the major environmental problems of the region and recommended the development of a regional action plan for the protection and development of the marine environment and coastal areas of the region.

After considering the report of the mission, the fifth session of the Governing Council (1977) decided that "steps should be undertaken for the development of an action plan and a regional agreement to prevent and abate pollution" in the West and Central African region.

1/ Mediterranean Region, Kuwait Action Plan Region, West and Central African Region, Wider Caribbean Region, East Asian Seas Region, South-East Pacific Region, South Pacific Region, Red Sea and Gulf of Aden Region, East African Region, South-West Atlantic Region and South Asian Region.

2/ Achievements and planned development of UNEP's Regional Seas Programme and comparable programmes sponsored by other bodies. UNEP Regional Seas Reports and Studies No. 1. UNEP, 1982.

The preparatory work on the development of the action plan and the regional agreement included several expert group meetings, missions and surveys[3/] leading to the Conference of Plenipotentiaries on Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region (UNEP/IG.22/7) convened by UNEP in Abidjan, 16 - 23 March 1981 as the final stage of the preparatory work leading to the adoption of the (a) Action Plan for the protection and development of the marine environment and coastal areas of the West and Central African Region, (b) Convention for the Co-operation in the Protection and Development of the Marine and Coastal Environment of the West and Central African Region, (c) Protocol concerning co-operation in combating pollution in cases of emergency, and (d) a set of conference resolutions.

This document is one of the surveys prepared as a contribution to the development of the Action Plan.

3/ For details see:

- Report of the Executive Director on preparatory activities for an action plan for the protection and development of the marine and coastal environment in the West African Region. UNEP/IG.22/4. UNEP, 1981.

- UNIDO/UNEP: Survey of marine pollutants from industrial sources in the West and Central African Region. UNEP Regional Seas Reports and Studies No. 2. UNEP, 1982.

- UNESCO/UNEP: River inputs to the West and Central African marine environment. UNEP Regional Seas Reports and Studies No. 3. UNEP, 1982.

- IMCO/UNEP: The status of oil pollution and oil pollution control in the West and Central African Region. UNEP Regional Seas Reports and Studies No. 4. UNEP, 1982.

- UNDIESA/UNEP: Ocean energy potential of the West African Region. UNEP Regional Seas Reports and Studies No. 30. UNEP, 1983.

- UNDIESA/UNEP: Onshore impact of offshore oil and natural gas development in the West and Central African Region. UNEP Regional Seas Reports and Studies No. 33. UNEP, 1984.

CONTENTS

I. INTRODUCTION

A. Introduction

Coastal areas are uniquely suited to support a variety of activities and to serve diverse human needs for food, energy, transport and recreation. Some two-thirds of the world's population lives near the coast and a majority of the world's largest cities - 39 of the 66 with populations over 1 million - are in coastal areas. Ninety per cent of the world's fish catch comes from the continental shelf and upwelling regions, and at present, approximately 8 per cent of the world's total animal protein supply comes from the sea. Again, about 20 per cent of the world's oil production comes from offshore areas and it is estimated that about 68 per cent of the world's ultimate recoverable hydrocarbon resources lie in coastal waters 200 metres in depth or less. Finally, the coastal area is a source of many other raw materials in the form of sand, gravel, and a variety of placer minerals such as diamonds. Salt for instance, as an extracted product from the oceans, contributes significantly in food processing and other industrial endeavours. Coastal areas are, therefore, an integral part of the development process in a large number of countries.

The evolution of coastal areas into focal points for tourism, trade, industrial production and transport, in the absence of an integrated and comprehensive plan for their development, often results in negative interactions between activities that act to reduce the potential value of one or more activities. Proper planning and coordination of marine activities can help, not only to manage and minimize conflicts, but to take advantage of positive interactions between activities and maximize the overall benefits

accruing from the coastal area. The value of treating coastal areas as planning entities within the overall framework of national development planning is not always fully recognized and very often countries lack the administrative and legislative basis for implementing such an approach.[1/] In West Africa, where there is a relatively narrow range of marine-related activities and a largely untrapped resource potential, there is a need and an opportunity for managing the growth of individual sectoral activities so as to obtain the optimal mix of activities which maximizes the contribution to national development, while ensuring the continuing productivity of the coastal environment.

The principal objective of the Action Plan is the development and protection of the marine and coastal area environment of the West African Region for the health and well-being of present and future generations. The Action Plan is intended to provide a framework for an environmentally sound and comprehensive approach to coastal area development particularly appropriate to the needs of the people. Any factors, therefore, that mitigate against the maintenance of the marine environment to the extent that the "health and well-being" of the people of the West African region becomes jeopardized will constitute "pollution".

The socio-economic component of the Draft Action Plan must, therefore, bring into focus the major categories of marine pollution in the region, explore their effects on this environment as well as on the people who derive benefits from it, survey past and possible future development activities which may have an impact on the quality of the marine and coastal environment, and subsequently recommend an approach towards effective environmental management which can be incorporated into national and regional development plans of the states of the region.

1/ The United Nations has prepared the following volumes on the subject. Manual on Coastal Area Management and Development. Vol. I - Establishing a National Programme: Economic and Technical Matters. Vol. II - Approaches, Problems and Guidelines, UN/DIESA 1980.

With the above considerations paramount, this paper seeks:

1. To examine existing classification schemes for the coastal and marine environments in West Africa;

2. To summarize the activities of the various socio-economic groupings within the West African coastal area;

3. To discuss the regional natural resource base and its relationship to the coastal area and

4. To examine present and future environmental management and planning issues for the coastal area given the various national development strategies in the West African region.

B. The Significance of the West African Coastal Area in Regional and National Development

The West African coastal area has traditionally played an important, albeit less than major role in West African socio-economic development. Over the years, using dug-out canoes, a number of the coastal ethnic groups developed such competence in sea fisheries that their influence was felt at a considerable distance inland.[1/] With the advent of Western influence in the region, the traditional role of coastal areas was diminished and replaced by one focussed on the need to create the necessary infrastructure to facilitate trade in raw materials destined for Europe. As a result and aided by subsequent national development efforts, coastal areas in West Africa, generally contain the most obvious examples of the effort toward modernization in the region.

Of the 20 countries included in this study, excluding Cape Verde, Sao Tomé and Principé, all but three of the countries have capital cities located

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1/ The Ewe ethnic group of Ghana, Togo and Benin are such an example.

in the coastal area.[1] Until the end of the nineteenth century, almost all these cities had populations of less than twenty thousand. In the colonial period, many of the towns already in existence were adopted as administrative and commercial centres and were linked together by railways and roads. Old towns, by-passed by the new means of communication, declined. The fastest growing towns were those chosen to be the ports, coastal or riverine, at the termini of the railways. They were the obvious centres for the type of trade and commerce of the period, and in many cases were chosen to be colonial capitals. After independence and up until the present, the dominance of the capital cities has been further heighten by various policy decisions adopted by national governments. Minor ports along the coast are declining as the harbour installations and overland links of major ports improve. Government spending on public works and the employment offered in government offices attracts ever more people to the national capitals. Industrial activity, particularly large-scale manufacturing, taking advantage of the same factors, also tends to be located in the coastal areas.

Of more recent vintage but perhaps in the present decade of more significance to the individual economies, is the known and potential energy resource endowment within the coastal area. Current petroleum production in the region is concentrated offshore. In those non-producing countries of the region, prospects for the occurrence of oil and gas offshore range from good to fair.[2] Aside from the obvious benefits accruing from exploiting these resources, additional national desires to increase value

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1/ The countries with non-coastal capitals are Cameroon (capital Yaoundé), Zaire (capital Kinshasa), and Congo (capital Brazzaville). Nigeria is planning on moving the Federal capital from Lagos (coastal) to Abuja (inland) soon.

2/ Described more fully in Section III E.

added through processing such resources will result in further concentrations of industrial activity particularly petroleum-based industries along the coast. Including refineries under construction, there are currently 14 refineries located in the coastal area each releasing varying quantities of toxic wastes into the environment.

Finally, the coastal areas contain resources that if properly utilized could significantly improve the quality of life of the West African peoples. An excellent example of the above can be gleaned from the exploitation of regional fisheries. Though the region boasts of a number of ethnic groups whose proficiency in exploiting the regional fisheries is renowned all along the African coast, efforts at improving the technology available to them to increase their productivity and, therefore, their standard of living, have only been fair and the results mixed. The regional fisheries are dominated by foreign vessels and fleets with little technological transfer to West African society as a whole.

C. Environmental Issues of the Coastal Zone

The sources and extent of pollution in the marine and coastal area environment, though not the subjects of rigorous and exhaustive study on a region-wide basis, have been investigated in part by exploratory missions and over-view studies. Portmann, in the "Gulf of Guinea: Pollution, the need for control and possible mechanisms thereof", identifies the following types and sources of pollution:[1/]

1. Sewage, generally in and around the Port capitals and major coastal towns;

1/ The Gulf of Guinea: Pollution, the Need for Control and Possible Machanisms thereof. J. E. Portmann, FAO/UNEP Joint Project No. FP/0503-77-02.

2. Oil contamination, not common to all countries, but found in ports, harbours and beaches of the countries where it is found. Oil contamination is caused in part by tanker traffic through the region, in part by handling operations in ports and refineries and finally, in part by activities associated with oil exploitation;

3. Timber industry pollution, in the form of logs and plywood remnants in countries like the Ivory Coast, Ghana, Cameroon and Gabon;

4. Industrial effluents, including effluents from refineries and mining operations which are discharged into rivers, the sea or lagoons without prior treatment;

5. Coastal erosion, again, not common to all countries but especially serious in countries like Ghana, Togo, Benin and Nigeria, and generally associated with ocean front construction (ports and harbours, etc.)

6. Pollution associated with agribusiness essentially in the form of fertilizers and pesticides.

Of the problems above, except for oil contamination from sources outside the region and the potential effects of a blow-out or spill which will require contingency plans adhered to by all countries in the region, the remainder point to the need for fundamental changes in the policy of resource utilization in the region. As noted by Portmann, with the provision of adequate oil analysis facilities in the region, it should not be difficult to establish the sources of oil contamination. Once having done this, the problem with external sources of oil contamination can be squarely addressed, the regional risks associated with a blow-out or spill estimated and the requisite contingency plans drawn up. Without the facilities to determine their origin,

this issue will remain the central theme of discussions on pollution while the actual and potential problems associated with the development and management of the region's coastal areas are overlooked.

Sewage pollution in the Port capitals and coastal towns where it has generally been identified as a problem, is being addressed in virtually all of the countries of region. Generally recognized as a problem created by either a lack of treatment facilities or an improper siting of outfalls, it is being corrected by the construction of treatment facilities in Senegal (both Dakar and St. Louis), Gambia (Bangul), Ivory Coast (Abidjan), Ghana (Accra), Nigeria (Lagos), Cameroon (Douala) and Gabon (Libreville). Allowing for hindsight and the historical evolution of many of the Port capitals and major coastal towns, the origin of the problem is readily identified-- in the other coastal towns.
uncoordinated planning. In Tema, for example, which was planned as an industrial town along garden city lines, such social facilities are availsble and generally, the town does not suffer from the environmental problems identified in the other coastal towns.

The remaining classes of pollutants, timber, industrial effluents, coastal erosion and environmental residue concentrations arising from the agribusiness though amenable to short-term and stop gap solutions point to a potentially more alarming problem of improper resource utilization schemes. Apparently missing even in national development plans, is the realization that the desire to obtain higher standard of living involves the deliberate modification of the natural environment (ecology, health, socio-cultural) at a cost to society. Such costs, which vary widely, result from either the failure to adequately consider environmental consequences during regional planning and development or from the lack of knowledge and information necessary to predict their eventual impact. To the extent that these losses occur or go unmeasured, the level of

The significance of the activities which generate the latter types of pollutants, therefore, is not in the severity of damage they can be determined to be imposing on a part of the ecosystem at the present time but, it is in the fact that these activities through both the pollutants they generate and the manner in which they occur, are choking off potential development opportunities that exist around them. Development activities, particularly resource utilization schemes within the region should include a broad array of concerns designed to assess costs that would result if projects were to lead to impairement of the future productivity of the national resource base and to adverse side effects of investment. What is being suggested is that at the outset of a major national or regional development scheme it is necessary to generate some discussion and answers to issues which impinge directly on the future productivity of the entire natural resource base.[1/] In the coastal area of West Africa, in particular, where the concentration of manufacturing activity and the population density is the greatest, and where the existence of environmental degradation is most visible, the opportunity exists for transforming any consensus arrived at in the discussions into corrective and preventive action.

1/ Resource as used in this report, is a term applicable to a wide range of environmental attributes which are of potential use to man, either directly as an input to the agricultural or industrial economy, or indirectly by exchanging the resource for monetary assets.

II. THE COASTAL AND MARINE ENVIRONMENT OF THE REGION

A. Introduction

Like other coastal environments, that of the West Africa Region is a complexity of integrated processes which have three major components: atmospheric, marine and terrestrial. Each component is characterized by a particular set of processes which may be viewed as subsystems contributing to the equilibrium in the entire system. The atmospheric and marine subsystems for example, are largely responsible for the transfer of energy and mass to which the terrestrial materials respond. The variation and interaction within the three components results in different products as evidenced by the diverse types of shore environments in the region. Since each type of shore environment has associated with it specific attributes that can either be harnessed profitably to promote socio-economic development or be adversely impacted upon by such development, knowledge of the individual elemental units that constitute the much larger environment would be invaluable in any management or development scheme.

A review of the literature reveals that although considerable work has been done to generate data on processes within marine subsystems and materials response to these processes (a significant amount of work has been done on the nature of West African coasts for example), relatively little work has been done in respect of the integration of process analysis (atmospheric and marine subsystems) with materials response (terrestrial interface units) in the region. One such attempt, continental in scope, revealed the presence of four major coastal climatic regimes, three marine

sub-regimes and nine types of terrestrial inferfaces.[1/] Given its scope, the atmospheric and marine processes within this study were viewed on a mesoscale within which feature of mean annual motion were resolved at approximately 500 miles while terrestrial features were recognized at a resolution of 20 to 50 miles. The significance of the study is that it provides an excellent example of the steps required to transform purely technical and scientific data on the region's coastal environment into information that is useful to decision-makers and planners in the development of the regional sea. For coastal area management and development at national or local levels, the scale at which the processes referred to were resolved will be changed as may a number of other variables but, the general principles utilized in the transformation process will remain essentially unchanged.

Until the creation of coastal metropolises in the region, coastal areas were generally sparsely populated with the overwhelming proportion of coastal ethnic groups engaged in fishing, trading or farming. Now, however, the coastal areas are among the most densely populated areas in the region and, with most of the capital cities located in them, contain socio-economically, some of the most technological groupings within the region. The opportunity to channel recently acquired technological ability into the productive areas of the coastal economy though enormous, has hardly been exploited. Coastal lagoons, with their capability to support aquaculture in certain cases and to serve as a means of transportation between countries in yet others, have until now been barely utilized.

1/ Classification of the coastal environments of the world. Part II Africa. Technical Report No. 3. Office of Naval Research Geography Programs, U.S. Government, February 1973.

B. Geography of the Coastal Area

Extending from Mauritania in the northwest to Angola in the south, along the Gulf of Guinea, marine, terrestrial and atmospheric processes have created coastal areas rich in resources both living and non-living that have contributed significantly to the region's development.

From the northern coast of Senegal to Dakar, marine trade winds, the dominant longshore drift and powerful waves, backed by the greatest fetch of open water of the Atlantic, are smoothing a low sandy shore (Figure 1). Within this section of the coast, the Senegal and Saloum estuaries are obstructed by variable sandspits behind which are relic lagoons. The head of the Senegal delta divides into several distributaries, especially when in flood. The City of St. Louis, on an islet (2,195m by 320m) contains in its southern settlement of Guet N'Dar one of the largest fishing centres in West Africa. The same factors which are responsible for diverting the Senegal river mouth and for making the unstable Langue de Barbarie sanspit, have made the smooth coastline of Cayor. Dunes rising up to over 40m (130 ft.) extend up to 24 km. (15 miles) inland. Between the dunes and parallel to the coast are the marshy depressions or niayes (meaning clumps of oil palm). In the south, extending up to the Cape Verde peninsula, some lakes are saline and frequently invaded by the sea (e.g. Lake Retba).1/

From the Saloum river estuary to Cape St. Ann in Southern Sierra Leone (Figure 3), the coast and river estuaries have been drowned and this

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1/ The Cape Verde peninsula is itself formed of a group of volcanic islands attached to the continent by peninsulas of sand. It offers many natural harbours. The port of Dakar in the southern part of the peninsula has a deepwater roadstead which is one of the best in all of West Africa.

stretch of coast is thus a ria coastline. Recent marine transgressions which drowned the lowest reaches of the rivers have created good waterways off the coasts of Guinea-Bissau and Guinea. Off Guinea-Bissau, there are some sixty islands; some of which adjoin the mainland, and are connected at low tide (12 ft.) by recently developed lateritic rock. The Bissajos islands further out, were doubtlessly separated from the mainland in the same way. Drowning of rivers with such gentle gradients in this section of the region, has contributed to the slackening of flow and silting of their lower courses. In these areas, since there is no constant longshore drift, and the tidal range is high, sandbars or lagoons do not readily form. Mudflats with mangroves, however, form readily in the estuaries off Guinea-Bissau, Guinea and Sierra Leone.[1/] In Sierra Leon, coastal swamps which average some 32 km. (20 miles) in width, are well defined because of the heavy rainfall (over 3,175mm-125 in.), which falls on a flat and low lying area where much of the sub-soil is clay or sand. The coastal swamps have alternating bands of gravels, grits, sands and clays.

The southern coast of Sierra Leone and the coast of Liberia are characterized by a northwest trending sandspit, which seems to be helped by a tidal range lower than that up north (Figure 2). Along Sierra Leone's southern coast are large areas of coarse marine sand ridges which are relics of former beaches. Lacustrine, lagoon, estuarine,

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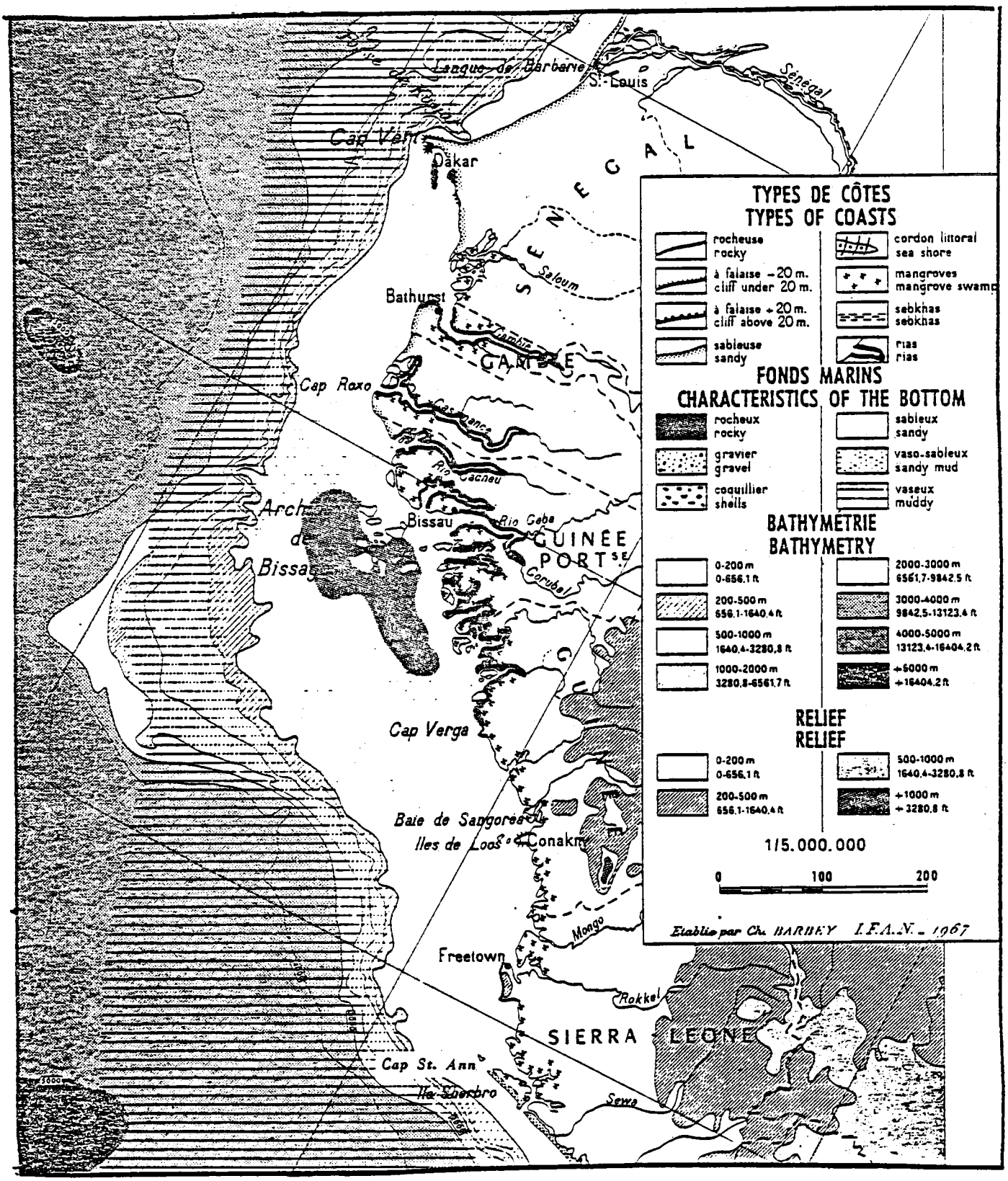
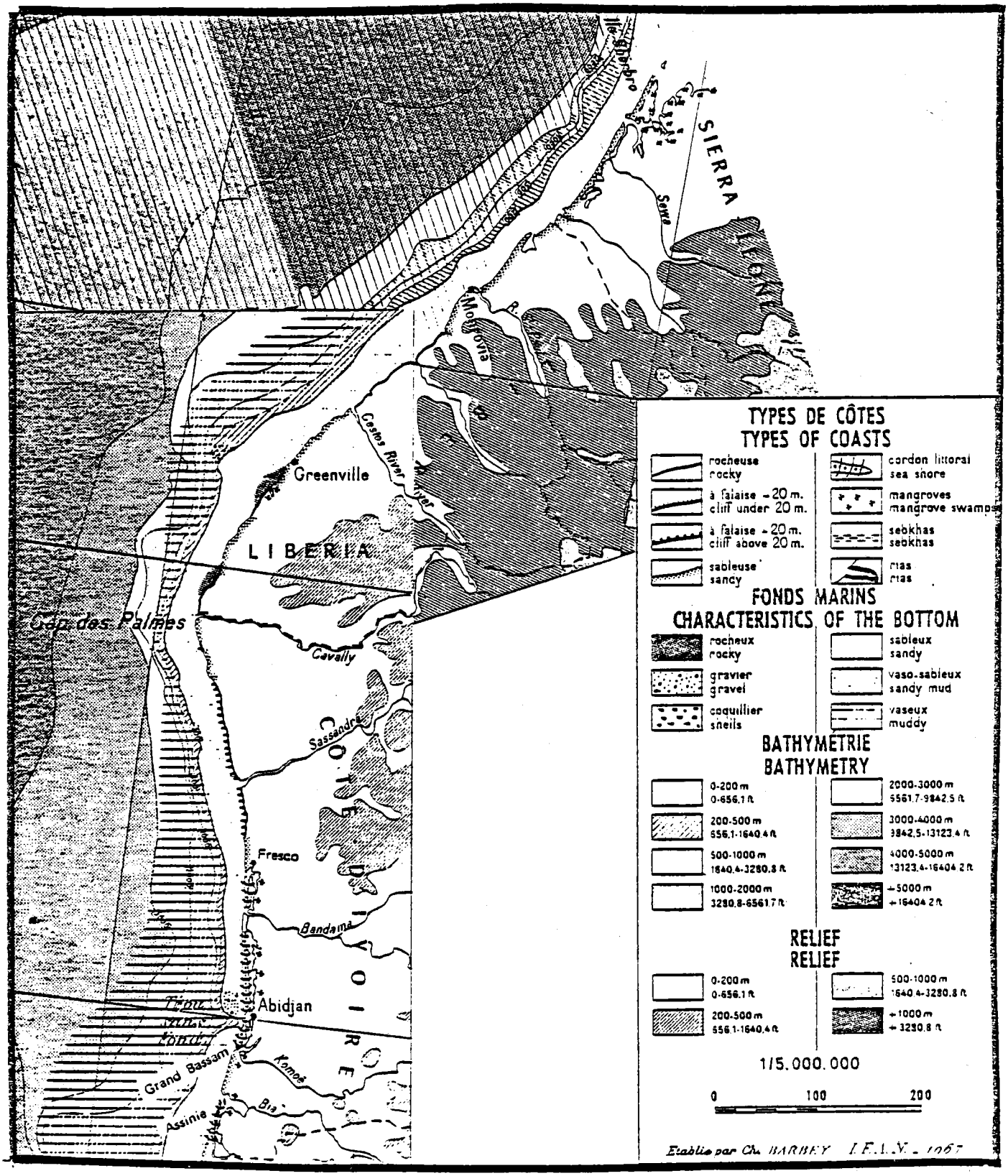
1/ In the Guinea-Bissau, the coastal region is composed on low plains which are badly drained. These plains are watered by rivers emptying into the Atlantic in deep estuaries in the form of fjords. As noted, even though these "Southern Rivers" offer excellent natural harbours, access to them is difficult because of the great expanse of mangrove. This situation is generally duplicated in Guinea and Sierra Leone.



Source : International Atlas of West Africa. O.A.U. Scientific, Technical and Research Commission. 1967

Figure 1: Coastline from the Senegal river to Sherbro island



Source : International Atlas of West Africa, O.A.U. Scientific, Technical and Research Commission. 1967

Figure 2: Coastline from the Sewa river to the Bia river

deltaic and marine conditions have widely occurred in recent geological times.[1/] In Liberia, the coastal plain is about 15-55 km. (10-15 miles) wide and has a forest-savannah mosaic of patches of forest and low bush, with gallery forests along the rivers, mangrove swamps, clusters of thorny bush, and grasslands with some oil palm and dwarf trees.

From the eastern border of Liberia (Cape Palmas), as far east as Fresco in the Ivory Coast, the coast is characterized by low cliffs, averaging 60 m. (200 ft.) in height, with rocky points and intervening sandy bays similar to much of the Ghana coast further eastwards. The western shore of the Ivory Coast and the central part of Ghana have only moderate coastal accumulation. The change in the orientation of the coast in relation to waves of maximum fetch in this area, results in movement away from Cape Three Points. Both coasts have occasional small but abrupt rocky promontories which, in the case of Ghana, provided little shelter for ocean going vessels. From the centre of the Ivory Coast shoreline (Fresco) to Cape Three Points, and again from West of the Volta delta to east of the Niger river, the coasts have suffered submergence. They have been smoothened by continuous longshore drift under the action of heavy surf and are characterized by sandbars and lagoon formations. Yet erosion is or has been taking place at Assinie (Ivory Coast), Keta (Ghana), Grand Popo (Benin) and at Victoria Beach (Lagos). East of Fresco, the coast becomes smooth and sandy, with a long and ever increasing sandbar; this is broken by the Bandama river at Grand Lahou, by the Comoé at Grand Bassam, and by the Bia river and Aby lagoon

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1/ Freetown, capital of Sierra Leone, was founded in a well-known site on the Sierra Leone coastline. It stands on raised beaches at the northern end of the hilly peninsula, adjacent to which is a deep channel of the easily entered, sheltered and large estuary. Upstream at Pepel, is a deepwater loading installation.