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IMPACTS OF RICE AND SALT GROWING ON MANGROVES IN THE DUBRÉKA AREA

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ABSTRACT

Mangroves in Guinea contribute to a wide range of environmental, economic and social goods and services. Despite these important roles, they are currently facing threats linked to anthropogenic activities such as rice growing and salt growing. Thus, the objective of this research is to take stock of the impacts of rice growing and salt growing in the reserved area of Sangareya bay in Dubréka, during the period from March 15, 2017 to March 30, 2018 During this study, four (4) rice growing sites were identified with a total area of 108 ha, of which 25 ha were developed by 41 Households and 83 ha abandoned. For salt growing, 128 households have been identified in the area, these producers are spread over six (6) sites, using 170 baking trays, with a production of 235,980 kg of salt, which leads to a consumption of 740,977.2 m3 of wood. The impact of these activities shows that they are exerting a strong pressure on the biodiversity in this area. Hence the need to propose possible solutions to reduce the negative impact of activities in this environment very rich in fishery and forest resources.

Keyword: Impacts, rice cultivation, salt farming, mangrove, Dubréka

1. INTRODUCTION

The process of degradation of mangrove resources, in connection with the ever-increasing needs of rural and urban populations, is today a major concern for all of humanity. Indeed, in many developing countries, coastal communities depend on mangrove forests, which provide them with economic opportunities and provide livelihoods for thousands of people [1].

The mangrove is used by the local populations for many uses such as rice growing, aquaculture, salt growing, fishing, etc. Thus, the movements towards the coasts are due to the attraction of the services and the goods offered by the coastal ecosystems in general and those of the mangroves in particular. In coastal areas, the mangrove ecosystem was considered one of the most productive. But today the trend is reversed in some areas, due to the decline that this ecosystem is undergoing [2].

In fact, the global area of mangroves increased from 18.8 million hectares in 1980 to 15.2 million hectares in 2005, representing a loss of 3.6 million hectares. The main causes of this destruction are population growth, large-scale conversion of mangrove areas for rice cultivation, salt farming, aquaculture, infrastructure, tourism, as well as pollution and saline rise in addition to natural phenomena. . This leads to biodiversity and livelihood losses and an imbalance in ecosystems [3].

Over the past 25 years, North and Central America have contributed significantly to the reduction in mangrove areas, to around 696,000 ha, and Africa to 510000 ha. The environmental and economic damage caused by the alarming disappearance of mangroves in many countries should be at the center of concern. The overexploited biological resources sometimes show signs of very strong pressure by a decrease in the size of the individuals. On the outskirts of the villages, large areas of mangroves have been destroyed [4].

In Central Africa, the cultivated areas are negligible but, the mangroves receive however significant quantities of waste coming from anthropic activities such as: the harbor extension, shrimp farms and other vegetable crops reported in several zones [5]. These activities are sometimes state projects or private investors that require significant resources and decision-making is always closer to economic aspirations than environmental. In terms of area, these activities cause more damage than traditional anthropogenic activities [6].

In the case of East Africa, the root causes of mangrove degradation are associated with

anthropogenic activities, mismanagement, economic pressure in urban and rural areas, poverty in local communities and uneven distribution of resources. Also, factors linked to climate change, such as sea level rise and increased sedimentation, have affected, for example, the mangroves of Kenya, Tanzania and Mozambique [3].

Similarly, in African regions with a contrasting climate (Mauritania, Ivory Coast, Senegal, Sierra Leone, Guinea, etc.), agriculture is an important factor in the degradation of mangroves. For other authors, the overexploitation of mangrove resources is due to the chronic poverty of the populations in the coastal region [7, 8].

It is along these lines that the Food and Agriculture Organization of the United Nations emphasizes that the world's mangroves are under threat from all sides. Their habitat is destroyed by the construction of dams, the diversion of rivers, the extensive development of agriculture and aquaculture in the intercontinental zone which generally ends up drying up [5]. This degradation of mangrove ecosystems has caused in several areas, the reduction of fishing, the acceleration of coastal erosion, the loss of livelihoods and the worsening of poverty.

In West African countries, a large area of mangroves has been used for rice cultivation (often associated with fish farming). Rice from these lands represents 13% of national production and more than 50,000 farmers live from this activity. According to the SDAM (1989), of the 300,000 ha of mangrove in Guinea, 140,000 have been converted to rice fields, 62,000 ha have been abandoned, 27,000 ha have been recolonized and 35,000 have remained sterile [9].

In addition, salt extraction (salt growing) remains another seasonal activity that consumes huge quantities of wood. The Mangrove Management Plan (SDAM) further states that rice cultivation and salt extraction negatively affect this ecosystem. One of the problems linked to rice cultivation and uncontrolled urbanization which is causing the reduction of the population of crabs and other benthic species [10].

Today, the destruction of the resources of this ecosystem by both indigenous and halogen populations has reached a worrying, even alarming, level. From the above, public opinion must place particular emphasis on the often irreversible disappearance of mangrove forests and their biodiversity as a result of the poorly controlled activities of a constantly growing humanity. The challenges for sustainable management of mangrove forests are at several levels (individual, community, national, international, and global) for better safeguarding of goods and services from mangrove forests, for environmental protection, and finally for sustainable development. Hence the merits of this study on the mangrove in Dubréka (Republic of Guinea).

2. METHOD AND MATERIALS

2.1. Presentation of the prefecture of Dubréka

The prefecture of Dubréka is one of the eight (8) prefectures of the maritime region of Guinea. It is between 9°45 ’and 10°15’ north latitude and between 13°20’ and 13°50’ west longitude with an average altitude of 15 m. It is located 50 km from the capital Conakry in the west of Guinea. It covers an area of 5676 km2 with a population of 157017 inhabitants, an average density of 28 inhabitants per km2 according to the 2014 demographic census. This population is divided between the six (6) rural communes which are: Tondon, Falessadé, Bady, Tanènè, Wassou, Khorira and the Urban Commune. It is bounded to the north by the prefecture of Fria and part of the prefecture of Boffa, to the south by the Atlantic Ocean and the peninsula of Kaloum, to the west by the prefecture of Boffa and to the east by the Coyah and Kindia prefecture, see figure 1 [11].

Its climate is of the Sub-Guinean type and is characterized by the alternation of two seasons, the dry season (December-April) and the rainy season (May-November). The rainfall is abundant in the area (2000 - 4000 mm of water per year with a maximum between July and August. The maximum rainfall during the period 1993 - 2003 is 3547.2 mm and the minimum for the same period is Temperatures vary little, the maximums oscillate between 27.4°C and 36.9°C. The atmospheric humidity is very high with an average of about 80% [12].

The Dubréka mangrove ecosystem encloses a tree vegetation made up of red and white mangroves (Rhizophora, Avicennia, Laguncularia and conocarpus erectus). The mangroves of Dubréka cover the coastal lowlands subject to twice-daily tidal phenomena. The highest parts are located on the edge of the continental shelf whose altitude

varies between 10 and 15 m. On the seafront, the channels and micro-channels form digitalis which contribute to the division of the area into islands and islets [13]. Some of the main activities of the peasant population are rice growing and salt growing in the mangroves of Dubréka.

2.2. Mangrove rice growing

Rice is the staple food of Guineans. In Guinea Maritime, rice consumption is estimated at between 110 and 130 kg on average per year and per capita. Guinean rice cultivation is based on small family farms. Mangrove rice cultivation is one of the four rice systems practiced in Guinea and accounts for 18% of the country's rice areas and 16% of national rice production. Mangrove rice growing occupies around 70,000 ha on the coast. It is also the most productive system, with yields ranging between 1.5 and 3.5 t/ha, compared to 500 kg to 2.5 t/ha for the other systems [14].

Management interventions in Lower Guinea focused on the large mangrove plains, but also and above all on the small and medium plains behind the mangroves. In mangroves, the areas developed correspond to 10% of the potential for development. The areas of mangroves managed across all systems are estimated to reach nearly 56000 ha today [14]. At present, more than 140000 ha of mangroves have been converted to rice fields, to which is added deforestation caused by timber harvesting [11].

2.3. Traditional salt production

It consists of desalinating the mangrove soil by repeated leaching. The filtrate is enriched with NaCl during each percolation. When the concentration of the solution (brine) is high from 1199°C to 1215°C according to the observations, cooking will give a lot of salt to the harvest. Salt growing is a seasonal activity, mainly carried out by women in addition to rice cultivation, and is practiced in the dry season. An income-generating activity for coastal populations, it consumes a lot of wood for cooking brine. To obtain 1 kg of traditional salt, it is necessary to consume on average 3.1 to 3.5 kg of wood taken from the mangrove [15]. Traditional salt production is unprofitable and the product is experiencing market difficulties. The Guinean saline technique (solar saline) was initiated in several areas of the mangroves of Dubréka by associations and producer groups.

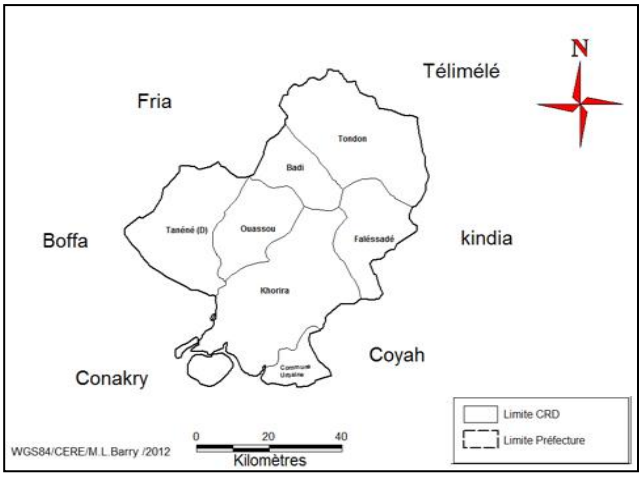

Figure 1. Map of the prefecture of Dubréka

2.4. Methodology

This research was carried out from March 15, 2017 to March 30, 2018 in the prefecture of Dubréka. It is based on theoretical and experimental approaches by carrying out field visits in the study area. Contacts with the authorities and resource persons (prefect, mayor, notables, village chiefs, groups and associations, etc.). The survey sheets made it possible to collect the various data collected in the field and from resource people during the study period. Formulas 1 and 2 were applied respectively for the evaluation of the average quantities of wood used and salt produced.

$$Q_{b/bac} = q_{mb/kgsel} \times Q_{Tsel/bac}$$

With: Qb/bin: Quantity of wood used per salt production bin in (kg); qmb/kgsel = 3.3 kg: Average quantity of wood required for the production of 1 kg of salt;

The mangrove areas exploited for rice cultivation were obtained by surveys using GPS and a decameter. The images in Figures 2, 3, 4, 5, 6 and 7 show certain stages of the activities of rice growing and salt growing.

Figure 2. Cleared area for rice growing

Figure 3. Vegetable rice

Figure 4. Abandoned rice field

Figure 5. Scraping area

Figure 6. Scraping of salted earth

Figure 7. Transport of salted earth

3. RESULTS AND DISCUSSIONS

3.1. Results

The results obtained relate to: Situation of rice farmers (rice sites, number of households, areas developed and abandoned); Situation of salt producers (salt sites, number of households, number of cooking trays, quantity of salt produced in kg and volume of wood consumed in m3). These results are shown in Tables 1 and 2.

Table 1. Situation of rice farmers

No.	Rice sites	Number of producer households	Number of perimeter	Developed area (ha)	Abandoned area (ha)
1	Solonyiré	2	3	2	30
2	Banankoro	5	2	5	20
3	Sonfen	16	3	15	23
4	Woyenkhori	18	2	3	10
TOTAL		**41**	**10**	**25**	**83**

Table 2. Situation of salt producers

No.	Salt growing sites	Number of productive households	Number of baking trays	Amount of salt produced (kg)	Volume of wood consumed (m^3)
1	Solonyiré	23	36	49680	155995.2
2	Kakira	18	25	35880	112663.2
3	Banankoro	25	30	41400	129996
4	Sonfen 1	25	36	49680	155995.2
5	Sonfen 2	17	22	30360	95330.4
6	Woyenkhori 2	20	21	28980	90997.2
TOTAL		**128**	**170**	**235980**	**740977.2**

3.2. Discussions

The results obtained are illustrated by the diagrams in the figures below for their discussions.

3.2.1. Rice cultivation

The numbers of rice-growing households, the numbers of perimeters, the areas developed and abandoned by site in the area are represented by the diagrams in Figures 8, 9, 10 and 11.

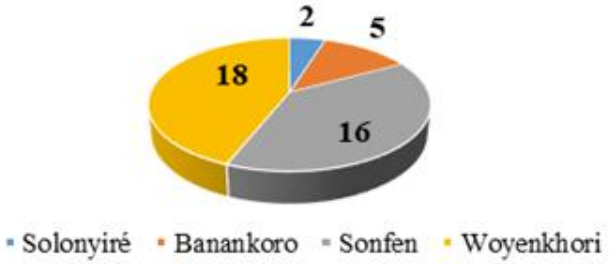

Figure 8 : Number of producer households

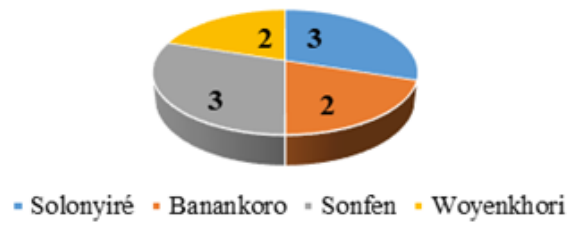

Figure 9 : Number of perimeter

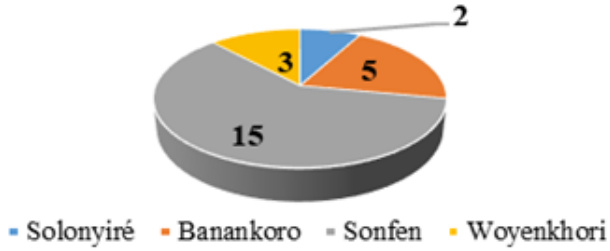

Figure 10 : Developed area

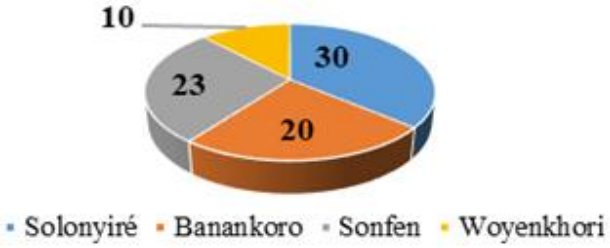

Figure 11 : Abandoned area

During the survey, 4 rice growing sites were identified with a total area of 108 ha, of which 25 ha were developed by 41 households and 83 ha abandoned, dominated by herbaceous plants of the genera séssuvium, paspalum and Jong. All the operators are residents of the Rural Municipality of Khorira (see figure 1). The diagram in Figure 8 shows that, out of a total of 41 households in the area, the maximum household (18) is found in the

Woyenkhori site, i.e. 43.9% of the total number of households, this site is followed respectively by Sonfen (39.02%), Banankoro (12.20%) and Solonyire (4.88%). The number of perimeters used is three (3) for Sonfen and Solonyiré, i.e. 30%, the Banankoro and Woyenkhori sites have two (2) sites each for a rate of 20% (see Figure 9). The areas highlighted according to the sites are respectively Sonfen (15 ha), Banankoro (5 ha), Woyenkhori (3 ha) and Solonyiré (2 ha) (Figure 10). The diagram in Figure 11 shows the abandoned areas Solonyiré (30 ha) or 36.14%, Sonfen (23 ha) or 27.71%, Banankoro (20 ha) or 24.10% and Woyenkhori (10 ha) respectively 10.05%. This rice activity leads to a decrease in the regenerative capacity of the mangrove, the production of birds, fauna and avifauna, as well as the migration of animals, the destruction of microfauna and the tanning of uncultivated soil.

3.2.2. Salt growing

The numbers of producer households, the number of cooking trays, the volumes of wood used and the quantities of salt produced per site in the area are represented by the diagrams in Figures 12, 13, 14 and 15.

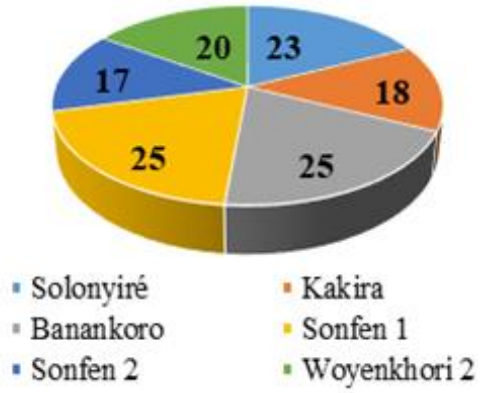

Figure 12 : Number of producer households

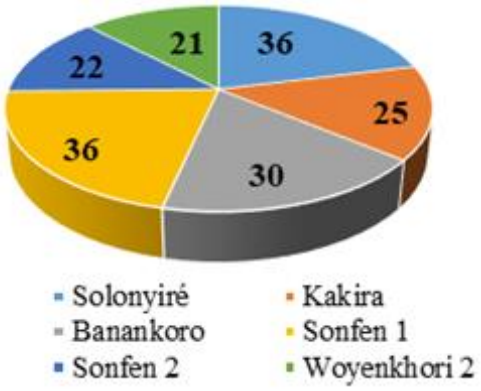

Figure 13 : Number of cooking pans

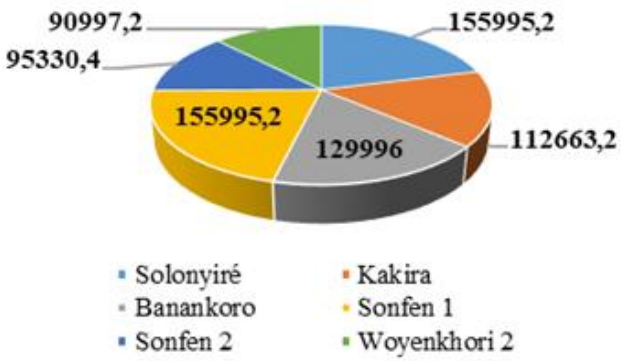

Figure 14 : Volume of wood consumed

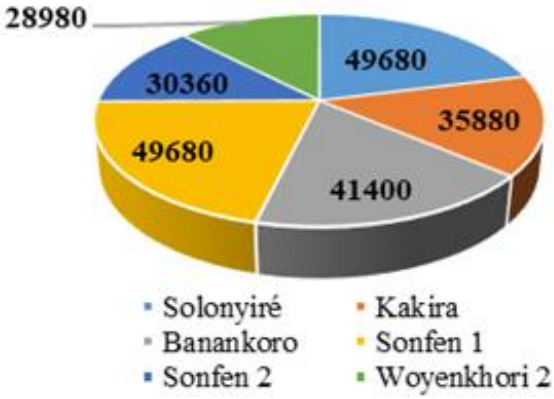

Figure 15 : Amount of salt produced

The results in Table 2 show that there are a total of 128 households of salt producers surveyed in the area, spread over six (6) sites, using 170 baking trays, with a production of 235980 kg, which leads to consumption 740977.2 m3 of wood during the study period. The diagrams in Figures 12, 13, 14 and 15 respectively show the distribution rates by site as a function of the number of producer households, cooking tubs, the amount of salt produced in (kg) and the volume of wood consumed in (m3).

This salt production activity leads to the deforestation of the mangrove, the destruction of the habitat of the fauna, avifauna and the spawning grounds of the fish, the marine and coastal erosion, the destruction of the young plants and grasses, the destruction of organic matter and soil structure and soil sterilization.

4. CONCLUSION

This research made it possible to assess certain impacts of rice growing and salt growing in certain areas of the Dubréka mangrove. The results reveal the urgency of conservation and protection of this environment, a natural buffer between the sea and the continent sensitive to the overexploitation of

wood and wildlife resources. It has scientific, cultural, educational and tourist value. The protection of this area must be the work of each and every one for the sustainable management of this rich but fragile environment.

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