

Artisanal fishing, sustainable development and co-management of resources

Analysis of a successful
project in West Africa

Eric Baran and Philippe Tous



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Summary

This document brings together the achievements of a project for the co-management and valorisation of fisheries resources, carried out by the IUCN in Guinea-Bissau since 1991 (Rio Grande de Buba region).

After a short description of the physical and human environment of the country and region respectively, the conceptual bases of this project are detailed and explained. This shows that the project anticipated important recommendations made at an international level. It was thus one of the first projects to implement the notions of sustainable management of the resource, the precautionary principle and a participatory approach in the field.

The principal mechanisms of this project are presented. Based on an integrated approach within the field of fisheries, they consist of:

- involvement of all parties (communities and institutions) via a co-ordination committee
- carrying out of modular micro-projects (training of people, transformation of fish,...)
- establishing an initial financing system, (micro-credit type)
- bio-ecological monitoring of the resource
- institutional and judicial support for the State

After a brief presentation of the activities undertaken between 1992 and 1998, the achievements are detailed. They are examined from the point of view of the knowledge of the resource and the environment, knowledge and monitoring of the fishery, co-management of the resource, contribution to development, and sustainability of the project.

This part is followed by an analysis of the project. This examines the same points and for each of them provides critical elements that can be debated.

The qualities of this project encourage its reproduction, one chapter looks at this topic. It lists the negative experiences, the particularities that proved favourable to the project and the positive points in view of its reproduction.

The last part summarises this information, schematises the functioning of this project, and based on the lessons learnt proposes a framework for generalised replication in other contexts.

Introduction

Guinea-Bissau is an agricultural country. It is largely open to the sea. The country is characterised by its search for a means of sustainable development and it has a strong environmental conscience. This is illustrated by the existence of a Ministry of Environment, Tourism and Artisanal work as well as a National Council for the Environment within the government.

IUCN – The World Conservation Union has been present in this country since 1989, promoting development through a wise use of coastal resources and the preservation of the country's rich natural heritage.

The IUCN project entitled "Sustainable development of artisanal fishing in the Rio Grande de Buba" began within this framework in 1992. It is financed by the Directorate of Development and Cooperation of the Federal Department of Foreign Affairs of the Swiss Confederation.

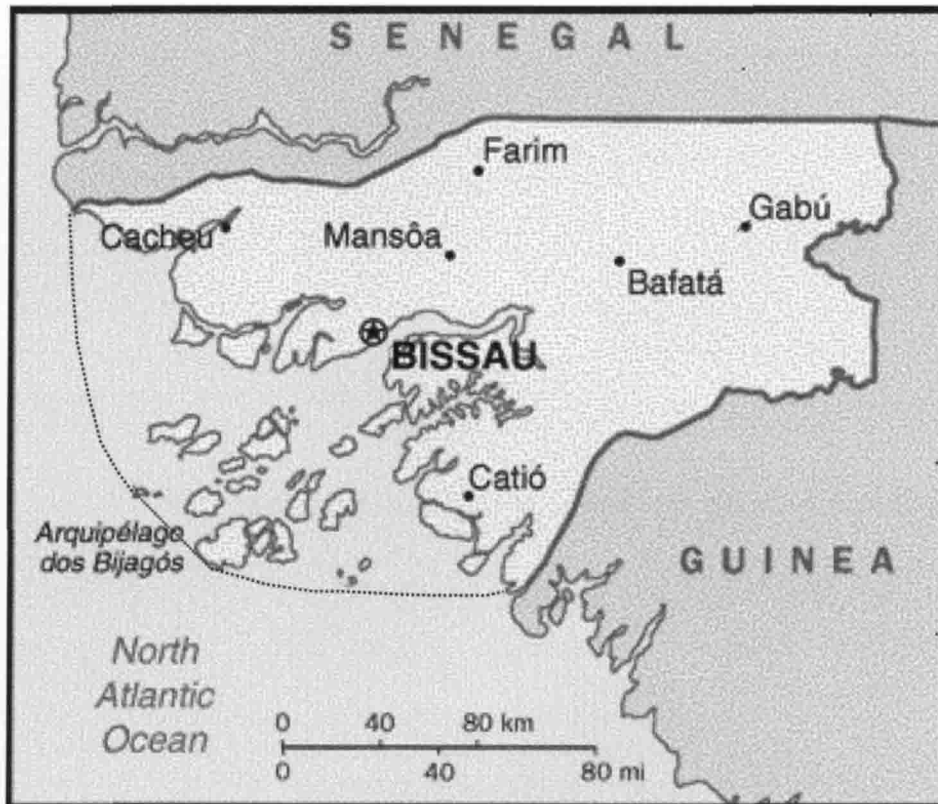
This responded to a wish to develop an artisanal fisheries project to show what sustainable management of fisheries resources could be within the context of Guinea-Bissau, and to serve as an example in other coastal regions.

This report aims to provide a summary analysis of the approach taken by this project and its achievements, in order to provide a set of guidelines and to learn lessons to be able to replicate the project in other sites.



Context

Guinea-Bissau



Key: Base line defining the coastal zone:.....

General physical and human geography

Guinea-Bissau has a surface area of approximately 36,000km², of which 2/3 are influenced by tides (23,500km² of coastal zone = 65% of the national coastal area). The coastline is 275km long. Opposite the continent are the Bijagos Islands, an archipelago which are difficult to access (shallow waters, strong sea currents). They are well conserved and have an extremely rich marine fauna (including manatees, dolphins, sea turtles,...). In 1996 UNESCO classified these islands as a Biosphere Reserve.

The climate is tropical, hot and wet; the rainy season extends from June to November (with South- western winds) and the dry season is from December to May when the harmattan wind blows from the North-east.

Total population: 1,179,000 inhabitants.	
Population in the coastal zone: 65% of the national population	
Population density in the coastal zone: 36 hab/km ²	
Life expectancy: 48.71yrs. Age structure: 0-14yrs: 43% 1-64yrs: 54% 65yrs and over: 3%	Rate: birth: 39.17 births / 1.000 inhabitants death: 15.85 deaths / 1.000 inhabitants fertility: 5.26 children / woman population growth: 2.33%

Ethnic groups: Balantes 30%	Number of languages: 23
Fulas 20%	Religions: Animists 65%
Manjaques 14%	Muslims 30%
Mandingues 13%	Christians 5%
Pepels 7%	
Others: less than 5%	Literacy rate: 54.9% (1995)

Guinea-Bissau is one of the poorest countries in the world:

GDP per inhabitant: \$950 (1996)	External debt: US\$816 million (1994)
Exports: US\$33 millions (1994)	Imports: US\$52.4 million (1994)

Agriculture and fishing are the principal economic activities. Cashew nuts, palm nuts, wood, peanuts and fish are the country's primary products.

In 1997 Guinea-Bissau was classed 163rd out of 175 countries on the United Nations Human Development Index.¹

Specificity of the marine environment and of the fishing sector

From a geomorphologic viewpoint, the coastal characteristics of Guinea-Bissau represent a particular environment with important biological consequences.

The continental shelf is exceptionally wide (less than 20m deep as far as 180km out to sea). This creates strong tidal waves (tidal range reaching 6m) and turbulent coastal hydrodynamics; the water is turbid to very turbid along the coast (Diop, 1990). This coast is bordered by an important mangrove and is brackish from July to October (Berrit, 1966). Upwelling (a phenomenon of cold and biologically rich waters brought to the surface) occurs during January-February (Rossignol and Meyrueis, 1964).

Guinea-Bissau therefore combines Senegalese (upwelling) and Guinean (turbidity, brackish water) type environmental factors. From a marine fauna perspective this creates a zone that is biogeographically distinct from its neighbours (from Cape Roxo to Cape Verga; Postel, 1968). These factors are particularly favourable from a fisheries point of view, and the zone is considered as one of the richest in West Africa (Williams, 1964; Domain *in* ORSTOM 1977). Along the coast the shallow waters and mangroves are favourable factors for juveniles. They constitute nursery areas for numerous species of fish and crustaceans (Yañez-Arancibia, 1985; Day *et al*, 1989).

This zone is considered as playing a fundamental role in recruitment for stocks exploited by the fishing industry in Guinea-Bissau and in the neighbouring countries, Senegal and Guinea (Domain, 1989).

Despite its potential, the fishing sector in Guinea-Bissau has only recently been developed. Fishing represents 40% of financial income in the country, mainly through fishing licences and agreements. Nevertheless, fish is not the dominant export. The Fisheries Ministry was separated from Agriculture during the 80's. It has two areas of concern: small-scale fishing, (high number of projects financed by diverse cooperation agencies), and industrial fishing (fishing agreements with the European Union since 1982). An applied Research Centre was also created at this time, but until the early 90's this was a neglected side of the fishing administration.

¹

Estimations from 1997, according to the CIA World Fact Book

<http://www.odci.gov/cia/publications/factbook/pu.html>

The Fishing Law was deeply revised in the late 90's, especially regarding the definition and regulation of small-scale fishing (Kromer, 1995 and EEC/FAO, 1996). The new 1997 law, amongst other things, introduced the notion of resource co-management.

Rio Grande de Buba region

The Rio Grande de Buba region has the same geological formation as the rest of the country, but is characterised by the presence of a ria (an ex-river valley that has been filled by the sea). It is very branched and has only low inputs of fresh water. However there are small zones of springs upstream, around which the fishermen place blocking nets ("mpandé").

Surface area: 285km², average depth: 30m, maximum depth: 60m. High tidal range of between 2.5 and 6m amplitude. Total length: 52km.

Because of its size and the low input of fresh water, the Rio Grande de Buba can be considered as a sea inlet or as a real estuary (Diop, 1990).



Flora and fauna

The banks of the Rio are fringed by a narrow mangrove then by dry forests. The region is covered with dry and sub-humid forests, which in places are degraded. In the more humid South, agriculture is characterised by perennial plantations (palm trees, citrus fruits) and in the North by subsistence cultures (peanuts, tubers). Everywhere the natural vegetation cover is parcelled by the pluvial rice – cashew trees succession.

The wild fauna is quite rich and there are important populations of birds (including several species of migratory birds that over-winter on Lake Cufada – a RAMSAR site since 1996). This is the most western limit of the distribution of the Chimpanzee *Pan troglodytes verus* and numerous other mammals are on the IUCN Red List.

The aquatic fauna is particularly noteworthy due to the presence of the African manatee (*Trichechus senegalensis*) and of two species of dolphin (*Tursiops truncatus* and *Souza teuszii*). There are more than one hundred characteristic species of fish, both in marine and estuarine environments: coastal fish (Mugilids, Cichlids), demersal fish (Sparids, Lutjanids, Ariids) and pelagic fish (Clupeids, Scombrids, Carangids, Sphyraenids). The latter group only enters the Rio to carry out part of their life cycle.

Sociological and cultural context

The different phases of the country's history have marked this region more than other regions of Guinea-Bissau. Navigators have known the Rio Grande since the 15th century because of its shallow waters and shelter. It was first clearly mentioned by Vasco de Gama in his narrative about his first voyage in 1499. Since the 15th century there has been a strong Portuguese presence. The region was the site of intensive battles during the war for independence (1962–1974). It was then largely neglected by the important development projects during the socialist period (1975–1990). During this latter period social and material organisation was very centralised, without any sort of community-based counter-power.

The region is essentially rural and has 45,000 inhabitants (in 1991; this is 0.5% of the national population). The main towns (Buba, Bolama, Empada) have 2000, 4000 and 1700 inhabitants respectively. There is no industry, services (electricity, water, health, education) are inadequate or absent. The region is globally very isolated. Since 1994 there is however a good road that joins Buba to Bissau.

This region is mainly inhabited by the Beafada ethnic group (about two thirds of the population, the rest are Peuls and Papels). Therefore the region where the project has been carried out corresponds essentially to a single ethnic group, and to a single administrative region (Quinara region).

Within the Beafada ethnic group the power structure is transversal. Decisions concerning the community are made in a collegial way and participation in community activities is the concern of all community members. The Beafadas are traditionally sedentary and are mainly farmers. Until recently they only fished to feed themselves on the borders of the villages. At present fishing activities are not very developed, but it should be noted that many individuals call themselves fishermen or say that they are ready to become full time fishermen.

Until the independence of Guinea-Bissau, the colonial powers apparently never tried to develop the local artisanal fisheries sector. The means for productive output by the coastal populations remained rudimentary, and fishing never developed at a commercial level (supplying inland markets or exports for example). Furthermore, for the majority of these populations, the proximity and abundance of the resources kept fishing at an intermediate subsistence level. The only transformation carried out was drying. Paradoxically, transformed products (" bacalhau " i.e.: salt-cod fish) were imported from Portugal and were increasingly consumed by the population. Replacement by transforming local species was not undertaken.

Given the very low exploitation rate by locals, since the 1970's foreign small-scale fishermen, mainly from Senegal and Guinea, have been coming to Guinea-Bissau to look for the abundant fisheries resource (Bouju, 1994). This movement has been becoming more important during recent years and these fishermen are the cause of concern about the sustainability of the resource.

IUCN in Guinea-Bissau

IUCN's mission is to encourage the creation of a political, economic and social environment that favours sustainable management and the use of natural coastal resources, as well as the preservation of biological diversity with and for local populations.

The IUCN office in Guinea-Bissau has 15 full-time employees and collaborates with the Guinean State in the following fields:

Coastal planning

This program aims to plan rational management of all natural resources from the coastal zone, particularly by setting up a national GIS.

Environmental legislation

Supports national legislation for protected areas.

Cacheu Mangroves National Park, Orango Islands National Park

These parks aim to ensure that natural resources and the coastal zone biodiversity are conserved.

Cantanhez initiative

This action aims to conserve, in collaboration with local communities, the last remaining sites of sub-humid pristine forest in West Africa.

Sustainable Development in the Bijagos Archipelago

Definition and setting up of an integrated development plan for the Archipelago, in agreement with the inhabitants and within the framework of the Biosphere Reserve as defined by UNESCO in 1996.

Environmental education

Aimed at all the population, by means of radio programmes, a regular newsletter of which 12,000 copies are distributed in schools, and by training sessions.

Institutional support

Support to members of IUCN, governmental research institutes and NGO's.

Sustainable artisanal fishing in the Rio Grande de Buba



Conceptual bases of the project

Principles and aims

This project is initially based on the concept of "developing to conserve". It was conceived in 1991 and was planned to apply the principles of sustainable development, to implement a precautionary approach to resource use and to include participatory management.

From a conceptual point of view, this project therefore anticipated and put into action recommendations that would be made by the main international institutions some time later:

United Nations Conference on the Environment and Development, Rio de Janeiro, 3rd-14th June 1992. From Agenda 21, Chapter 17:

§ 17.79. Coastal states... should *inter alia*: (b) Implement strategies for the sustainable use of marine living resources, taking into account the special needs and interests of small-scale artisanal fisheries, local communities and indigenous people to meet human nutritional and other developmental needs;

§ 17.94. Coastal States, with the support of relevant subregional, regional and global agencies, where appropriate, should: (b) Provide support to local fishing communities, in particular those that rely on fishing for subsistence, indigenous people and women, including, as appropriate, the technical and financial assistance to organise, maintain, exchange and improve traditional knowledge of marine living resources and fishing techniques, and upgrade knowledge on marine ecosystems; [...]

The more precise objectives of this project combine environmental protection and a response to the population's desire for economic and social development. They were detailed by Kromer *et al.* (1994):

The main objective of the project is to succeed in defining and establishing mechanisms that would allow as long term as possible use of existing fisheries resources to the benefit of local populations. It should try to reconcile both economic and biological durability.

Particular attention has been given to co-management. Partnership has been conceived as the fundamental means of functioning and should guarantee viability beyond the duration of the project.

From a practical point of view another of the project's objectives was to test whether it was possible to set up environmental conservation and fisheries resource management mechanisms in a developing country characterised by:

- (very) poor knowledge of the resource characteristics and exploitation;
- equally poor situation both financially and in human resources within the local administration.

This has led its authors to plan the project in such a way that it is not based on alarming information concerning the state of the resource or on excessively high levels of exploitation. They instead adhered to the precautionary principle. The aim is therefore to prevent over-exploitation in a context of scientific and institutional deficiencies. This is in contrast with the more common situation where outright over-exploitation leads to a management/restriction system to be put in place.

Globally this project fits into an Integrated Coastal Development philosophy, and was one of the first projects to use such an approach in West Africa.

"Integrated Coastal Development ... is a dynamic process in which a coordinated strategy is developed and implemented for the allocation of environmental, socio-cultural and sustainable multiple uses of the coastal zone".

CAMPNET, 1989

The principles on which the "Rio Grande de Buba" Project is founded

Sustainable management of the resource

"The coastal State, taking into account the best scientific evidence available to it, shall ensure through proper conservation and management measures that the maintenance of the living resources in the exclusive economic zone is not endangered by over-exploitation." *United Nations, 1982*

United Nations Convention on the Law of the Sea, Article 61

Precautionary Principle

"Accepting that, in order to protect a marine area from possibly damaging effects of the most dangerous fishing practices and gears, a precautionary approach is necessary which may require action to control fishing activities even before a causal link has been established by absolutely clear scientific evidence." *Garcia, 1994; cf. also FAO, 1995*

States shall apply the precautionary approach widely to conservation, management and exploitation of straddling fish stocks and highly migratory fish stocks in order to protect the living marine resource and to preserve the marine environment.

In implementing the precautionary approach, States shall: [...] develop data collection and research programmes to assess the impact of fishing on non-target and associated or dependent species and their environment, adopt plans which are necessary to ensure the conservation of such species and protect habitats of special concern. *United Nations, 1995*

Conference on Straddling Stocks and on Stocks of Migratory fish. Article 6

Management through local communities

A resource that belongs to everybody is managed by nobody, and this leads to over-exploitation. "Free access to a common property leads to the ruin of all." *Hardin, 1968*

Integrated development

"Fisheries development projects need to emphasise organisational rather than technical factors in promoting socially and biologically sustainable development". *Bailey and Jentoft, 1990*

Participatory approach

Cooperation and participation of fishermen is necessary to ensure the success of artisanal fisheries management plans. Fishermen's organisations should be considered as a mean to make management decisions operational." *FAO, 1984*

Strategy for fisheries and development. management

"When deciding on the use, conservation and management of fisheries resources, due recognition should be given, [...] to the traditional practices, needs and interests of indigenous people and local fishing communities [...]."
FAO, 1994

Technical Consultation on the Code of Conduct for Responsible Fishing, Art. 7.66

Valorisation of traditional knowledge

"Working with artisanal fishermen can yield otherwise inaccessible insights to such matters as: unappreciated resource areas and their vulnerability to damage through coastal development, important aspects of the biology of target species, relevant local oceanographic phenomena, the local cultural palatability of proposed management schemes and local traditional conservation practices of continuing value." *Johannes, 1981*

Strategic axes

The analysis of this project and its results bring to light three main strategic axes:

Involvement of all parties

The project's initial objective was to establish dialogue and consideration between the concerned populations, prior to defining the actions to be planned. The framework and then the achievements of the project should thus result from a real interaction between the different participants. For this reason the project was conceived in such a way that the existing national structures were really integrated, reinforcing their capacities when necessary. Furthermore the population of Rio Grande de Buba were kept up to date on progress made and were made responsible for the appropriation of the resource. This follows the principle whereby it is in the interests of sedentary communities that start to earn by exploiting a local resource, to do so in a sustainable manner, unlike for migrant communities. Collaboration was also planned in the field of ecological knowledge, by benefiting from the fishermen's experience, and in the field of co-management, to solve conflicts between users.

Integrated approach in the fisheries area

Starting from the wish for sustainable development, this project has chosen to give priority to one main axis, the fisheries sector. This sector has been approached in as broad a way as possible:

- capture (equipment credits)
- knowledge and management of the resource (biological and socio-economic studies)
- transformation and valorisation of fish
- commercialisation

The legislative aspect has also been taken into consideration by proposing policies to the government which regulate resource management.

This approach has been expanded during the evolution of the project when secondary questions concerning fish transformation (improved smokehouses, market gardening) and commercialisation (setting up of a specific credit) came up. More broadly still, the area of education was considered, via the setting up of a literacy programme (aimed at the communities concerned by the fishing project and centred on this theme).

Pragmatism and modularity

Beyond the definition of objectives, the project assumed a rhythm at which to progress that would not be fixed beforehand, but would be one the communities could follow.

Furthermore another option taken on is that of an exploratory approach, in which unsuccessful initiatives are considered as lessons. Conclusions are quickly drawn and integrated to later initiatives. This was possible thanks to initially small-scale thematic modules (micro-projects). A new model was extended when successful, otherwise it was abandoned and the action was planned in a different way. Finally the project aimed to resolve raised problems with local capacities and means, favouring the exchange of know-how.

Project interest from a development point of view

This project aims to increase the financial resources of the communities of fishermen living in the Rio Grande de Buba. This should in turn improve their quality of life.

The fact that it also greatly promotes education (basic and environmental) is another clear quality. It should reduce the gender and generation differences (access to schools being generally limited to the young and to boys).

In a given group (fishermen or women), the fact that different members have equal access to credit (irrespective of age) means that each individual has the opportunity to create an activity. Offering innovative

opportunities to individuals who would not normally be allowed to express themselves by society helps to gradually dynamise this society.

Conflicts at a later date are avoided by regulating access to the resource and by the construction of a suitable legislation enabling equitable use of this resource.

Finally, in Guinea-Bissau, as is often the case in West Africa, men capture fish, while the treatment and commercialisation of fish is carried out by women. By aiming the development at the whole of the fishing area, both genders benefit. Furthermore, as the profit earned from transformation and commercialisation operations is generally higher than that earned from primary products, such a project will tend to favour the increased autonomy of women in the concerned community.

Project interest from an environmental point of view

There are still many gaps in scientific knowledge about this highly original coastal environment.

This justifies any approach that aims to describe, then understand how such an ecosystem that is almost free from human influence functions.

From a biological point of view, the final aim of the project was to find an alternative approach to classical fisheries science schemes. The requirements of these schemes are far from being met given the situation in this country.

To summarise, the people responsible for this project aimed:

- to set up a minimal biological data base, to be completed;
- to implement a warning system about the state of the resource;
- not to look directly for "optimal" exploitation points such as MSY (what are these worth? On this point see Caddy and Mahon (1995) where Target Reference Points are redefined, after 38 years of fishery science, as Limit Reference Points);
- to favour progressive exploitation of the environment, and remain well within the probable fishery exploitation optima;
- to allocate time adequately, given the available means, so as not to neglect the integrated development of the rest of the area.

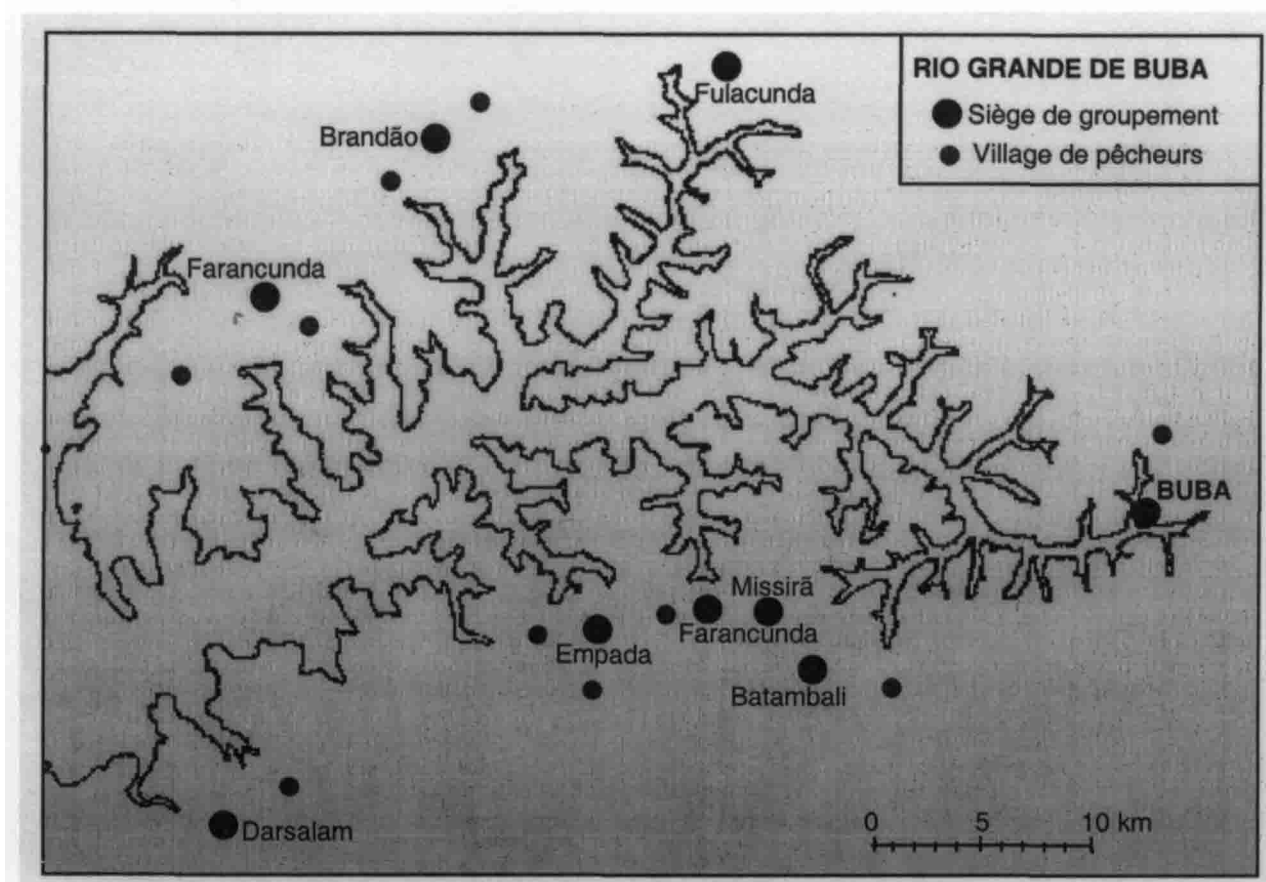


Chosen site and mechanisms

Choice of the site

The Buba site was chosen for the following reasons:

- interest had been clearly expressed by the local populations during previous work by IUCN in the country;
- identified reproduction zone for many fish species;
- seasonal presence of many migratory fishermen who come specifically to catch these species during their reproduction period, which leads to conflicts with resident fishermen;
- the Rio is well defined in space. This facilitates the consideration of all spatial factors: regulation, definition of laws, surveillance, population ecology, etc.;
- absence of any other development project, whether it be contemporary or in the past, based on different criteria;
- concern for a balanced settlement of the various IUCN projects across the whole of the coastal zone (Cacheu, Bissau, Buba, Cantanhez, Bijagos).



Project mechanisms

The implementation of this project relies on the following technical or organisational mechanisms:

Co-management

- involvement of fishermen, as they feel responsible for the resource;
- participation of the local administrative services and authorities in a search for institutionalisation, long term success of the project and bearing in mind the frequent insufficiency of traditional structures to manage a fishery subjected to demographic and technological evolution. (Quensiere, 1994; Laë and Lévêque, 1999).

The aim was the real co-management of the resource by both the fishermen and the administration. Each group should recognise the legitimacy of the other. A second aim was that local fishermen should control access to the resource more efficiently, avoiding conflicts later.

Micro-projects

In order to achieve its objectives, the project focused on small-scale modular actions. These were likely to follow the local population's demands more closely, and to provide solutions that everybody could understand.

Credit

Once again a small-scale was chosen, with a system based on low initial credit, rapid repayments, responsible methods and the money managed by the community.

Institutional support

The principle is to help and empower the State to ensure that the resource is managed sustainably via a relevant technical, judicial and executive framework.

Bio-ecological monitoring

In Guinea-Bissau the absence of information and of adequate local structures has led the IUCN to undertake fishery biology actions. However, neither the material nor the financial requirements of a classical fishery approach could be met in this context. It was therefore decided to focus on a certain number of low-cost basic indicators that would enable the evolution of the state of the fishery (and indirectly that of the resource) to be monitored:

- Catch per unit effort (CPUE) for the main fishing gears and zones;
- Size frequencies per fishing gear for the main commercial species;
- Basic biological studies aiming to identify zones and crucial periods for the reproduction of the main harvested species (e.g. the barracuda *Sphyraena afra*).

Socio-economic monitoring

Annual monitoring by questionnaires has been set up in order to evaluate the impacts of the project in terms of socio-economic development. Questions asked have looked at the options chosen by the young, at the move to become sedentary and the relationships between generations. They have also looked at recent commercial acquisitions and exchanges; at the impact of environmental education and at the natural resources used.

The boxes below explain the essential characteristics of these project mechanisms:

Co-management

A coordination Committee was set up right from the start of the project. This aimed to facilitate discussion, negotiations and decisions to be reached between the different parties concerned with the field of fisheries. The project worked like a pivot and a negotiation space for all the involved parties (representatives from the local community, from traditional law-enforcing bodies, from local and central administration, from other NGOs and members of the Project).

The committee discussed the project's objectives and limitations. This allowed a regulatory decree for the fishery to be elaborated. The committee negotiated the modalities for credit to the fishermen groups by the Administration. It set up contacts with Senegal, representing the fishermen and in collaboration with the Administration, to agree on commercialisation arrangements for the fish. The committee also ensured liaison with projects that were improving pirogue construction.



Micro-projects

A micro-project is a small-scale attempt to meet a need expressed by the community. Its theme must be directly related to the main Project or the principle of sustainable exploitation of a natural resource. The micro-projects budget is limited, as are material means. Those benefiting must always provide compensation (financial or manpower, such as the construction of a meeting room) when the project starts. A micro-project can run at a loss (literacy program) or can be very profitable (commercialisation). If, after one year the outputs are satisfactory, the project will be extended and may be replicated elsewhere. Otherwise it is abandoned.

Example of a budget:

200,000 Swiss Francs were allocated to six micro-projects over three years (phase II). 90% of this amount was spent. The micro-projects reached between 40 and 400 people each. That is a cost per year and per beneficiary of between 50–500SF depending on the micro-project.

20% of the funds at least must be allocated to education and training, 15% to equipment, and the funds allocated to salaries and overheads should not exceed 20% of the total value.

Practicalities for setting up

Identification of partners, organisation of the groups of people, definition of the operation and credit rules reached by consensus, search for technical partners to be contracted (reference terms, planning,...)

Monitoring systems and micro-project type evaluation

The following parameters should be measured:

- production/ valorisation: number of members, production, commercialisation, income
- auto-consumption: number of members, production, inputs
- reinforcing of capacities: number of members, tests
- natural resources economy: number of members

Credit

Initial credit

Among the villages, *groups* of fishermen (on average 20 fishermen) receive small quantities of expendable material (average value: US\$200).

Repayment

This material is given by the group to chosen individuals, who initially pay 10 to 15% but have to repay the rest within a very short time: one fishing season (this repayment period is significantly less than the expected life of the equipment). Other members of the group ensure that the loan is repaid, so that they too can benefit from the loans when it is their turn.

The group meets to assess progress each month, and the money is only physically available during these meetings (by means of a safe with multiple keys). Thus, the money is lent to individuals, but is managed by the community.

The repayment interest rate is between 82 and 100% according to each village.

Community management

If a fisherman has problems repaying his monthly quota, this is announced publicly during the meeting. Individual sanctions that can be applied have been planned since the beginning of the project by the group, and are applied by the group.

This system works well for low value equipment attributed to individuals, but is less efficient for more substantial purchases managed collectively (e.g. a motor boat) because the responsibility is diluted.

A commercial credit has been created for women wholesale fish merchants and traders (availability of liquid assets). This type of credit is based on an even faster repayment rate, one to two months maximum.



Institutional support

Technical section

As scientific data on which to base sustainable management was not available, a bio-ecological study was started by the project. Once the project finishes the State will have to assume responsibility for the study. To guarantee this continuity, technical training has improved the capabilities of the employees who are responsible for monitoring the resource and its exploitation. Collaboration with the Institute in charge of fisheries management (CIPA) has also strengthened organisation and efficiency.

Judicial section

Institutional support included a proposal to establish an appropriate judicial framework, based on experience gained in other countries. This will facilitate the setting up of a judicious legislation.

Executive section

This section was also considered during research in collaboration with the State to look for solutions which would allow effective laws to be applied and efficient control methods to be set up (auto-financing possible for onboard surveillance trips).

Bio-ecological monitoring

Study of the environment

The collected parameters were temperature, salinity, turbidity, dissolved oxygen and pH. Initially they were collected for the whole year, during monthly measurements carried out at each station. There were seven stations that are regularly distributed along the estuary. This protocol is the same as that used in other estuarine bio-ecological studies in West Africa.

Study of the resource

Fish were sampled with three different gear types: drift nets, beach seines and long lines.

Species were identified, individuals were measured and weighed and sexual stage was noted. The sampling strategy was the same as above.

The drift nets (sets often different mesh sizes) are placed for three hours at the beginning of the night in two stations. A total of three sets are placed each month. Seven stations are sampled with the beach seine, these are distributed in different sites along the estuary. The long lines (250m, 40 hooks each) are either fixed or drifting.

Study of the fishery

A survey of fishermen and fishing units was carried out using a routine questionnaire once a year. For each fishing gear, captures were followed with spatial (different geographic zones) and temporal (monthly estimations) stratification. For each landing the quantities of the principal species landed were evaluated, from the following parameters: fishing effort (by fishing gear and by month), and the average catch (by pirogue, by fishing gear and by month).

Finally, a non-material aspect has been integrated in all these actions: a suitable development rhythm.

"It takes time to adapt to new technologies, to create the associative dynamism necessary to attain the relatively costly means of production, and to become integrated in the commercial circuit.

One of the project's characteristics is that it takes into consideration the technological, social and cultural limitations that should determine the development rhythm. It is therefore appropriate to try and follow this rhythm, letting local populations have the time to assimilate the transformations made progressively".

UICN Bissau, 1991

Thus, for example, suitably long training of the groups (five years here) seems necessary in order to establish comprehensive regulations based on adequate experience and before group members take over the project and start to take initiatives independently of the trainers.



Setting up and results

Putting into practice the principles and tools detailed below was carried out in the field from 1992 to 1998. The following chronology follows how this was done, and the main achievements.

Historically and administratively the Rio Grand de Buba project can be divided into three phases of three years each:

First Phase

December 1991 to November 1994. Persons in charge: J-L Kromer, D. Gomes

Entitled "Phase 92–94", this is the 2nd phase of the IUCN programme in Guinea-Bissau.

Second Phase

December 1994 to November 1997 = 95-97. Persons in charge: P. Tous, D. Gomes

Entitled "phase 95–97", this is the 3rd phase of the IUCN programme in Guinea-Bissau.

3rd Phase

December 1997 to November 2000. Persons in charge: P. Tous, D. Gomes

Entitled "phase 98–2000", this is the 4th phase of the IUCN programme in Guinea-Bissau.

First phase: 1992–1994

Community organisation

- Preliminary consultation with the population on the theme "according to you, how should things be organised to develop fishing in the Rio Grande de Buba?". This leads to groups being formed that are involved within the community. Representatives are chosen and a set of operation rules are decided on (financial management, means of settling conflicts, sanctions to be envisaged,...). This approach, based on thorough discussion, took almost one year (1992).
- Creation of a co-ordination Committee that groups all the parties concerned with the fishing area.
- Creation of groups of fishermen. About two-thirds of the region's fishermen have joined.
- Setting up a credit system for the fishermen's groups.
- The Tiniguena NGO has started to replicate the socio-economic side of the project along the Rio Grande de Buba, except in the Bolama administrative region, with financial autonomy from the main project.

Knowledge about the resource

- Start of a large-scale survey of the fishery resource and of its environment, in relatively informal collaboration with the CIPA. The outputs from this project are presented below.

Micro-projects

- Setting up of a small-scale market gardening micro-project, to produce pepper to be used for the conservation and valorisation of caught fish ("escalada" semi-fermented and spicy). This micro-project involves 300 women, grouped into six gardens. IUCN provided the seeds, financed the digging of wells and supplied two market-garden advisors. This then meant that the cultures could be diversified.
- Launching of a literacy micro-project. The inhabitants of 23 villages have undertaken the construction of seven collective houses for group meetings of the fishermen and for literacy lessons. In return, IUCN has borne the costs of these night classes that are given by local teachers and who are paid locally.

Institutional and judicial aspects

- Agreement protocol established with the Fisheries Ministry with the intention of applying the project providing for a) the study of the resource and of the socio-economic environment; b) the support to fishermen and to the community organisation; c) the management of the resources.
- In June 1994 a "Proposition for the regulation of barracuda fishing in the Rio Grande de Buba" was established and adopted as a decree by the Government. The decree prohibits fishing with gill nets in August-September (spawning season of barracudas) but hook and line fishing is still allowed.
- Proposition of a licensing system for the barracuda fishery during the whole year. Because of a lack of infrastructure to apply this, and because an agreement could not be reached with the other countries of the sub-region, this system is not operational.

Portrait

Aramata Banora is the daughter of mandingues immigrants. She has 19 brothers and sisters and is 30 years old. Thanks to the wishes of the community she is president of a group of 57 fishermen's wives from Empada. This used to be an important town in the Rio Grande de Buba region. She recalls:

When the traditional fishermen's captures started increasing, the women from Empada suggested joining forces in order to produce the traditional "escalada de malaguete", a kind of fermented-dried fish with high levels of pepper which keep parasites at bay and gives it a well appreciated taste.

The women therefore organised themselves. The village provided them with a plot of land that the whole population helped prepare. The Project financed the digging of a well. Obviously the seeds chosen were pepper seeds, but from the second year on other vegetables, like onions, were also planted. The women quickly discovered the advantages from which they could benefit by organising a market garden activity. A large variety of products were available which improved both the children's and the adults' health. Any excess was easy to commercialise.

Today the money earned is used to buy seeds for the next planting session and to buy school material for the women and children.

After Cesar MENDES, journalist (RTGB/Voz de Bissau)

Second phase: 1995–1997

This phase essentially consisted in the validation and extension of phase 1, complemented with a training section.

Community organisation

- Increase in the number of members of the groups, especially women (increase from 100 women initially to 525 in 1997 due to the diversification of activities; the number of male fishermen has remained fairly constant at about 100 members).
- Transfer of credit to activities other than fishing (commercialisation of fish, palm oil production). Furthermore fishermen have used the savings built up within their groups to purchase another series of material from the Fisheries Ministry. This has also been completely reimbursed on time.
- Study of the three possible replicable points of the project and the conditions under which they can be replicated in response to requests from partners.

Knowledge about the resource

- The study of the resource follows up. This includes a section to validate previous observations, a section for training biologist technicians and a final section to study the potentials of zones other than the Rio Grande de Buba (Rio Cacine and îles Bijagos where the work from a CIEO project have been undertaken and expanded on).
- Change from monthly to quarterly biological monitoring plan.
- Financial and methodological aid to the Ministry (DGPA) to guarantee regular control of the fishery.
- Publication of a field guide to the fish of Rio Grande de Buba.
- Publication of a technical manual in Portuguese on the analysis of fisheries data.
- Study ways to conserve fish caught.

Micro-projects

- Development and expansion of the literacy and small-scale market gardening micro-projects.
- Launching of a bacalhau micro-project (salted pressed barracuda, to replace the traditional salt-cod imported from Portugal). Valorisation with a publicity campaign (entitled "Bubacalhau", "bu" means "yours" in Creole).
- Setting up of an "improved smokehouses" micro-project to valorise mullet and bonga shad, without using ice.p
- Setting up of a "palm oil" micro-project to benefit from the old colonial plantations in a zone of the Rio where fishing is difficult to commercialise. The project has provided material in advance (oil presses).
- Launching of micro-project for improved ovens to enable palm oil to be extracted in the above micro-project without wasting wood. This should then be extended to the entire Rio zone, and to every type of oven.



Institutional and judicial aspects

- New agreement protocol with the Fisheries Ministry (April 95) reviewing the terms of the previous protocol, and adding a section "Institutional support to CIPA". This support includes training of CIPA members (about twenty people), support for planning and for the management of its activities. Support will be given to the department responsible for transformation procedures and to that in charge of fisheries statistics...
- Setting up of a system whereby the Ministry's technicians can work on contracts to accomplish the above tasks.
- Participation in the elaboration of new fishing regulations.

As an illustration, the budget of the second phase of the project, in Swiss Francs, was as follows:

Personnel	396,500
Travel costs	60,000
Equipment	50,000
Running costs	180,000
Specific material (fishing gears, pirogues)	80,000
Various costs	4500
Total in Swiss Francs	771,000

Third phase: 1998–2000

This phase started in December 97, but finally only continued until June 98, when the civil war broke out in Guinea-Bissau. The presentation that follows is therefore very short.

The project expanded and its name was changed to "Project for sustainable development of artisanal fisheries in the coastal zone of Guinea-Bissau". This had two specific objectives: a) consolidate what has already been achieved in the Rio Grande de Buba; b) reproduce, adapt and publish the approach for other strategic zones.

One important innovation that is specific to the third phase is the *strategic planning* of project activities in a logical framework until the end of 2000. This lists the expected results, the programmed activities and the means available to put these activities in place and their relative indicators ("such an activity was completed at such a date").

From a biological point of view, bio-ecological studies were centred on the Rio Grande de Buba zone and on zones where it was planned the project would be replicated (Ganago in Orango and Cacine).

Finally a replica of the project was set up on Ganogo Island *at the initiative* of an association of local fishermen. This work consisted of visits from national experts who made an inventory of the project's potentials and obstacles. There was a workshop during which the Ganogo populations were consulted about the priorities of the project, and exchange visits between fishermen and wholesale fish merchants from Ganogo and Buba. A planning workshop was held in Bissau with all the partners. Simultaneously to these actions, the local communities of Ganogo undertook the construction of a training centre, based on the example of the one in Rio Buba and they participated in a workshop where the returns from biological results were explained by the CIPA.

Portrait

Mamadu Jack is the president of the Buba fishermen group. This group, like six others, benefited from small credits that they reimbursed with 20 % interest on the actual price in order to compensate for the galloping devaluation of the Guinean Peso. For the past four years repayments have been made on a fixed date, each month during the General Assembly. The principle guarantee offered is based on the particular moral values of this community: sincerity and responsibility towards promises within the small group means that no one can break the rules without being identified. The facts speak for themselves: about 110 million pesos (3500US\$ on average over 4 years) loaned to 23 fishermen, of which 82 % were repaid.

Mamadu Jack considers himself totally committed to the project, because he likes this community which has managed to progress by integrating values which he agrees with. He feels responsible, and above all, despite everything he is still a fisherman. He is one of the most active, everyday his courtyard is the scene of intense activity. Numerous women come to smoke and dry the fish. He is among the most enthusiastic, he talks about fish behaviour and migrations like a biologist, and is one of the most visionary fishermen. Each year he takes the decree signed by the Fisheries Ministry in 1994 out of his safe, and he never tires of explaining and defending this Law to the Assembly of fishermen, so that the Rio Grande de Buba will always be a refuge for fish, and a source of prosperity for the communities.

After Cesar MENDES, journalist (RTGB/Voz de Bissau)

FISH TRANSFORMATION



Pepper, semi-fermentation
ESCALADA



Smoking
SMOKED FISH



Pressing, salting
BUBACALHAU



Project achievements

Knowledge about the resource and the environment

The achievements of the Rio Grande de Buba project and its partners concerning knowledge about the environment, the resource and its exploitation are considerable given the resources used. At present they are one of the only sets of scientific data available on the estuarine and coastal fishery resources of Guinea-Bissau.

The first study carried out directly within the framework of this project dates from 1994 (Kromer *et al.*, 1994b). This document provides the physico-chemical characteristics of the Rio over an annual cycle. It identifies the estuary as being remarkable both because of its depth and clear waters.

To study the fish, thirteen sampling strategies were planned, and five were implemented. One of these (purse seine) enables reliable comparisons to be made with other studies carried out in similar environments in West Africa (Senegal, Guinea, Ivory Coast).

The specific catches from each different mesh size of drift nets were described, providing a basis for the first minimum mesh size regulations.

The biology of the twelve most common species in captures was described (size frequency; size at first maturity; reproduction period...). The biology of eight other species was described from the literature. This document thus provides the basic knowledge that is essential for resource management.

This work was completed by a sampling operation, using a purse seine and in collaboration with CRODT/ORSTOM (Deme-Gningue *et al.*, 1994). The overall work has yet to be presented in scientific publications, but it has already enabled the Guinea-Bissau coast to be characterised bio-geographically within all of West Africa (Albaret and Diouf, 1994; Baran, 1995; Diouf, 1996). These works confirm the originality of the coastal fish fauna, characterised by an overlap of species typical of Guinea (brackish water species under a continental influence) and of Senegal (typically marine species that enter well into the estuarine zones).

This work has continued beyond 1994 with the official collaboration of CIPA, with the aim, in particular, to confirm the initial data and conclusions. This has resulted in a report on the Rio Grande de Buba, the Rio Cacine and the Bijagos Islands (CIPA, 1997a) where the biology of the eight principal species is analysed. An important observation is that the estuarine migration of the barracudas is not limited to the Rio Grande de Buba. The ecological structure of the populations (their either pioneer or mature character) in each zone is detailed.

Finally a one-off experimental fishing study (blocking net set during the rising tide in a tributary of the Rio Grande de Buba) was carried out by CIPA (CIPA, 1996). This is interesting as it is a traditional fishing method, and so the consequences of it can be evaluated.

Knowledge about and monitoring of the fishery

A study on the characteristics of the fisheries of the Rio Grande de Buba zone was started in 1992. This has led to a document (Kromer *et al.*, 1994 a) which summarises the knowledge acquired in the field. It explains and justifies the approach taken by the project, and evokes the first precautionary measures to be adopted by the exploitation. It envisages which forms of exploitation should be developed and details planning and regulation measures to be established.

This text has been the backbone of the project. The "principal" options at the origin of the project are laid out and defended here, supported by the results from a survey carried out on the fishermen, by the monitoring of catches (species, quantities and sizes) during one year and from evaluations of profitability.

The essential characteristic of this fishery is its small size and its simplicity:

Number of fishermen: 142 (divided between 38 villages)

Number of landing ports: 6 (3 main ones)

No. of non-motorised pirogues: 101

No. of motorised pirogues: 3

Furthermore, globally 1 fisherman = 1 pirogue, and 1 trip = 1 day.

	Local fishermen	Non-local fishermen
Main species fished	Bonga shad, mullets, W-A. Spanish mackerel	barracudas (76 %)
Estimated captures between 07/93 and 06/94	700 tonnes	35 tonnes

This first study was extended by a joint Project/CIPA monitoring program, which led to a monthly evaluation of landed captures from 1995 to 1997 (Almeida and Tous, 1996, CIPA, 1997b). These data consider the composition of the catches, their volume and the spatial and temporal distribution of fishing effort.

This part of the project now runs autonomously, and does not need much financial support given the small-scale of the fishery. For the barracuda fishery, wholesale fish merchants that are members of the group have been trained to provide length-weight data.

Eight years after the project started, the dimensions of the fishery have not been noticeably modified (the growth of the fishery is not an objective anyway, in 1997 there were still only seven motorised pirogues). An increase in the number of motorised pirogues is inevitable in the medium or long run due to pressure from other factors. However, by delaying the increase in pressure on the resource, the project will enable a number of necessary mechanisms for the good management of the fishery to be established. These include the constitution of a database and of a simple monitoring system, the development of a quality commercial chain, the increased involvement from participants in this co-management system, their training, and the improvement of their negotiation capabilities.

Co-management of the resource

Since the project started, it has stimulated regular meetings between the different parties involved: representatives from the population (fishermen, but also women wholesale fish traders and traditional chiefs); local administrative representatives and certain representatives from the central organisation (Director of Fisheries, representatives from the organisation in charge of monitoring); technicians in charge of resource appraisal; private entrepreneurs and representatives from the NGOs working in the region.

These parties meeting as a committee enabled the exchange of information and, for example, the results of bio-ecological and fisheries studies were regularly presented to those concerned. At this time the annual evaluations of micro-projects were also formally given.

The collaborative approach also meant the roles of each party could be identified (for example, the respective responsibilities of fishermen and of the administrative agents in charge of surveillance).

Each proposition relating to the evolution of the project was discussed with the communities concerned, it was then submitted to the government institutions who considered the best way to concretely establish a coastal planning policy.

Another advantage of these exchanges was that responsible parties who were usually rarely present in the field could acquire the project results, validate rules and use them to define legislation at a national level. This is what happened with the new fishing law. Amongst other things, this resulted in the creation of Regional

Consultation Councils, based largely on the experience gained at Rio Grande de Buba, and gave fishermen organisations negotiation powers in the management of their local fisheries.

Contribution to development

The credit system set up greatly mobilised the population. It worked convincingly and, mainly thanks to the simplicity of the system and the ease of reproduction, it could be generalised to a large number of economic activities (fishing, product valorisation, small-scale market gardening, commercialisation, etc). Rather than supporting only the fishermen, the training approach of the credit system meant it could be collectively appropriated, leading in turn to a great dynamism and letting a progressively greater number of people from the community benefit.

Multiple and diverse micro-projects were launched, they relied on the support of different types of partners (NGOs, specialised State departments). These micro-projects enabled income sources to be multiplied and thus reinforced the local economy.

The diversification of activities and their adoption by the community (for example: commercialisation of fish and of palm oil) led to the spontaneous creation of a weekly market, the administration contributed materially to this market (sanitary control, security of belongings and of people, etc...).

During the second phase a budget line was created. This aimed to reinforce the setting up of a system of control so that regulations concerning the fishery were applied.

Following the section "institutional support to the CIPA" (1995), both the human and institutional capacities of this institute had been strengthened. The centre has become an independent institution and is relatively operational. It must now provide a plan for the management of the artisanal and industrial fishery, statistical and biological data,...

From annual socio-economic surveys carried out since 1996, it can be seen that most homes that have generally improved their quality of life (improvement of the habitat, acquisition of a means of transport, etc) are those including people who participated in activities supported by the project.

The literacy section was officially recognised by the National Education Ministry (prize awarded to IUCN for the best adult literacy programme in Guinea-Bissau). Furthermore, collaboration between Ministries meant that post-literacy thematic projects for adults were carried out in the project intervention zone (fishing, improved technologies). These were then used at a national level.

Portrait

Seni Nhabali remembers sadly her surprise the day she had to leave primary education to get married, according to the wishes of her parents, with a man twice her age. Today her husband can no longer hunt or fish, so she is fully responsible for her seven children. She does this by being, according to the season, either farmer or fish seller.

Seni enrolled in the functional literacy classes in 1996, not because she wanted a diploma, but because from the start she believed that being able to read would open the doors of the world to her, even at 45 years old.

The search for development implies adaptation and new responsibilities for adults within their society. Learning is tough, but is the only way to access a place in this new world. Today Seni can read and write in Creole, most importantly, she can write her name on official papers where she used to leave an inky fingerprint. She can check other tradespeople are not cheating on the weight of the scales or the price to pay. In sum, this has given her back pride and confidence that in turn will let her move forward.

After Cesar MENDES, journalist (RTGB/Voz de Bissau)

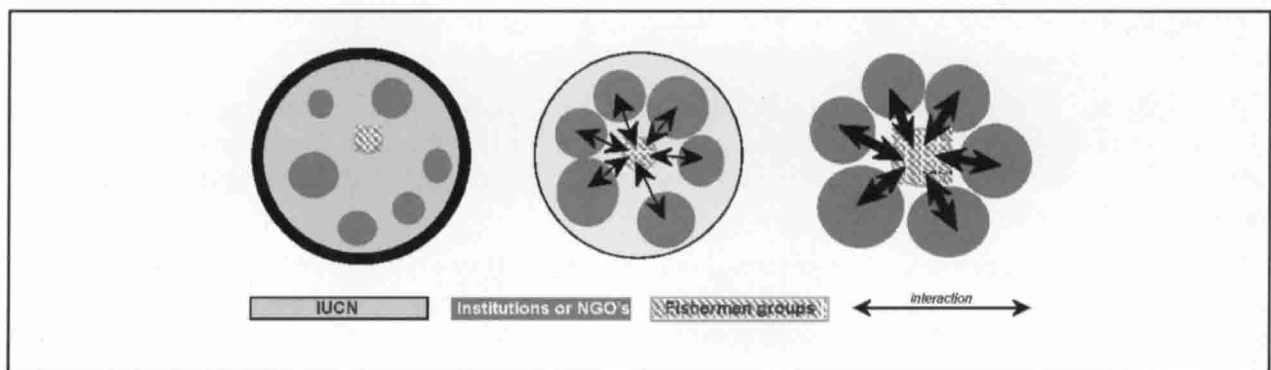
Finally, the overall achievement of these activities was to create and encourage confidence in parties who would not otherwise have collaborated. This functioned in two ways: confidence of people in government institutions, and confidence of the administration in the basic, serious organisations that were capable of managing their financial resources.

Sustainability of the project

The concern for a sustainable post-project leads to thinking about the withdrawal of IUCN.

In simple terms, the presence of IUCN followed by its withdrawal can be conceived of in the following sequence:

- 1) Groups poorly structured, or non-existent; low presence of institutions and NGOs; weak or non-existent interactions between participants; high investment by IUCN;
- 2) Strengthened groups; institutions and NGOs present; interaction between participants; reduced investment by IUCN;
- 3) Strong groups; institutions and NGOs very active; strong interactions between participants; IUCN leaves.



What about the facts?

The strengthened CIPA has become an institute that is recognised and consulted by both the fishermen and the National Institutions.

A system to control the application of the regulations was set up and operated regularly between 1996 to 1997. At this point it was demonstrated that the system could be auto-financed by the income from fines, the competent administration therefore took over.

Looking forward to their disengagement, from the second phase the Project also planned to pass the responsibilities to a national NGO (Tinguena), such that this NGO could then assume the different roles. This NGO had reproduced the socio-economic part of the project successfully in another site in every aspect except that of the "landings surveys".

The actions carried out by the fishermen's groups at their own initiative since 1996 show that they have completely taken over the Co-ordination Committee. They have used it to negotiate with different partners, including the State.

Until the second phase it was not considered necessary to legalise the base associations (for a long time they had detailed internal regulations, but didn't have an official judicial status – this did not prevent collaboration with the Administration). In the 3rd phase however legislation was recommended. The State recognised these associations, whose members were literate. This gave them the power needed to apply for credit from a bank, to negotiate official agreements and thus further contributed to their autonomy and independence vis-à-vis the Project.

During the third phase the Buba project was replicated on Ganogo Island *at the initiative* of a local fishermen's association. This process was ongoing in mid-1998 when the military events started.

Critical analysis and debate

The Rio Grande de Buba project received a very positive evaluation from the mission by the External Evaluation under the Swiss Development and Co-operation Directorate in March 1997. This mission nevertheless listed a number of points towards which great attention needed to be paid in order to continuously maintain the improvements. This analysis also suggests several critical points or subjects to be debated, which it can be beneficial to look at more closely.

Knowledge about the resource and the environment

- The bio-ecological survey carried out between 1995 and 1997 and during 17 missions (CIPA, 1997a) covered a considerable area (Rio Grande de Buba and also Rio Cacine and Bijagos Islands). Normally the material and human means used should be proportional to the area. When this is not the case, there is the risk of dispersion, the data are more varied but their robustness is lost. Thus, even with a simplified sampling strategy based on length classes, the quantity of data collected (500 to 6000 individuals per species between 1995 and 1997, many missing data) would not enable the state of the resource to be followed (Sparre *et al*, 1989). This, above all, because most of these species exhibit quasi-continuous reproduction cycles, and therefore their cohorts are not clear.

To avoid a heavy protocol each month, the existing data could allow a few biologically significant periods to be defined during which sampling could be intense.

With the aim of optimising both available time and material, an important question to consider is what are the motivations of the routine collection of environmental parameters and what use will be made of these data.

Impact of the project in terms of biodiversity

Despite it being clear that the project had a favourable impact on improving the environmental consciousness of both the local communities and the administrative authorities, it seems difficult to quantify at present its impact on the aquatic environment and in particular on biodiversity.

At the time of the first phase the exploratory bio-ecological and multi-gear studies enabled 91 species to be identified in the Rio Grande de Buba. Later, the routine monitoring only used standard fishing gears, the total sampling effort in this zone was reduced (UICN, 1995, p. 5) and the sampled faunistic spectrum was seen to be lower. Thus a real quantification of the evolution of the biodiversity (as in species richness) could only be conceived if the bio-ecological monitoring carried out in 1993–94 was repeated. Failing this, a few particularly threatened witness-species could now be followed, like the sawfish, guitarfish and sharks.

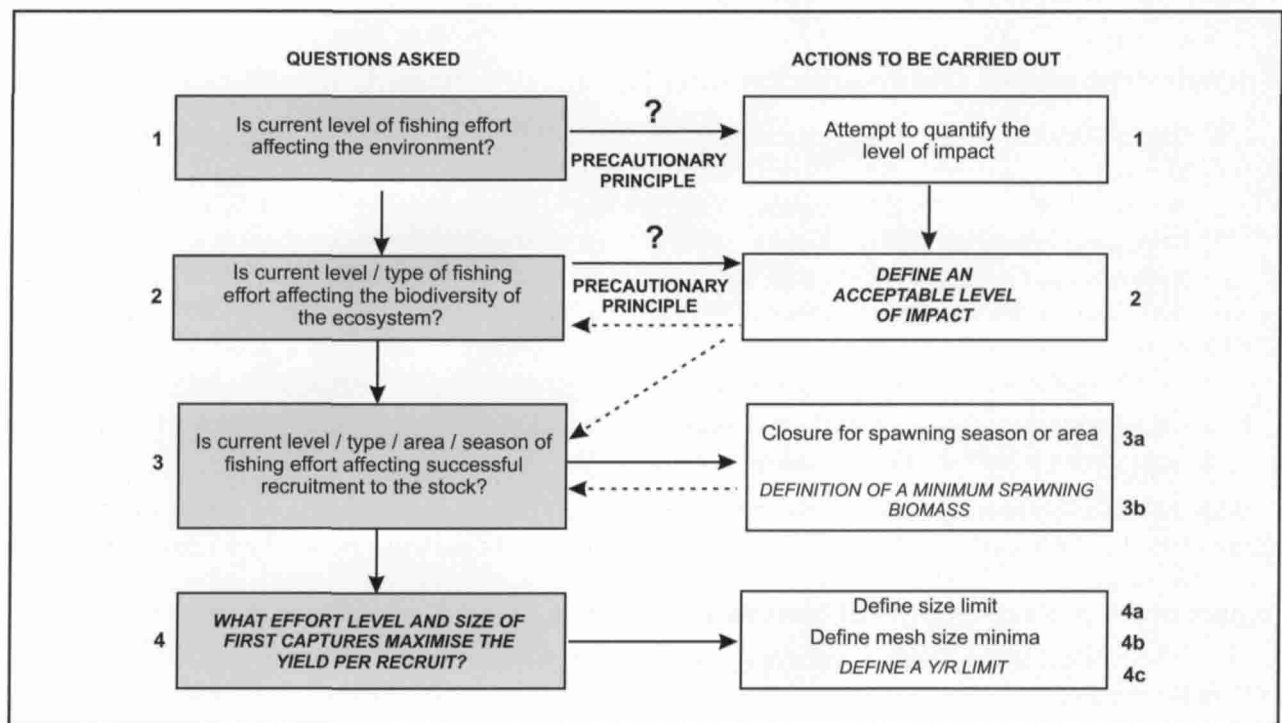
Furthermore, it should be noted that Guinea-Bissau's coastal zone has a surface area of 23,500km² and Rio Grande de Buba's is 285km². It is therefore unlikely that the impact on biodiversity due to a variation in fishing activity *in this site only* would ever be quantifiable (thus, for example 20 % variation in fishing activity in 1.2% of the total surface area would represent 0.2% variation of impact on the total zone).

The arguments concerning the conservation of biodiversity should above all be considered in terms of the increased consciousness of the populations, the conservation of traditional exploitation types, and the implementation of long term management policies at the national level. In this sense the Buba project has the benefit of an example which is much more qualitative than quantitative ("learn how to read rather than to read a story").

Knowledge about and monitoring of the fishery

The Buba project backed an alternative approach to traditional fisheries management. It can however be useful to point out certain principles of the latter here, in order to better consider the unavoidable elements and the optional elements of management.

Caddy and Mahon (1995) provide a logical framework of measurements to be implemented for a sustainable management of the fishery resource. This framework "gives habitat and ecosystem conservation highest priority, puts resource conservation next, and ends with issues of yield optimisation".



Modified from Caddy and Mahon, 1995.

Note: In this diagram, the actions that were not carried out by the project are in capitals.

At the beginning of the project questions 1 and 2 of this framework could not be answered and the precautionary principle supplemented by a first bio-ecological study led to actions 1, 3a, 4a and 4b of this plan. At this stage one can note that:

- action 2 was considered theoretically from the start², but was in practice only approached in an extremely superficial way³;
- actions 3b, 4 and 4c were not considered given the complicated studies and the corresponding infrastructure they require.

² The components of the project:

b. Evaluation of the fisheries resources of Rio de Buba, with, as a main objective, the definition of the sustainable production potential of the principal species of commercial interest." *IUCN, 1991b, p. 13*

³ "With annual captures of about 800 tonnes, if the productivity of other coastal environments is considered (Kapetsky *et al.* 1984) an increase in annual captures, at first estimate, of up to around 1080 (40 kg/ha/yr) to 1300 tonnes (50 kg/ha/yr) can be envisaged." *Kromer et al., 1994b, p. 59*

By applying this schema different classical stages should therefore be envisaged in order to set up a plan for sustainable management of a local fishery. Those carried out within the framework of the Rio Grande de Buba Project are the following:

- exploratory fishing and research
- provision for the routine collection of statistics and samples
- monitoring of the state of the resource

The stages which were not carried out are:

- formulation of management objectives
- setting of annual targets for the fishery
- monitoring of the stock

The annual targets for the fishery should be set above all, after the project has been replicated along the whole coast. For example, in the case of the barracuda, defining exploitation objectives for the Rio Grande de Buba which do not take into account the other estuaries and the archipelago makes no sense given the ecology and distribution of this species.

On the other hand, *formulating management objectives* seems to be an unavoidable step, which remains to be specified. Thus, what is the maximum number of new fishermen (autochthonous) that can be allowed to harvest the Rio each year? The fact that this number has not exploded avoided any problem, but the case should be considered, when the project is replicated. To scientifically establish such objectives or limits is after all the reason why the biological data were collected.

In the case of this Rio, the small size of the fishery allows a precise evaluation of landings without the need for extensive resources. However on a larger scale (if for example other estuaries were integrated) stratified sampling would need to be considered and defined. As the significance of the resulting evaluations is an extremely complex subject (Blaber 1997), it could be useful to strengthen collaboration/cooperation with organisations that have proven experience in this field in West Africa, such as CRODT, CNSHB, CRO or IRD. This would enable a data collection protocol to be developed that would guarantee the sustainable exploitation of the data.

Finally with regards to the interactions with fishermen, one of the obstacles during the first phase were the ambitions developed by certain fishermen, who convinced the project to finance the construction and equipping of two large pirogues (14m long, equipped with 40 CV motors). This in fact did not work out due to the lack of technical knowledge and thus of efficiency, which meant that loans were not repaid. Furthermore economic analyses showed that heavy investments of this type were not the most profitable.

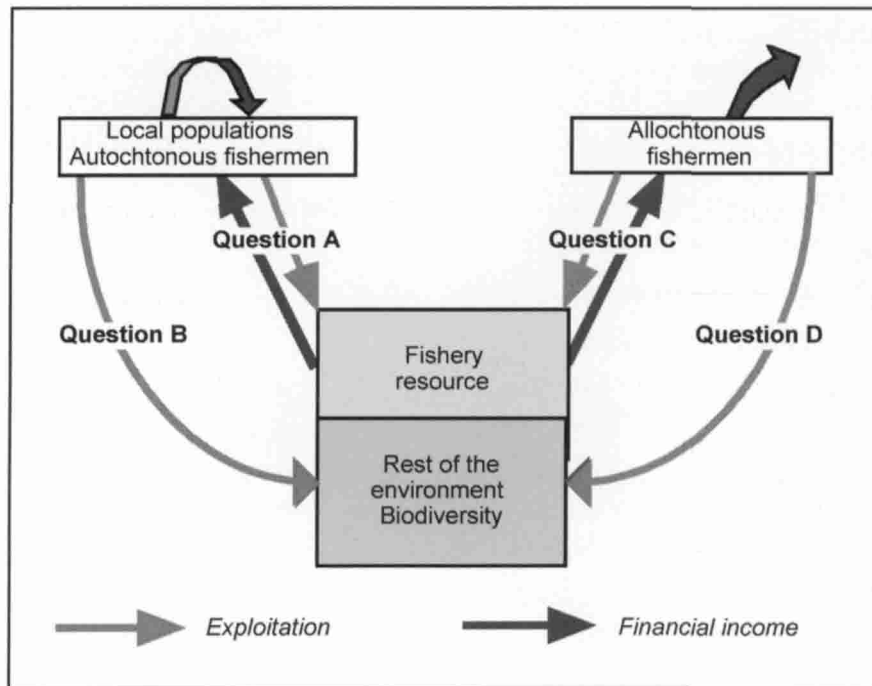
Compared profits from two types of fishing

	Non-motorised line fishing	Motorised drift net fishing
Minimum investment (Guinea Peso)	2,600,000	45,000,000
Income per person per fishing trip (Guinea Peso)	125,000	106,500

Source: (Kromer *et al.*, 1994a)

Co-management of the resource

The principles of the project concerning the control of access to the resource and the limitation of this to resident fishermen could be applied without conflicts, as the effort exerted by migrant fishermen was concentrated on other adjacent sites. Thus, the management of the resource and the control of access on a global scale only make sense if a project, such as that at Buba, is reproduced along the whole coast. The presence of migratory stocks even leads to the consideration that in the long term different scales will need to be fitted together. This would be done initially by multiplying these projects across the whole country, then by a national level management and finally by the participation of the country in regional negotiations.



If we reconsider the original configuration, which includes the presence of foreign fishermen (this configuration still applies for the rest of the coast and on the Bijagos Islands), the search for sustainable management raises four essential questions, that are both biological and social in nature:

- Question A:** What level of exploitation of the resource by the autochthonous fishermen is sustainable?
- Question B:** What impact do the autochthonous populations and fishermen have on the rest of the environment and on biodiversity?
- Question C:** What level of exploitation of the resource by allochthonous fishermen is sustainable?
- Question D:** What impact do allochthonous fishermen have on the rest of the aquatic environment and on biodiversity?

In its present state the project does not answer these questions precisely. However the pressure on the resource is increasing, and the laws limiting access to these resources as a precaution will in time be challenged by the users. For this reason these questions need to be answered as best as possible.

Contribution to development

At present, few or no data exist on the social organisation of the Beafadas, on how they consider the resource and their fishing activities or on their actual knowledge about ecology and fishing techniques. However the appropriation by the community of the elements established appears to be one of the major successes of the project. This may be conditioned by the sociological context.

Furthermore experience shows that a small fisherman often possesses complex knowledge and can easily become an intensive fisherman and predator under certain conditions, which are more often social than technological or environmental.

Consequently a more thorough comprehension of the socio-cultural context would better enable the factors of success to be determined. The approach could then be adapted more efficiently to other human contexts

when it is reproduced, and would give a presentiment to the conditions of "divergence" during the development of a fishery.

If the number of members is used as an evaluation factor, it appears that the "transformation/ commercialisation" aspect of the project, taken on by the women, achieved a considerably more important success than the "fishing" aspect (the number of members increased five fold in the first case, and remained almost constant in the latter). It would be beneficial to understand the reasons for such disproportion, and to consider the possible consequences if the situation were to amplify ("gender discriminative action"?).

The above points lead to the recommendation that a complementary socio-anthropological study considering the following should be carried out:

- the current social organisation within the Beafada ethnic group and the historical origins;
- the representation of aquatic spaces, of the resource and of fishing activities within this ethnic group;
- the distribution of fishing activities between the various ethnic group components of the area and between the various age groups;
- the principal consequences to be expected, at a social level, from the activity and resources generated by the initiative of the project.

On the negative side, many requests and various participations undoubtedly harmed the cohesion of the action, even if they contributed to reinforce the links between participants. Thus the institutional support to the CIPA (training, increasing capacities) corresponded to an extension of the project in response to a concrete and justified request, in a direction that was globally coherent with the initial objectives, but the scale of this required specific personnel.

Sustainability of the project

Initially the project was launched on the assumption that the money or material lent to the fishermen would quickly be refunded, and thus that the profitability of the exploitation would be significant. In addition it was clear that the fishery resources were abundant, which made this assumption reasonable. However, when this type of project is reproduced in a different country or context, it would be wise to first plan a study of the potential profits, in order to be sure about making such an assumption.

This project is based on the commercialisation of captures and surpluses, i.e. on selling and exchanges. Buba is now at the junction of four major roads of the country. This is of course an advantage. What kind of alternative can be proposed to countries that are isolated or far from commercial centres like some of the Bijagos Islands? Should the "micro-projects" component be devoted to the problem of transport in such a case?

During phase 2, the ministry technicians worked with finalised contracts rather than per diem. This maintained motivation both in the field and during data synthesis. For the members of the CIPA, working like this corresponds to the search for external credits, but it also had the inconvenience that individuals become more involved rather than the institutional structure. In the spirit of an autonomous "post-project", it is undoubtedly desirable that the empowerment of the CIPA also aims to promote the conditions of financial autonomy of this structure. The current financial support from IUCN should be considered as a transitional stage.

Finally beyond this project the question of the withdrawal of IUCN arises. The Union aims to be a facilitator, a network of members working to define and establish protection-management programmes. The need to work together for nature protection is permanent, due to the context in dynamic evolution. For this reason, it can be asked whether IUCN should totally disengage from projects such as the Rio Grande de Buba one, and more generally from its involvement in Guinea-Bissau or in any country.



Reproducibility of the project

The problem with a reproducibility study is to know how far it should be envisaged: reproduction of the project identically, in different environmental conditions, in a different socio-economical context, with more parties with opposing interests, in a different domain,... ?

Before trying to make a summary of the transposable elements, it is useful to list the negative and positive points and those that are particular to this project.

Reproducibility: negative points

During phase 3 the Buba project team began studies (consultation of the populations, bio-ecology, monitoring) and provided the institutions with support in order to reproduce the project in Cacine, a priority zone for the Ministry of Fisheries, as well as in Ganogo and Formosa, and on the Bijagos Islands. However:

- in Cacine the socio-economical situation of the zone is unfavourable and very complex: no roads, border zone with Guinea, high density of migratory fishermen, already existing fish commercialisation network, involvement with other co-operation agencies, negative impact of previous projects organised on different bases, need for a regional approach also involving the State of Guinea, absence of an organisation to take over from the IUCN team in the long run,...
- in Ganogo and Formosa, the population is made up of 99% of Bijagos. This animist ethnic group is characterised by late and long initiation cycles. This limits the freedom of the younger generations to undertake an innovative activity. Numerous projects (especially fisheries ones) have failed there because the beneficiaries of a credit had no individual right, so the community immediately took possession of the equipment acquired by the individual. Furthermore, the isolation of the islands (from each other and from the mainland), added to the complete lack of services (health, education), constitutes a major handicap for the development of the fishing domain. Finally the inhabitants' distrust of the State there is legendary. The NGO Tiniguena is already active in Formosa. However the approach recommended by Tiniguena has the inconvenience of little involvement of government institutions. As a consequence it was not possible to establish a first regional consultative committee in the archipelago. This questions the long term viability of this initiative.

More generally, at present in Guinea-Bissau no NGO of national scale exists that is capable of effectively ensuring the monitoring of duplicated projects on such a large scale, that would enable the effective disengagement of IUCN in the long run.

Particular case that is favourable to the success of the project

An immediately apparent characteristic of the project is the very small size of the initially existing fishery (about 150 fishermen) in a homogeneous social and even ethnic context. This made it possible to profit from a community of interests, and thus from a homogeneous response from the villagers to the proposals of the project.

The foreign fishermen who also exploited the resource saw their access restricted, but they could easily turn towards equally rich and less supervised adjacent zones. The biological richness of the environment and the considerable earnings from fishing also allowed rapid refunding of the initial loans from the project.

Furthermore, the extremely small size of the fishery meant it could be monitored precisely and at a low cost. This is rarely the case elsewhere.

The fact that this environment is within a fairly limited area and that exchanges between villages are easy undoubtedly contributed to the rapid extension of the number of groups. This would be less easy in large, open environments like the Bijagos Islands.

Finally an element that is certainly important, but is difficult to evaluate, is the fact that the Beafadas are traditionally from agriculture and not sea-goers. This may explain the great receptivity to the principles of sustainable management of the fishery resource, as cultivators rather than as gatherers.

One hypothesis resulting from these different observations is that the same type of project applied in an innovative field other than fishing could have had equivalent success.

Finally an element considered as significant by the Project members is that this isolated region had never experienced a development project before this one. For this reason the project never met *a priori* self-interested eagerness or scepticism from the different parties.

Reproducibility: positive points

The qualities of the project undoubtedly arise from a few simple and easy-to-reproduce factors:

- individual loans, but under collective responsibility;
- amount of loan in proportion to repayment capacities, which have been well estimated;
- limit and rate of refunding in agreement with the fishing and commercialisation of products calendar;
- development of internal regulations for each group, thus avoiding litigation and enabling the sanctioning of individuals at fault without questioning the advantages for all the community;
- deliberate choice to not repeatedly support the project at a loss and demonstration that the communities manage these funds (the project receives no money);
- support of the valorisation of the working capital in order to motivate the activity for which it is destined (purchase of equipment).

During the first phase the importance of the choice of personnel from the Project who form a direct link with the communities (personality, sense of human contact, involvement, availability,...) became clear. The choice of people close to the concerned community is a determining element for the success of a reproduction. Experience shows that the different personnel can come from very diverse horizons not necessarily associated with fishing.

Finally it seems that duplication is facilitated, or even simplified, by the establishment of collaboration between the members of an existing project and candidates for a reproduction. In a new site members of the first project can therefore be responsible for the "involvement of communities" aspect. At this stage those responsible for the initial Project can simply play the role of facilitators, by putting people in touch with each other.

Furthermore, at the level of the State the institutional and judicial tools set up or available during the first project are already available for future ones (economy of scale).

Thus the time needed for the reproduction process could vary greatly according to the interconnections between the initial project and the sites for duplication. The more similar the ethnic groups, the institutions and the context of the original site and the sites where the project is to be reproduced, the less time will be needed.

Beyond the favourable factors, it appears that the Project designed, set up, tested, and validated a broad collection of management tools. This provided ideas and experience that will be advantageous in many other configurations, even beyond Guinea-Bissau or West Africa.

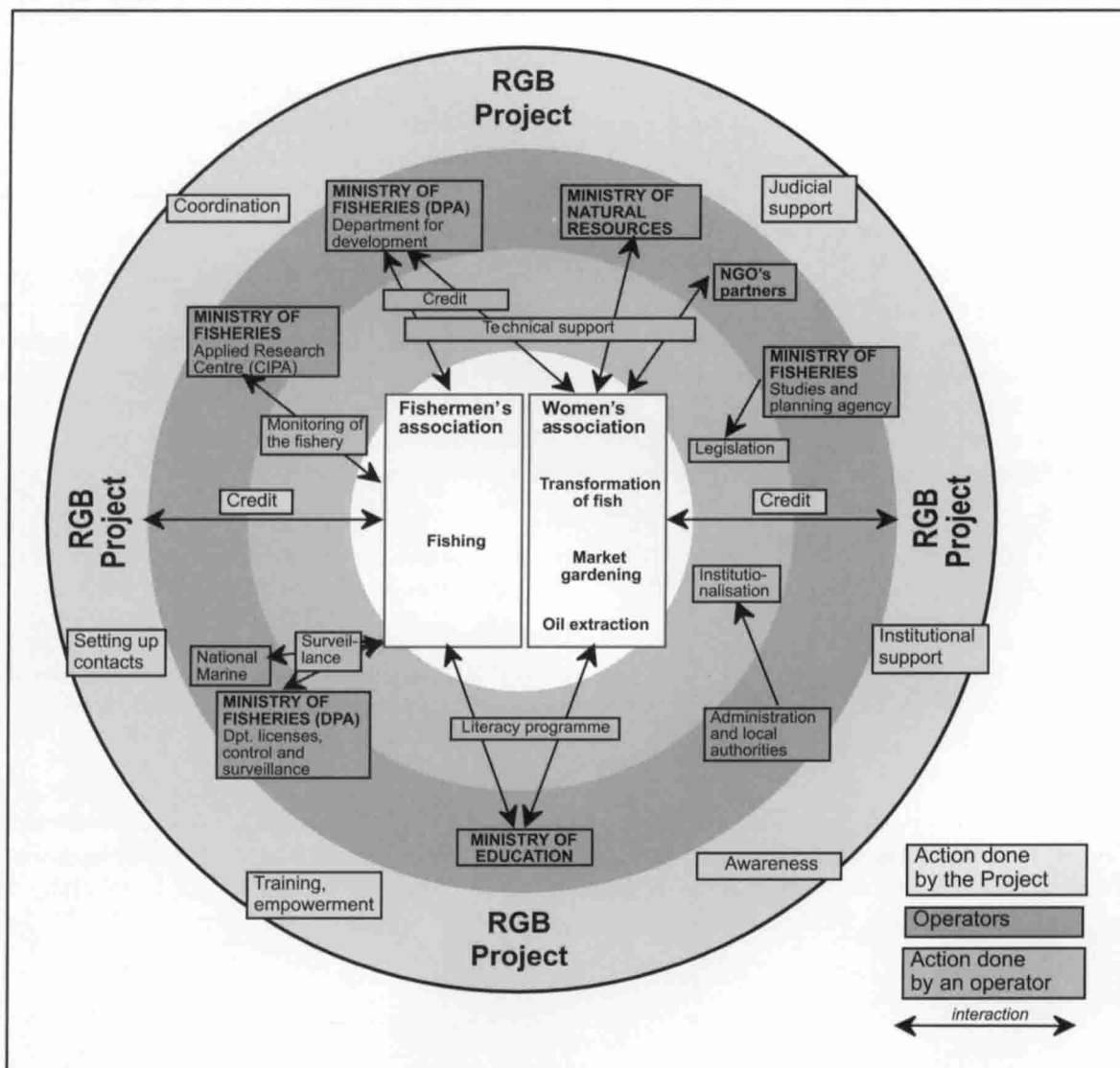


Overview and conclusions

This project can be qualified as experimental in so far as it anticipated important recommendations that were made at an international level, and looked for ways to put these in to practice in a given context, despite the fact that no one had any experience yet.

This approach was developed in parallel in Asia (Chua and Pauly, 1989; Chua and Scura, 1992 and SEAFDEC, 1997), but an equivalent approach did not seem to be have been carried out in Africa.

The approach followed closely integrated social aspects and used ecological knowledge for which a previous model did not really exist. All the activities, collaborations and interactions set up under the initiative of the Buba project can be summarised by the following figure:



The analysis of the achievements highlights the very integrated character of the various activities, which means the project has a balanced and solid architecture.

This is not a schema that can be transposed to every situation. However the experience resulting from the Rio Grande de Buba Project allows to propose the conceptual schema presented on the following page. This summarises both the starting and finishing points of the present Project, and lists the actions that need to be considered during a reproduction, depending on context. The choices and options on which the project was based and which define the spirit in which its concrete actions are conceived and set up appear transversally.

In fact the Buba project fits into interactive dynamics between institutions and local communities: the Central Administration expressed a need for a plan for the whole coastal zone; during meetings in the field the local administrations and populations expressed their needs and constraints; these were integrated into a global vision and validated at the central level; this vision was illustrated, for artisanal fishing, by a field project enabling the approaches to be identified and the rules to be defined; these rules were integrated in the policy of the relevant Ministry, which in turn is looking to apply them to other sites; their application will gradually lead to the modification of the fisheries legislation, and will possibly influence approaches at the sub-regional level.

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One of the elements explaining the achievements of this project is that each of the categories of parties accepted and played its role well. This is because of a shared perception of the stakes, of the resources adapted to the context and to the different levels of the parties, as well as the efficient and flexible co-ordination. "Communication" (both informing and listening) was an essential factor for this, to which the national members of the team particularly contributed. The interactions created between the different parties have had a synergistic effect, both from a material point of view (structuring of a domain, increasing the capacities of all parties by collaboration), and from a social one (establishment of institutional and social links, creation of dialogue...).

Thus IUCN, which initially was probably alone in having this vision and the means to achieve it, was able to "set up" the parties, and then gradually withdrew as the different roles were successfully filled.

A real evaluation of the sustainability of this project can only be considered, as is often the case, a few years after a total withdrawal of IUCN. It is however noteworthy that in such a project based on the co-management of the resource, on the increased capacities of fishermen's groups and administrations and on institutionalisation, the sustainability will depend on the continuity of the State, of its institutions and its management policies.

In conclusion this project can be proud of itself for being one of the first to have demonstrated the possibility of using a concerted approach towards a fishery resource in order to reasonably develop its exploitation within the framework of sustainable management. This constitutes, amongst everything else, a subject for reflection about the definition of operating modes for protected areas.

VISION	PRINCIPLES	OBJECTIVES	TOOLS	Actions by the RGB Project
DEVELOPMENT	Valorisation of the natural resources by the local communities	Improved exploitation of the environment	Local techniques	Micro-projects
		Increased economic returns	Training	Literacy programme
CONSERVATION	Sustainable exploitation of the biological resources	Knowledge of the resource and its exploitation	Professional associations	Fishermen/traders groups
			Financing	Credit system
			Biological monitoring	Biological studies
MANAGEMENT	Functioning structured via the State	Conceive the regulations	Monitoring of the fishery	Study of the fishery
			Socio-economic monitoring	Socio-economic study
		Define the regulations	Technical Institutes	Technical training
		Implement the regulations	Judicial authorities	Empowerment
		Legitimacy	Surveillance organisations	Judicial support
Reciprocal recognition by parties	Coordination	Surveillance support		
SUSTAINABILITY	Pragmatism Flexibility Factor of time	Common vision, principles and objectives	Planning	Coordination Committee Planning Strategy
			Identify the tools that are already operational	Implement the necessary actions
REPRODUCIBILITY				

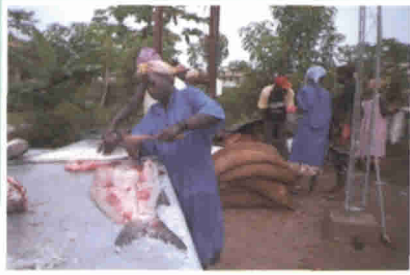
Abbreviations and acronyms

CIPA	Centra de Investigacao Pesqueira Aplicada (Guinée Bissau)
CIEO	Centre International d'Exploitation des Océans (Canada)
CNSHB	Centre National des Sciences Halieutiques de Boussoura (Guinée)
CRO	Centre de Recherches Océanographiques (Côte d'Ivoire)
CRODT	Centre de Recherches Océanographiques de Dakar-Thiaroye (Sénégal)
DGPA	Direcção Geral da Pesca Artesanal (Guinée Bissau)
IRD	Institut de Recherche pour le Développement (ex-ORSTOM ; France)
ORSTOM	L'institut français de recherche scientifique pour le développement en coopération
IUCN	The World Conservation Union

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IUCN – The World Conservation Union

Founded in 1948, The World Conservation Union brings together States, government agencies and a diverse range of non-governmental organizations in a unique world partnership: over 950 members in all, spread across some 139 countries.

As a Union, IUCN seeks to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

The World Conservation Union builds on the strengths of its members, networks and partners to enhance their capacity and to support global alliances to safeguard natural resources at local, regional and global levels.

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