



## RESEARCH ARTICLE

### EVALUATION OF THE IMPACT OF HUMAN ACTIVITIES ON THE ICHTYO-FAUNA OF THE MAKONA RIVER IN THE URBAN COMMUNE OF GUECKEDOU (REPUBLIC OF GUINEA)

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#### ABSTRACT

The ichthyofauna, being all the fish of a watercourse, constitutes in particular a source of protein at reduced cost and of income for the riparian populations. However, human activities are becoming increasingly threatening to fish. The consequences of intensive catches, the use of chemical substances in agriculture, the destruction of forests and the introduction of new species of fish strongly disturb aquatic ecosystems and pose real threats of extinction to many species of fish. The objective of this study was to assess the influence of human activities on the fish species of the Makona River in the urban commune of Gueckédou and to propose corrective measures for an effective and sustainable management of resources. The following methodology was adopted: (1-Field survey, 2-Identification of wharves, 3-Inventory of human activities, 4-Inventory of ichthyofauna., 5- Identification of physical parameters, 6- Mapping of the study section of the river, 7- Evaluation of the impact of activities, 8- Proposals of corrective measures for sustainable management of resources. The freshwater ecosystems of Gueckédou are undergoing profound modifications by anthropogenic activities.

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## INTRODUCTION

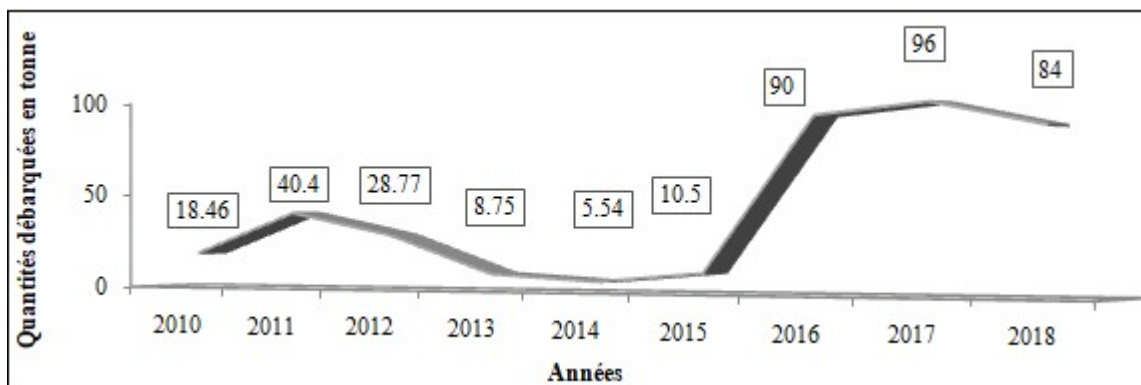
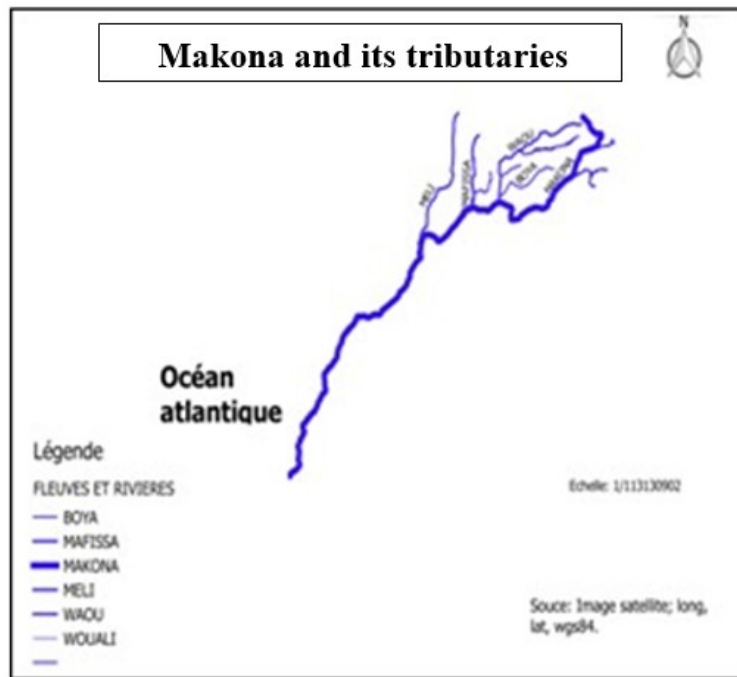
The surface of continental aquatic ecosystems represents only 0.8% of the total surface of the planet, but it is home to at least 6% of the species that have been described to date. However, aquatic biodiversity is declining worldwide. The main factors in the erosion of this biodiversity are not only the degradation of the habitats of species, in particular by modifying the morphology of watercourses, but also point and diffuse polluting discharges, the introduction of invasive alien species, overexploitation of the resource and climate change (Michelet P., 2017). In Africa, the combined population of vertebrate species for which data are available is estimated to have declined by about 39% since 1970. Declines are faster in West and Central Africa than in East Africa or Southern Africa. (WWF, 2014). A total of 6,419 animals and 3,148 plants in Africa were found to be listed as endangered species on the 2012 IUCN Red List. (IUCN, 2014). The freshwater ecosystems of Gueckédou are undergoing profound modifications by anthropogenic activities such as garbage disposal, fishing, agriculture, carbonization and sand extraction which paralyze the life of the species of these rivers. But very unfortunately these activities have never been the subject of published studies and nothing like concrete action is envisaged by the authorities to prevent and restore these ecosystems.

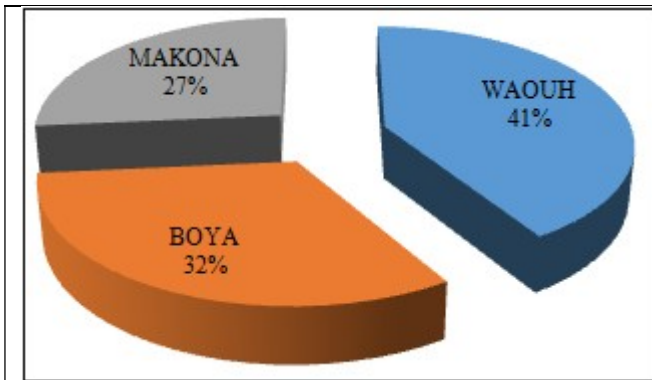
However, the rivers found there are in perpetual degradation under the effect of pollution and deforestation, leading to the loss of natural habitats, the scarcity or even the disappearance of certain species. Hence the choice of theme: "Assessment of the impact of human activities on the ichthyofauna of the Makona River in the urban commune of Gueckédou" in order to preserve the quality of our continental aquatic ecosystems. To accomplish this work we followed the outline below.

## MATERIAL AND METHODS

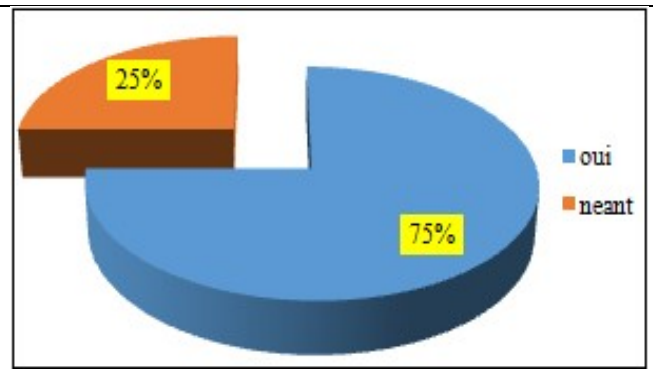
### Material

It is located 677 km from the capital Conakry and 219 km from N'zérékoré, capital of the governorate; with an area of 4,400 km<sup>2</sup>, approximately 1.8% of national territory, and a population of 310,602 inhabitants including 148,143 men, i.e. a density of approximately 71 inhabitants per km<sup>2</sup> (RGPH 2014) composed of nine (9) rural communes which are: Gbollodou; Fagamado; Guendembou; Kassadou; koundoulegobengou; Nongoa; OuendéKènèma; Temessadou Djigbo and Tekoulo. This prefecture located in the southwestern part of the Republic of Guinea, is between 9°18' and 10°49' west longitude and 8°17'

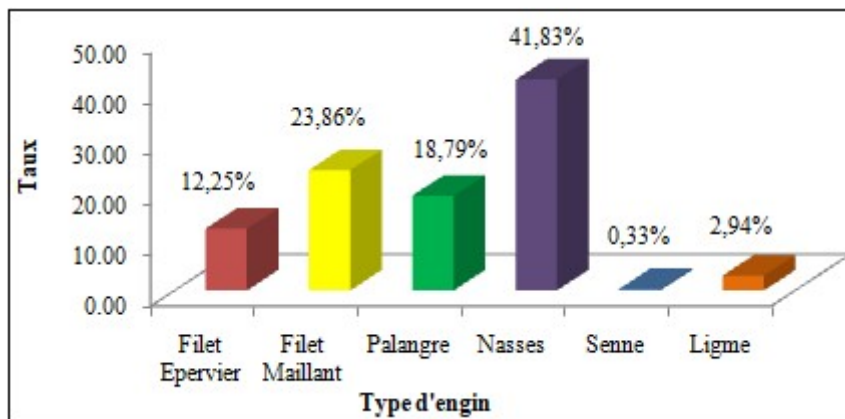




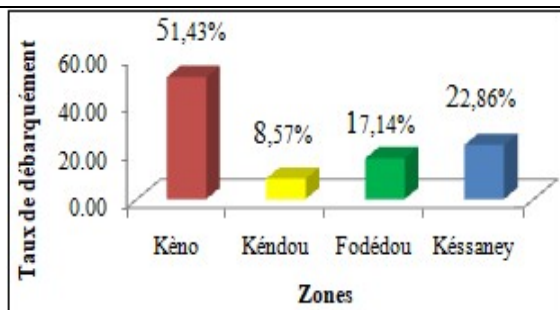
Pie chart 1. Sand extraction rate on rivers in the municipality of Gueckédou in 2018 years



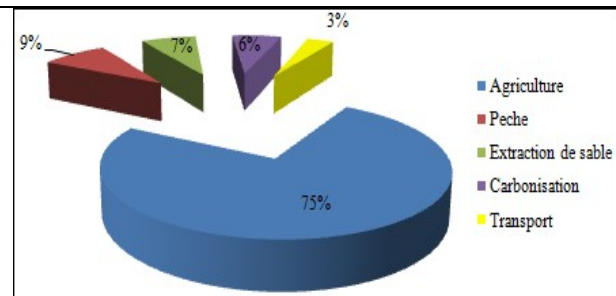
Pie chart 2. Comparative assessment of the Makona River landscape of the 80s and 90s compared to the current



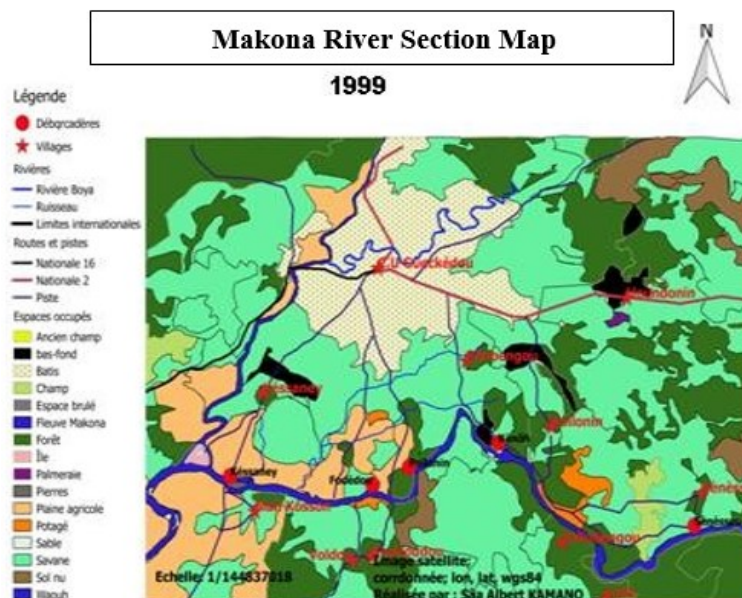
Histogram 1. Statistics of fishing gear encountered on the Makona River in an urban commune



Histogram 2: Percentage of bags of charcoal obtained by landing stages and by month on the Makona River in the urban commune of Gueckédou



Pie chart 3: Frequency of human activities along the Makona River in the urban commune of Gueckédou



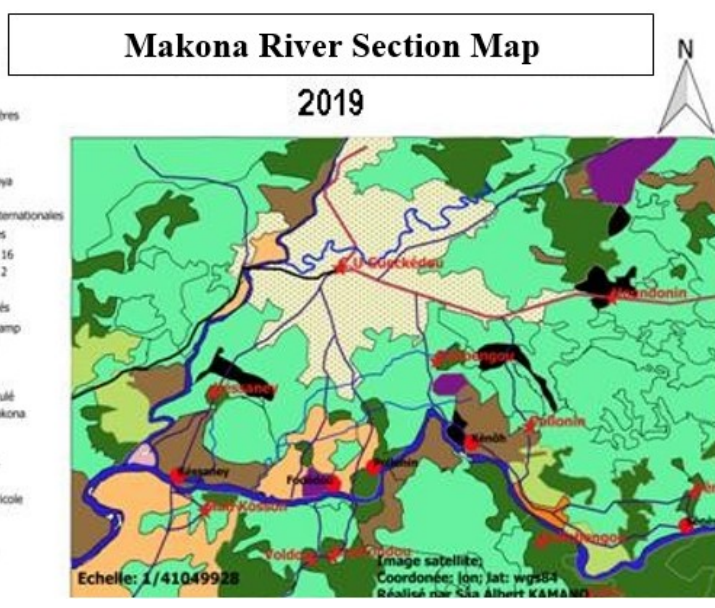
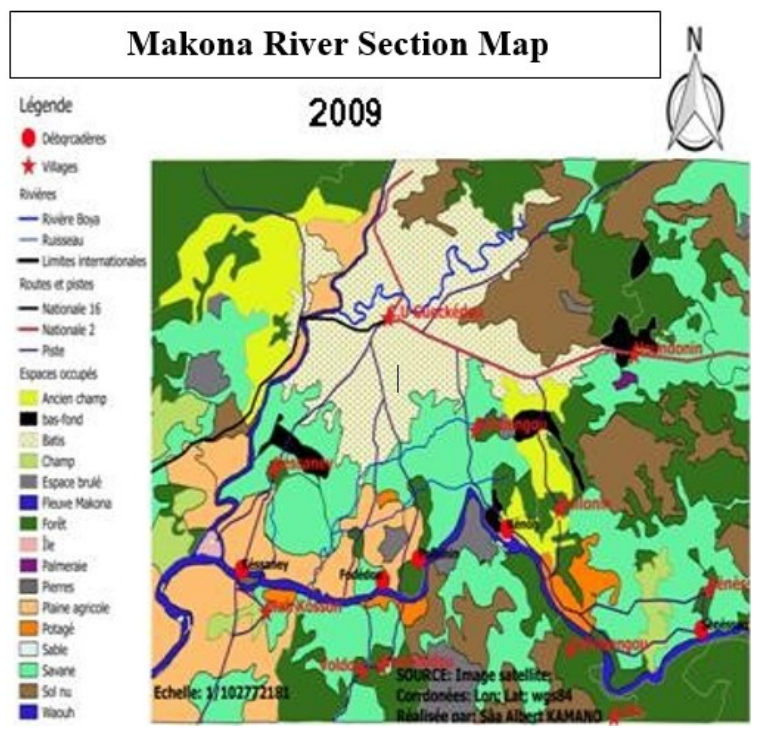


Table 1. Assessment of the impact of human activities on the Makona River and proposal of some corrective measures

Activities	Consequences		Corrective actions
	immediate	distant	
Agriculture	The loss of natural habitats; shoreline erosion; silting up of the waterway	Global warming by deforestation, Gradual decrease in the depth of the watercourse by silting up and intensive flooding.	Use organic fertilizers in agriculture and stop the use of pesticides; To leave a significant margin between the banks and the fields; To reforest the banks of the Makona River
Fishing	Decrease in resource stock	Disappearance of certain species of fish fauna; disturbance of the ecological balance	-Stop the use of monofilaments in fishing and prohibited fishing practices
Sand mining	Increased water turbidity and destruction of spawning areas		- Prevent activity at the beginning and towards the end of the rainy period. - Desilting the watercourse in the middle of the dry season;
Carbonization	Destruction of plant cover	Disappearance of plant cover; Surface water warming	Set up techniques for the production of bio-gauze for the kitchen; - Limit the production of coal on the bank;
Transportation	Destruction of the living environment of fish	Migration of aquaticspecies	- To increase security measures in the transport of people and their goods; - Build the bridges

Table 2. Recommendations

Entity	Proposed Measures
In the state	<ul style="list-style-type: none"> <li>To apply the law in all its rigor on the loggers</li> <li>Encouraged the reforestation of river banks</li> <li>To provide biogas production techniques for cooking</li> </ul>
To the authorities of the Prefectural Directorate, Fisheries, Aquaculture and Maritime Economy of Gueckédou	<ul style="list-style-type: none"> <li>To continue the verification of the gear and the fishing techniques used and to sanction any form of prohibited fishing,</li> <li>To train fishermen on the environmental impacts of the use of monofilaments, small-mesh gear, and ichthyotoxins</li> </ul>
To the authorities of the prefectural directorate of the environment and water and forest of Gueckédou	<ul style="list-style-type: none"> <li>Increase surveillance of large forest areas in general and the banks of waterways in particular; -To find a limit of (250m) for the practice of activities likely to degrade aquatic ecosystems; - To prohibit the use of chemicals (herbicides and fertilizers) on the banks of rivers</li> </ul>
To the authorities of the town hall of Gueckédou	To find for urban and rural populations other garbage dumps other than waterways
At the Prefectural Directorate of Agriculture of Gueckédou	To promote organic farming and sustainable agriculture on the banks
To actors at all levels	To listen to and put into practice the advice given by the authorities to which they are attached.

and 9°18' north latitude (Archives of the Gueckédou Town Hall 2018).

## Methods

The objective of this study was to assess the influence of human activities on the fish species of the Makona River in the urban commune of Gueckédou and to propose corrective measures for an effective and sustainable management of resources. The following methodology was adopted (1-Field survey, 2Identification of landing stages, 3-Inventory of anthropogenic activities, 4-Inventory of ichthyofauna., 5- Identification of physical parameters, 6- Mapping of the study section of the river, 7- Evaluation of the impact of activities, 7- Proposals of corrective measures for sustainable management of resources).

## RESULTS

### Field investigationa)

#### a)With executives and analysis of archives

The consultation of the executives of the Prefectural

**Economy (DPPAEM):** informed us of the existence of 6 main rivers of Gueckédou: LaMakona La Waouh: La Mafissa La MelliTheMallou: The Boya:

The search of the archives allowed us to obtain the situation of the landing stages on the Makona and the annual landings of freshwater fish in the prefecture of Gueckédou recorded in table 3 and curve below.

**Curve: Annual landing of freshwater fish in the prefecture of Gueckédou from 2010 to 2018:** From this curve, we notice a slight increase in production activities in the prefecture, namely sand extraction and gold from 2010 to 2011 which would be justified by the panning which has just started at the intersection of the involvement of a small number of fishermen which evolved Makona river and the river mèli its tributary: during the year 2011. demic, Ebola virus haemorrhage in the prefecture. The survey conducted with the executives of the Prefectural Directorate of Mines and Geology of Gueckédou made us understand that there are currently two (2) main mining

**Pie chart 2:** Comparative assessment of the Makona River landscape of the 80s and 90s compared to the current years.

**Pie chart 1:** Sand extraction rate on rivers in the municipality of Gueckédou in 2018.

**Histogram 1:** Statistics of fishing gear encountered on the Makona River in an urban commune.

**Histogram 2:** Percentage of bags of charcoal obtained by landing stages and by month on the Makona River in the urban commune of Gueckédou

**Pie chart 3:** Frequency of human activities along the Makona River in the urban commune of Gueckédou

**Mapping of the study section of the river:** To confirm the result of the comparative evaluation carried out with the actors, we carried out the mapping of the study area and obtained the following images.

Assessment of the impact of activities on fish life in the Makona River. Anthropogenic activities carried out in any ecosystem have some consequences on the fauna and flora of this ecosystem. These consequences can be immediate or distant depending on the nature and degree of intensification of the activity.

To maintain the health of our freshwater ecosystems, we recommend From this table, we hope that if all these recommendations are taken into account, the banks of the rivers of Gueckédou will recover and we will obtain a perfect ecological balance, a rich and varied biodiversity and an inexhaustible source of protein.

## CONCLUSION

Our scientific research has shown that human activities on the banks of the Makona are changing intensely in relation to population growth. This development has increased pressure on the Makona River and its resources. Agricultural activity and carbonization have a greater impact on this ecosystem through deforestation, the alteration of shorelines and the ecological imbalance they cause.

We note the regression of gallery forests along the watercourse, giving way to savannah. The inventory of ichthyofauna has shown a strong threat to the ecosystem at the level of the Makona River and we estimate that these threats of disappearance of fish species and habitats will increase in the years to come, if the ambition of the installation of the Kenô hydroelectric dam in pôbengou and the extraction of gold take place in and along the Makona.

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