

Impacts of Anthropogenic Activities on the Reproductive Dynamics of Fish in the Mangrovia Zone: Case of Kopering - Dubreka (Republic of Guinea)

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Abstract: *Ecosystems have constantly undergone natural and anthropogenic attacks since the beginning of the second half of the 20th century. These progressive degradations are for the mostly linked to urbanization and the need for increased income. The objective of this study was to assess the impact of human activities on the dynamics of fish reproduction in the Kopering area in Dubréka. A series of cross-sectional surveys were carried out with stakeholders (farmers, salt farmers, lumberjacks, oyster farmers and fishermen) active in the area. The results show that 27 out of 35 loggers targeted rhizophoras as a preference or a percentage of 77% of total cuts, 14% cut Avicenia (black mangroves) and 9% the Laguncularia. It was also noted that salt producers harvested around 5 tonnes of salt per hectare for a cleared mangrove area of 9 hectares, with an estimated average annual production of 45 tonnes of salt. Regarding rice cultivation, the surface areas of the fields varied between 2 and 5 hectares or 38 hectares cultivated each year for an average annual production of 190 tons of rice. It should be noted that the fertilizers used to maximize harvests could have a negative effect on fishery resources in general and fish in particular. These different activities are superimposed on several others, they overlap by practice or by the fact that the purpose of one leads to the beginning for the other. The urgent need to protect this area of Sangareyah Bay, a natural buffer between the sea and the mainland, seems more than necessary.*

Keywords: Anthropogenic activities, reproduction dynamics, mangrovia zone

1. Introduction

The mangrove ecosystem plays an important ecological and economic role in the countries of the West African coast. But the proliferation of traditional exploitation areas and the need for urbanization in the coastal zone, risk damaging the mangrove or even leading to its disappearance. [1] (Constanza et al., 1997).

The mangrove is made up of a very complex plant formation; it covers wet and marshy lands. It is a real biosphere reserve. In recent years, it has been observed on the Guinean coast that the mangroves are gradually declining. [2] (Camara and Diallo, 2012).

In fact, since the 1970s, the majority of development programs which have focused on the practice of income-generating activities traditionally practiced (agriculture, salt farming, forestry, fish smoking and the harvest of oysters), appear to be the main drivers of deforestation in the coastal zone. Fishing, along with logging, rice cultivation and salt extraction, are the four main mangrove activities [3] (François Domain et al., 1999).

Mangroves, wetlands, are disappearing around the world at an alarming rate. It is estimated that 40% of coral reefs are significantly damaged, 30-60% of mangroves are lost in South Asia, and more than half of the world's salt marshes have disappeared.

The first attempt to estimate the total area of mangroves in the world was undertaken as part of the Global Tropical

Forest Resources Assessment by FAO and UNEP in 1980. At that time, the estimate reached 15.6 million of hectares. More recent estimates give figures ranging from 12 to 20 million hectares. Countries where mangrove areas are very small were excluded from the majority of studies due to a lack of information. The cumulative surface of the mangrove areas excluded would not however significantly affect the world total. [4] (FAO, 2007).

Mangrove deforestation still continues, although the rate has been slower since the 1990s with 0.7% per year, than in the 1980s including 1% per year, since some 500,000 hectares of mangroves were lost between 2000 and 2005 [4] (FAO, 2007).

Over the past decades, African mangroves have been increasingly affected by deforestation. In West Africa, mangrove areas decreased from 20,500 km² in 1980, to their current area of 15,800 km², while in Central Africa, they were reduced from 6,500 km² in 1980 to 4,300 km² currently [5] (Ajonina et al., 2008). According to the FAO, Africa has lost around 500,000 hectares of mangroves over the past 25 years [4] (FAO, 2007).

Globally, the finding is also worrying. Humans have largely changed their coastline in recent centuries. The alteration of coastal ecosystems by land use change and population growth is the main causes of changes on a global scale [6, 7] (Burke et al., 2001; Olsen et al., 2009).

According to a study published in The Encyclopedia of Earth in 2010, the apparent progression of mangroves

between 1980 and 2000 only reflects the increase in the countries taken into account in the analysis. Indeed, if we observe the evolution of mangrove areas region by region, the analysis of the total evolution of mangroves indicates that mangroves have fallen from 19 million ha in 1980 to 15 million ha in 2003. The world has therefore lost 3.7 million hectares of mangroves in the last 25 years, or 20% of the total area of mangroves in 1980. Estimates of the existing mangrove areas would vary from 2555 km² to 7211 km². Similarly in the United States, the size of estuaries has halved from 900,000 km² to 415,000 km² from European colonization to today. In Europe, it is estimated that less than 15% of the coastline is in good environmental condition [8] (Airoldi & Beck, 2007).

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In Cameroon, the analysis of data collected in mangrove areas reveals a multitude of activities sometimes carried out on a seasonal basis. Although we find the same activities throughout the area, some take on greater importance in the southern mangroves due to the presence of large towns. In the Rio Del Rey on the border with Nigeria, fishing is the most important activity (47% of respondents) followed by smoking fish (30%), then manufacturing and repairing canoes (10%), the sale of wood (5%), agriculture (4%) [9] (Cormier Salem, 1999).

The degradation of the Guinean coast, central link of the mangrove swamp, affects coastal areas in general and particularly the Kopèring Dubreka area located in Sangareyah bay. It is an area, which serves as a refuge and spawning grounds for many endangered species of fauna and ichthyofauna. [3] (Domain et al., 1999).

The objective of this study was to assess the impact of human activities on the survival dynamics of the mangrove swamp, fish reproduction area in Sangareyah bay in Guinea.

2. Materials and Methods

Materials

Description of the study area

Sangaréah bay is located in the area of influence of Conakry and Dubréka (figure 1). The population of the bay is dominated by the Soussou and by a minority of Peuls. There are also a few stands swaying and teméné respectively from Guinea-Bissau and Sierra Leone [10] (Koné, 2015).

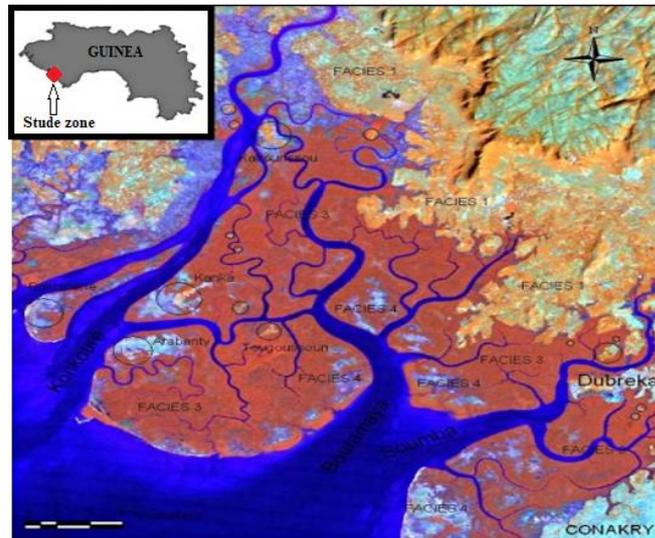


Figure 1: Location of the study zone

The bay of Sangaréah, mangrove area is located between land and sea, it is subject to the continental influence of the Konkouré, Bouramaya and Soumba rivers as well as to the maritime influence orchestrated by the play of the tides. The flow of these rivers can vary quickly, because their coastal watersheds extend over a small area, therefore a punctual change in the rainfall regime is enough to cause significant sedimentary changes in estuaries (erosion or deposits) [9] (Cormier Salem, 1999). The main activities carried out on the continent are agriculture (rice fields, market gardening, millet, oil palm, etc.), the breeding of N'Dama cattle (trypanotolerant breed) and the manufacture of charcoal. In mangroves, men mainly practice fishing, rice cultivation (flooded), salt extraction and wood cutting [11] (Camara et al., 2005).

Methods

A randomized visit was made in the field to make a survey of degraded areas. A questionnaire filled in by the actors in the field made it possible to collect data on the activities of the populations of the area. All the landing stages and water supply points, cultivation and salting areas have been identified.

The main activities carried out by the identified populations that could lead to degradation of the mangrove have been identified. The role of each activity in the destruction of vegetation has been determined.

The assessment of the impacts of mangrove degradation on fish reproduction was observed at the landing stages. Observations were made on certain fish and in the mangroves in order to observe possible morphological modifications. Statistical analyzes were obtained using Excel software.

3. Results and Discussion

The mostly executives consulted in the urban municipality, the Center for the Scientific Research and Oceanographic of Rogbane (CERESCOR) in Conakry and the National Center for Fisheries Research of Boussouira (CNRHB) in Conakry

spoke of the degradation suffered by the Guinean coast during the last decades in through these human activities and the consequences that emerge.

A total of 35 loggers were surveyed and the woody species targeted by the loggers were identified, including rhizophoras, Avicenia and Laguncularia. These field and survey results showed that 27 of the 35 loggers targeted rhizophoras as a preference, i.e. a percentage of 77% of total cuts, 5 of them cut Avicenia a percentage of 14% and the rest (9%) cut the Laguncularia. The exploitation of each species would be due to its usefulness to the population and its economic importance to loggers, for example the pressure on the rhizophora would be due to its importance in construction services and its long burning time as wood energy for smoking fish, cooking and bakeries (figure 2).

Salting was generally carried out during the dry season between February and mid-May, in the Kopering area. Three salt production sites were identified with a number operators varying between 9 and 13 people. Our surveys also noted that salt growers harvested 5 tonnes of salt per hectare for 9 hectares of mangrove cleared. The average annual salt production has been estimated at 45 tonnes.

The survey among farmers made it possible to know the cultivated areas, the types of crops and the periods of cultivation. The areas of the fields varied between 2 and 5 hectares, that is to say 38 hectares cultivated each year with an average annual production of 190 tons of rice. It should be noted that the fertilizers used to maximize harvests could have adverse effects on the fishery resources present (figure 3).

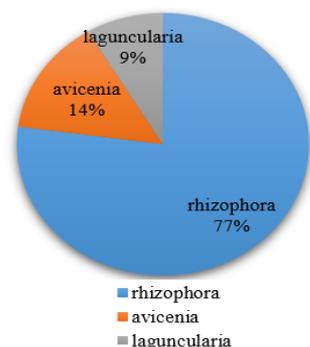


Figure 2: Distribution of timber by exploitation rate

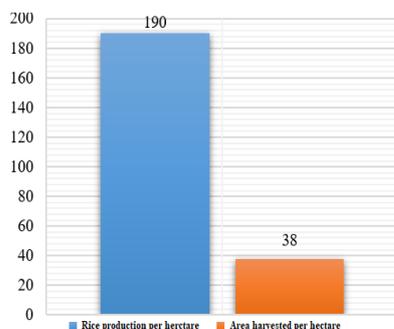


Figure 3: Rice production according to hectares

The survey of this group revealed that the wood species used for this purpose are Rhizophora sp, Avicenia sp and Laguncularia sp. Rhizophora was collected in abundance not

only because of its efficiency in combustion, but also because of the appreciable odor it gives to fish after smoking. Then the women revealed that the size of the catches was decreasing from year to year, this variation in the size of the fish was undoubtedly linked to the degradation of the mangrove. With the oyster farmers surveyed, it was revealed that the oysters attached themselves to the woody species and that the harvest was carried out by cutting a few roots.

From an urban planning point of view, it has been reported that constructions along the coast have become very frequent in Dubréka, neighboring area of Kopering, Conakry, Coyah and Boké. It was also noticed that the constructions were made by pushing back the sea by embankments of the mangrove areas. The Kopering area has known for this year the construction of a port infrastructure by a Chinese company and the area continues to have new leisure facilities such as hotels.

The boats of the motorized type (18.18%) and those of the non-motorized type (81.81%), used in Kopering differed among other things by their length. If the length depends on the means of the fishermen, the type of boat used, and the number of crew, the mesh size depends on the catch, and therefore on the target species. For the devices encountered, the meshes varied according to the type of device. The fishermen were followed for surveys related to their activities, namely: the types of boats, the type of fishing gear, the fish caught and the fishing areas frequented. Kopering is an arm of the sea which provides easy access to the coast.

Depending on the fishing location, 67% of catches are made at mangrove level, 22% at coastal level and only 11% are made at high sea level. This would be due to the type of boat used and the means with which have fishermen.

This identification of anthropogenic activities degrading the Kopering mangrove was carried out in parallel with surveys of the prefectural authorities in charge of fishing, aquaculture and the maritime economy, and local elected officials of Kopering. Our field surveys enabled us to identify the various anthropogenic activities practiced in the Mangrovia zone of Kopering. They are among others: rice cultivation, salt farming, fish smoking, logging, oyster harvesting and urbanization.

It should be remembered that these different activities overlap by practice or by the fact that the purpose of one involves a beginning to reach the other; and all act on aquatic fauna and the consequences differ much more according to the activity and very little according to the number of actors carrying out the activity. Let us remember that of the 100% of the different activities, 24% were fishermen, 20% rice growers, 19% loggers, 18% salt growers, 13% fish smokers and only 06% practiced oyster farming in our zone of study. The high percentage of some activities would be due to their profitability, ease, and these activities are permanent, while those with a low percentage are seasonal and are done with great difficulty with low return.

This impact was evaluated during our field surveys with fishermen and fish smokers and during the evaluation of the fishery resources landed at the artisanal port of Kopering. It shows the impact of the various human activities carried out in the Kopering area on the dynamics of fish reproduction. Activities that could lead to the risk of extinction of fish stocks in the future. A dozen families of fish have been

identified (Carangidae, Clupeidae, Sphynidae, Scombridae, Mugilidae, Albulidae, Pomadasidae, Pomadasidae, Trichuridae, Polynemidae, Scianidae, Cynoglosidae and Aridae). In this identification, 20 species of fish were identified. This plurality is affected by the impact of fishing gear. Overall, 23% were found to be mature and 77% immature.

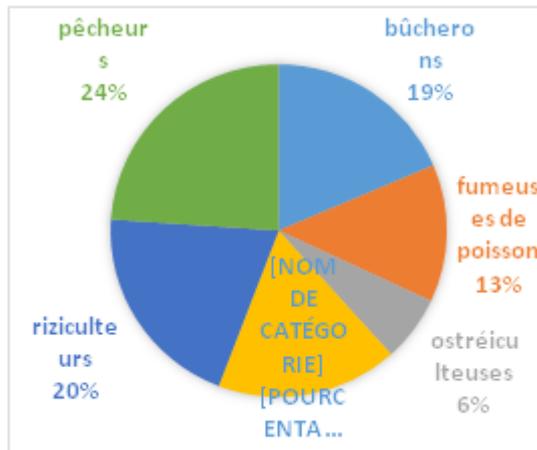


Figure 4: Degradation of mangroves according to occupation

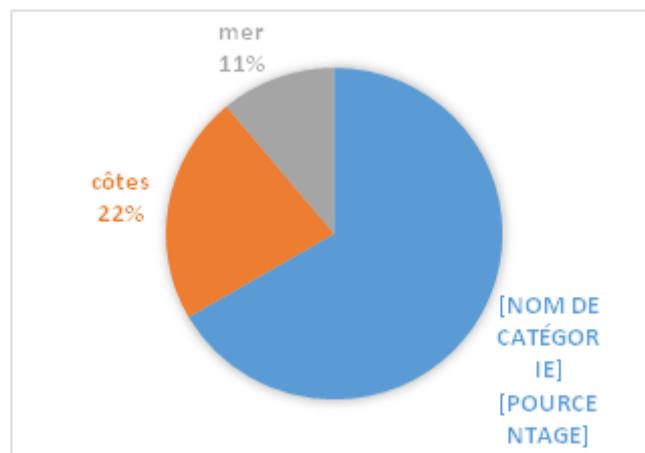


Figure 5: Frequency rate of boats by fishing area

Overall, it should be noted that as human populations in Africa's coastal areas increase, and as pressures on the environment from land and marine human activities increase, coastal resources increase. and marine life and

their habitats will continue to be damaged. The images below show the impact of certain anthropogenic activities carried out in the Kopering area on the dynamics of fish reproduction (figure 6 to 14).



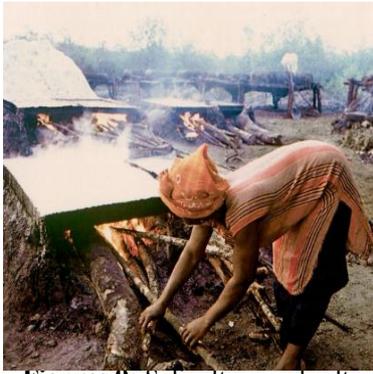
Figure 6: mangrove deforestation



Figure 7: Storage of cut timber



Figure 8: Fish smoking



Figures 9: Saliculture and salt evaporation



Figure 10: mangrove cultivation



Figures 11: rice cultivation



Figures 12: Saliculture and salt evaporation



Figure 13: types of craft



Figure 14: oysters fish

4. Conclusion

This study made it possible to assess the impacts of human activities (salt cultivation, rice cultivation, forestry and fish smoking, oyster harvesting and urbanization) on the mangroves in the different development units of the bay of Sangaréyah. These activities contribute on different scales to the degradation of the mangrove. The results also reveal the urgency of the conservation and protection of this reserved area, a natural buffer between the sea and the continent, sensitive to the overexploitation of wood and fauna resources. Finally, the reserved areas, still unharmed in the bay, also deserve special attention to understand their functioning and the state of their environment. The bay of Sangaréyah being an important environment in the economic development of Guinea, its ecosystem is rich in natural biotic resources, contributes nowadays to supplying the Guinean capital with firewood and service wood, mangrove rice (organic rice), salt, smoked fish and oysters. Protecting this area must be everyone's job for the sustainable management of this rich but fragile environment.

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