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Livelihoods In Cameroon Mangrove Areas : Finding A Balance Between Conservation And Sustainable Use In A Fragile Ecosystem

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Abstract : A socioeconomic study was conducted in the two mangroves of Cameroon with the objective of all the activities and livelihoods of populations and subsequently record their impact on the conservation and sustainable management of this ecosystem. The Rio Del Rey mangrove in the South-west region (Bakassi area) and the Cameroon estuary mangrove in the Douala region, include seven species that form the wood and non-wood floristic base in this environment. These comprise six indigenous mangroves species and one species introduced from Asia, the Nipa identifying palm (Nypa fructicans). The study underlines a multitude of sectors including those of halieutic (fishing) products, agricultural products, wood, shopkeeping and sand. Measures to manage the anarchic development of Nipa palm are suggested. For a sustainable management policy of Cameroonian mangroves, it is urgent to have laws and regulations specific to that ecosystem.

Keys Words : mangroves, livelihoods, conservation, sustainable management, A socio-economic study

I. Introduction

With an estimated surface area of 277,000ha, Cameroon mangroves include three large groups: (1) the Rio Del Rey mangrove in the Bakassi area (150,000ha) stretching from the Njangassa village to the Nigerian border, as well as all the islands of the Rio Del Rey estuary; (2) the Cameroon estuary mangrove (120,000ha) stretching from the Sanaga estuary to the Bimbia Cape; and (3) the Southern mangrove (about 7,000ha) located in Campo at the mouths of the Nyong, Lokoundjé and Ntem rivers. It should be noted that this mangrove has been excessively exploited here and there, especially for young trees cut as poles and exported to Nigeria.

The coast's equatorial maritime type of climate, the differences in annual rainfall from the south to the north (4,000mm in Douala, 11,000mm in Debunscha, and 6,000mm in Rio Del Rey), a relatively high air temperature (28°C), and a low salinity (<5‰), are all favorable factors for the development of these mangroves. They are also conducive for the installation of human communities in these environments, and for economic activities that potentially have negative impacts on the biodiversity of that ecosystem. Apart from the known natural functions of mangroves, in Cameroon they are often the basis for significant

economic exchanges. The economic operations thrive on the dynamics of the demand from urban areas in Cameroon as well as exchanges with neighbouring counties such as Nigeria and Equatorial Guinea.

Universally known as an unstable and fragile ecosystem, Cameroon has adhered to the protection of mangrove ecosystems through a framework law n° 96/12 dated 05/08/96 and its Article 94. In the overall framework of defining a sustainable development policy for Cameroon's mangroves, a multidisciplinary study focusing on the participatory management and conservation of the biological diversity of mangroves was carried out during the year 2005. This paper presents a number of results of the socioeconomic aspect of the study, with a view to identifying all the activities and livelihoods of communities in mangroves areas of Cameroon, and recording their impact on the preservation and sustainable management of that ecosystem.

II. Materials and MethodsCc

II .1 Site and materials

The study considers the Rio Del Rey estuary mangrove and the Cameroon estuary mangrove. Several villages were visited except those on the Bakassi peninsula (Idabato and Diamond) that were still experiencing armed conflicts at that time. Site visits were carried out using a 4x4 pickup vehicle and a small boat. The light equipment includes a GPS, a camera, hydrographical and tides maps, pieces of strings and survey sheets.

II .2 On-site data collection strategy

A multidisciplinary team including a socio-economist in fishery, a mangrove developer, a hydro-pedologist, a lawyer and the survey staff, was formed to conduct a participatory analysis in the communities living in the region under study.

The collection of information was primarily done at the level of the administrative centre of localities visited, after consultation with local institutions for information on the largescale dynamics affecting the overall mangrove ecosystem. Local institutions consulted included administrative authorities, representatives of relevant technical ministries, NGOs, fishermen associations, fish traders, logging companies and lumberjacks; and sand operators. Information was collected in villages systematically visited and georeferenced :

- At the level of focal groups and village institutions (Village Chief, heads of socioprofessional associations, youth and women groups, fishing post managers, School headmaster, hospital nurse, etc) to collect information on the various aspects of communities livelihoods ;
- Participatory discussions with the various socio-professional categories (fishermen, fish traders, farmers, loggers, transporters, sand and gravel operators, etc.) in 20% of villages visited. The sample embraced all the types of villages (small, average, large). The data collected enabled the team to grasp the village dynamics as regards access to resources and related conflicts, income generating activities, actors' perceptions on sustainability, environment preservation and protection, etc.

The approach used was interactive and deductive with the use of the main MARP (Methode Acceleree de Recherche Participative) tools which facilitated an identification and inventory of the floristic biodiversity and enabled detection of areas where the mangrove ecosystem is in a state of advanced deterioration. MARP (a French acronym) is very similar to Participatory Rural Appraisal (PRA).

III. Results and Discussions

III. 1 Vegetation and floristic composition of mangroves

The majority of mangrove species in Cameroon belong to three (3) families: Rhizophoraceae, Avicenniacea and Combretaceae. The associate or volunteer species are highly varied and amount to more than 19 families. Seven species are predominant, including six indigenous species gathered under the term 'mangrove' and one introduced species, the Nipa palm originating from Asia (Table 1). The 'associate species' are mainly: Drepanocarpus lunatus, Dalbergia ecastaphylum, Hibiscus tiliaceus, Phoenix reclinata, Acrostichum aureum, Pandanus candelabrum, Raphia palma pinus, etc. Rhizophora spp. is the predominant species in Cameroon with about 80% of mangrove vegetation followed by the Nipa palm (Nypa fructicans) with about 13%.

Table 1 : The main mangrove species in Cameroon

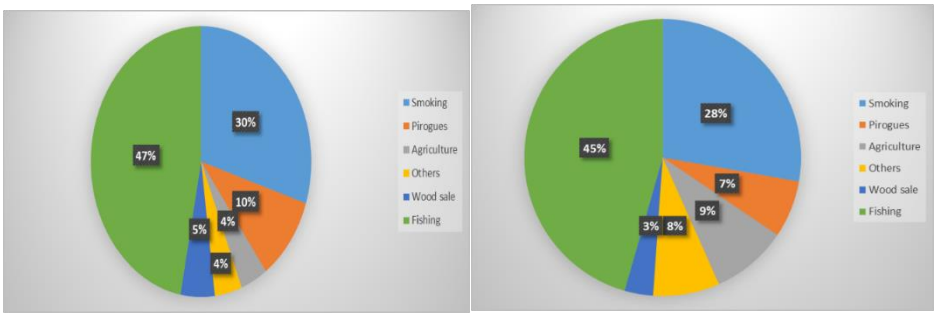
Mangrove species	Abbreviation	Family
Rhizophora racemosa	Rr.	Rhizophoraceae
Rhizophora mangle	Rm.	Rhizophoraceae
Rhizophora harrisonü	Rh.	Rhizophoraceae
Nypa fructicans*	Np.	Arecaceae
Avicennia Germinaans	Av.	Avicenniacea
guncularia racemosa	La.	Conbretaceae
Conocarpus erectus	Co.	Combretaceae

*Introduced species Source : Thomas, D.W. & Check M., 1992

III. 2 Livelihoods in the mangroves of Cameroon

The analysis of data collected on site (Njifonjou, 2005 ; Mbog, 2005 ; Mvondo Ze, 2005) underlines a great number of activities often performed seasonally. Even though the same activities are found in the entire area, some of them are more important in the Southern mangrove in view of the presence of large towns.

In Rio Del Rey, at the border with Nigeria (Figure 1.a) fishing is the most important activity (47% interviewees) followed by fish smoking (30%) and the manufacturing and repair of dugout canoes (10%), wood sale (5%), agriculture (4%) and other activities (house building, petty trading, transport of goods).



a) Bakassi area **b) Cameroon estuary**

Figure 1 : Distribution of populations' activities in the southern part of Cameroon

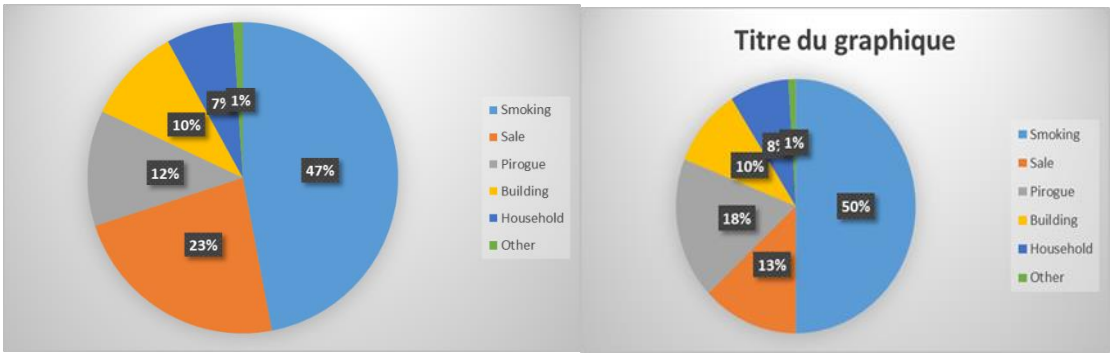
Fish smoking, manufacturing of dugout canoes, house building, and wood selling represent 48% and are all the activities related to the exploitation of mangrove wood, confirming its importance in the area under study. Wood sale is less important and located around the Bekumu fishing grounds of which the main activity is catching the small shrimp (Nematopaleamon hastatus) (popularly called Njanga in Cameroon) which is sold dried-smoked.

At the Cameroon estuary (Figure 1b), fishing also remains the most important activity within that mangrove ecosystem. However trade in wood (3%) is gaining relatively importance in view of the nearness to large urban centers of Douala and Tiko (especially in Bilongue, Bonaberi and Avion Beach neighbourhoods). Fishing grounds such as Yoyo I, Youme, Cap Cameroon, Kange, Mabeta, etc. are big centers for fish smoking.

All the activities related to logging (smoking, woodwork, building) represent 46%. This confirms once again the excessive logging occurring in Cameroon mangroves in general and testifies to the need to undertake an urgent action to preserve that ecosystem. Agriculture is also more important in the south (9%) of villages located near dry land. The other activities (8%) are spread between sand exploitation (2.5%), house building and woodwork (3.0%), transport of goods and persons (1%) and trade (1.5%).

III. 3 **Levels of exploitation**

Human activities in the mangrove forests of Cameroon are more focused on logging; however some species such as rattans and palms near or inside mangrove ecosystems, are also subjected to intensive harvesting. Mangrove logging has become the second activity after fishing in mangroves. Red mangrove (Rhizophora spp.) is by far the most solicited species: used for fuel wood, fish smoking (wood and fruits), timber. Figure 2 presents the distribution of wood use in the mangrove areas of (a) the Cameroon estuary, and (b) the Bakassi area.



a) Cameroon estuary **b) Bakassi area**

Figure 2 : Categories of wood-use in the mangroves of Cameroon

There are small and large scale loggers. Regarding the small-scale loggers, the cutting is done with machetes or sometimes axes and mainly involves small areas. This system leads to the reduction of young trees of 10 to 20 cm diameter (1 to 5 years old) sought after for their easy use and transport (fish smokers, housewives, shelter builders).

The large-scale loggers use motorized chainsaw and cut big trees to be sawn as planks and used for fuel. This is an intensive and profitable exploitation even though illegal. Loggers are sometimes organized in associations (operating illegally) like the 'Firewood Cutters Union' of Cap Cameroun Village. At Rio Del Rey, mangroves suffer from excessive cutting of poles directly exported to Nigeria for use on various building sites.

III. 4 Agricultural Logging

In Cameroon, agriculture is secondary and highly scattered in mangroves area. It concerns only a few villages such as Ekoumamindo, Bekumu, Bamousso in the northern part of the area; Tiko, Mabeta, Manoka, Mouanko in the southern part; and these are villages benefiting from the nearness to dry land. However, there are large rubber tree and oil palm plantations belonging to the agro-industrial company Cameroon Development Corporation (CDC) that occupies large surface areas at the outskirts of the mangrove area. Rice production is missing and unknown and backyard (homestead) gardens are widespread in the villages with fruit trees and various types of food crops.

III. 5 Exploitation of Sand Quarries

Sand exploitation is one of the important activities in areas covered by mangroves, and at the same time near large towns. Sand quarries are visible everywhere in the Cameroon Estuary, particularly around the city of Douala (Modeka Bay, Youpwe, Bonabéri neighbourhoods) where the annual mangrove sand production is estimated at 90,000 m3 ; that activity is increasingly spreading in the Cameroon Estuary because of the ever increasing demand for large grain river sand exported to Equatorial Guinea.

III. 6 Impact of Industrial, Urban and Entertainment Activities

The effects of urbanization and its consequences are more perceptible in the Cameroon Estuary mangrove. The perpetual increase of the population of Douala causes a systematic invasion of mangrove areas, both by populations and new factories. The result is industrial and household pollution with the dumping of waste materials such as phosphate, heavy metals (Pb, Zn, Cu, Cd, etc.), solid waste and organic matter in the environment. Hydrocarbon pollution is perceptible in the entire area, especially with the frequent dumping of oil in the sea (e.g. refinery wastes, platforms, waste oil from fishing boats, etc.).

III. 7 Impact and Development of Nypa palm (Nypa fructicans)

Originating from South-East Asia and typical of swampy estuaries, Nipa palm was introduced in the Gulf of Guinea from the Calabar region where the species spreads its seeds along the Guinea current. The multiplication and development of Nypa fructicans species in the areas disturb the optimal development of various indigenous mangrove species and became a plague in the entire region. In Asia, the plant has multiple uses (building material, basketwork, sweet sap used to prepare sugar and alcohol, kernel often consumed, etc.). In the Bakassi region and in Calabar where the palm found a good growing environment, populations use it only to build houses, weave mats and baskets, etc.

III. 8 Prospects for the Sustainable management of Mangroves in Cameroon

Since the participation of Cameroon to the Rio de Janeiro Earth Summit (United Nations Conference on Environment and Development, 1992), the protection and conservation of the mangrove ecosystem is henceforth included in the list of priority tasks for ministerial, decentralized and other authorities. Among the current projects: the review of the legal framework for fishery and aquaculture (Project (A) : the TCP/CMR/2908(A) Project on participatory management and conservation of mangroves biological

diversity, the research programme N°3-2007/IRAD/SRHOL on destruction strategies of the Nipa palm (manual destruction of fruits and sabotage of the heart of Nipa to stop its growth) and in Nigeria, funding of a demonstration project on Nipa monitoring through its use at the University of Calabar, by the Project 'Gulf of Guinea Large Marine Ecosystem (GCLME).

IV. Conclusion and Recommendations

This study contributed to the diagnosis of the situation of major mangrove ecosystems in Cameroon, through the evaluation of mangroves resources and their potential to contribute to food security and income generation. The mangroves were exposed to a double pressure from endogenous and exogenous factors. They were subjected to various uncontrolled actions by local coastal populations, and to continuous changes of the coastal environment as well as to pollution by urban and maritime waste. Many activities were thus carried out, notably fishing and related activities, wood cutting for various uses (more than 60% of activities revolve around wood cutting), agriculture, sand extraction ; and the multiplication of Nipa palm added up to the long list of the causes of the drastic reduction of the extent of mangroves surface areas. Cameroon is thus faced with mangrove ecosystem that is anarchically exploited, not rationally managed or protected and little developed. This situation will further compromise the ecosystem's vital functions.

The results have made vital information available. Therefore the country should formulate its development plan, put in place mangrove-specific legislation and regulations, and adapt them to the latest developments that occurred in that ecosystem both at national and international level. As the primary beneficiaries of the ecosystem, local resident populations should be sensitized to make sustainable use of the mangrove ecosystem. Actions to embrace should include selective tree cutting for fish-smoking, the use of more efficient fish smoking wood-kilns, the use of young Nipa fruits to slow down its development, and the non-use of destructive practices in nursery areas, etc.

Although some initiatives have been launched on the sustainable management of the mangrove ecosystem in Cameroon, it would be advisable that concerted actions be carried out to realize the activities of the GCLME Mangrove Demonstration project on each side of the Cameroon-Nigeria border.

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