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Resource-Use Conflicts in the Bamboung Marine Protected Area (Fatick, Senegal)

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Abstract

Against a backdrop of restrictions on the exploitation of fishery resources in the Bamboung Marine Protected Area (BMPA) established in village territories, this study analyses the characterisation of conflicts between the various stakeholders around this Marine Protected Area (MPA) in Senegal. The methodological approach consisted of semi-structured surveys of specific socio-professional categories and local administrative services, and the surveys were carried out on a sample of 100 people. The surveys focused on the socio-economic structure of the respondents and the relationships that exist between these different groups of players, the players involved in the governance of natural resources in the area, the types of conflicts that exist and the methods used to resolve them around the BMPA. The results showed a predominance of fishermen (35%) and women processors (29%) in the study area. The devastation of food crops (33%) and land conflict (22%) are the most important sources of conflict over natural resources, according to surveys. This devastation of crops is mainly caused by wildlife, and the main wildlife species responsible for the damage are monkeys, granivorous birds, baboons and warthogs. The spatial distribution of these species varied significantly between villages (p-value < 0.001). The study also revealed that 49% of women were completely unaware of the process for selecting members of the management committee, while 51% of men felt that there was no transparency in the process. In addition, 40% of the conflicts surrounding the management committee were linked to noncollegial decision-making, with the chairman often imposing decisions without prior consultation of committee members, and 22% of respondents complained of poor distribution of the resources generated by the management of the Keur Bamboung camp. The dispute resolution body most

often called upon was the traditional authority in the villages, demonstrating the effectiveness of this body as a means of regulation. However, conflicts relating to land and wildlife remain unresolved sources of conflict in the area. These results underline the need to strengthen the power of local authorities to deal more effectively with these conflicts surrounding the BMPA.

Keywords

Bamboung Marine Protected Area, Conflict, Management Committee, Natural Resources, Senegal, Surveys, Stakeholders

1. Introduction

Coastal areas, particularly wetlands, due to their growing global importance, are among the richest and most productive ecosystems on the planet because of their high biological diversity. They are biologically diverse and highly productive environments [1]. These environments provide ecosystem goods and services, thus conferring major socio-economic importance for local communities [2]. Faced with growing risks of degradation and strong ecological pressures, natural resources have been overexploited globally for at least two decades [3] [4]. The international community has become aware of the scarcity of resources, giving rise to the concept of ecosystem conservation during the second half of the 19th century [5]-[7]. Protected areas were created with a view to limiting the degradation of resources, mainly caused by humans, and, in so doing, protecting societies themselves from the harmful consequences of their practices [8]. In this difficult context, combining socio-economic and ecological imperatives, Marine Protected Areas (MPAs) were created in Senegal in response to the recommendations of the fifth World Parks Congress of the International Union for Conservation of Nature (IUCN) in September 2003, which recommended protecting at least 5% of the national coastal and marine area [9]. Between 2004 and 2014, Senegal established seven MPAs covering a total area of 206,162 ha, with the aim of preserving marine biodiversity, rebuilding habitats and improving the living conditions of local communities. Marine protected areas are part of the broader paradigm of biodiversity conservation: restoring biological diversity in reserves coupled with plans to manage human activities in sensitive ecosystems. Their establishment coincided with the experimentation of the co-management approach in fisheries, and they have therefore emerged as a prime area of application for participatory governance [10] [11].

In the Saloum Delta Biosphere Reserve (RBDS), where the Bamboung Marine Protected Area (BMPA) is located, the interests of stakeholders and stakeholder groups in natural resource management are diverse and not always compatible, depending on whether the stakeholders are the State and its decentralised structures, local authorities, local populations, private operators, non-native popula-

tions, NGOs or projects. This divergence of interests is the cause of conflicts that may be internal, pitting stakeholders from the same institutional structure, social group or organisation against each other, or external, pitting stakeholders from different institutional structures, social groups or organisations against each other [12]. Conflicts in conservation can be defined as "situations that arise when two or more parties with opposing views clash over conservation objectives and when one party is perceived as promoting its interests at the expense of another" [13]. Conflicts do not only pit human actors against each other; there are also those that involve wildlife and have repercussions on conservation activities. Human conflicts over wildlife are very old, but today they pose a growing challenge to conservation managers throughout Africa [14]-[16]. According to [17], human-wildlife conflicts (HWC) arise when the basic needs of wildlife conflict with those of humans, resulting in negative consequences for both communities and animals. This makes it difficult to reconcile the use of wildlife between livestock farmers and crop farmers. The latter are victims of predation of their livestock and damage to their crops by wild animals, some of which are on the list of protected animals. Human conflicts over wildlife arise when the needs and behaviour of wild animals have negative impacts on human objectives and when human objectives conflict with the needs of animals. Wild animals ravage crops, injure or kill domestic animals, and threaten or kill humans [18]. Despite their sometimes participatory nature, MPAs are rarely examples of successful implementation of decentralised natural resource governance. This is particularly evident in the recurring conflicts between management bodies and different social groups [10]. It is in this context that this study on conflicts over natural resources is being conducted in one of the first MPAs created in Senegal, the Bamboung Marine Protected Area (BMPA). The study asks the following questions: 1) What is the socio-professional and demographic distribution of stakeholders around the BMPA? 2) What are the main conflicts related to the use of natural resources in the BMPA? 3) Are the different categories of stakeholders properly involved in the local governance of the BMPA? 4) What are the traditional and institutional mechanisms for conflict resolution in the BMPA? To answer this series of questions, the study's overall objective is to contribute to the characterisation of conflicts between the different stakeholders around the Bamboung Marine Protected Area. Specifically, this involved: 1) Analysing the socioprofessional and demographic distribution of stakeholders around the BMPA; 2) Studying the main conflicts related to the use of natural resources in the BMPA; 3) Determining the involvement of different local stakeholders in the governance of the BMPA; 4) Studying the mechanisms for conflict resolution in the BMPA. To meet these objectives, the following hypotheses were formulated: 1) The socio-professional structure of the local population significantly influences the nature and frequency of conflicts related to the BMPA; 2) The lack of transparency and communication on the part of the management committee causes conflicts between stakeholders and this management body in the area; 3) Traditional conflict resolution mechanisms remain predominant but are insufficient to

manage recurring conflicts related to anthropogenic pressures.

2. Materials and Methods

2.1. Presentation of the Study Area

The Bamboung Marine Protected Area (BMPA), created in 2004 by Decree No. 2004-1408 of 4 November 2004 establishing five marine protected areas, covering an area of 7,000 ha, is located in the Saloum Delta Biosphere Reserve (RBDS). The Bamboung bolong (13˚50N and 16˚33W), a tributary of the Diomboss, is one of the three main branches, along with the Bandiala and the Saloum. Administratively, the BMPA is located in the district and commune of Toubacouta, which is part of the department of Foundiougne in the Fatick region. It encompasses thirteen (13) villages: Toubacouta, Sourou, Dassilamé Sérère, Bany, Soukouta, Sangako, Médina Sangako, Sandicoly, Béthenty, Bossinkang, Sipo, Missirah and Némabah (**Figure 1**).

These villages are part of the larger group of islands in the Saloum Delta, a UNESCO World Heritage cultural site. The localities of Béthenty, Bossinkang and Sipo are only accessible by river due to their insularity [19].

The terrain of the municipality of Toubacouta is generally flat, but there are a few depressions in the valleys and along the various watercourses, the most important of which is the Néma valley.

The commune has a tropical Sudano-Guinean climate characterised by two main seasons: a rainy season from mid-June to mid-September and a dry season lasting nine months. Temperatures vary between 20˚C and 35˚C. Since 1984, the year that marked the end of the drought cycle in this local community, rainfall has stabilised at around 700 mm, with peaks of over 1000 mm per year [20].

The soils are of the following types: leached and unleached ferruginous tropical soils (58%), *Deck-Dior* soils (25%), *Deck* (hydromorphic) soils (9%) and tannic, acidic and saline soils (5%).

The fauna identified in the Bamboung MPA area is very rich and varied [19]. It includes:

Warthog (*Phacochoerus africanus*), Spotted Hyena (*Crocuta crocuta*); Jackal (*Canis adustus*);

Sitatunga (*Tragelapus spekei*); Vervet monkeys (*Cercopithecus aethiops*); Patas monkeys (*Erythrocebus patas*); Senegal galagos (*Galago senegalensis*); Guinea baboons (*Papio papio*); Genets (*Genetta tigrina* and *Genetta thierry*) and a wide variety of birds. In terms of fishery resources, Mugilidae, Carangidae and Sciaenidae are the most common species. However, it should be noted that 79.13% of individuals are represented by Mugilidae, Clupeidae and Gerreidae. The fishery resources inventoried at this site consist mainly of molluscs, crustaceans and fish [19].

It is characterised by the presence of woody and non-woody species. A total of 154 plant species have been inventoried in the BMPA (MPA 2019 annual report): the dominant species are *Cordyla pinnata* (dimb), *Khaya senegalensis* (caïlcédrat),

and *Parkia biglobosa* (Nété). Other species include *Cola cordifolia (Cola)*, *Prosopis africana* (*Ir*), *Detarium senegalensis* (*ditakh*), *Adansonia digitata* (Baobab), *Sclerocaria birrea* (*Beer*), *Neocarya macrophylla* (*New*), etc. In addition, there is a particular type of vegetation on the islands and in the estuaries in the riverine area: the mangrove ecosystem, consisting of mangrove species including *Rhizophora racemosa*, *Rhizophora mangle*, *Avicennia africana*, *Conocarpus erectus and Laguncularia racemosa*.

Socio-economic activities include fishing, agriculture, beekeeping, tourism and trade.

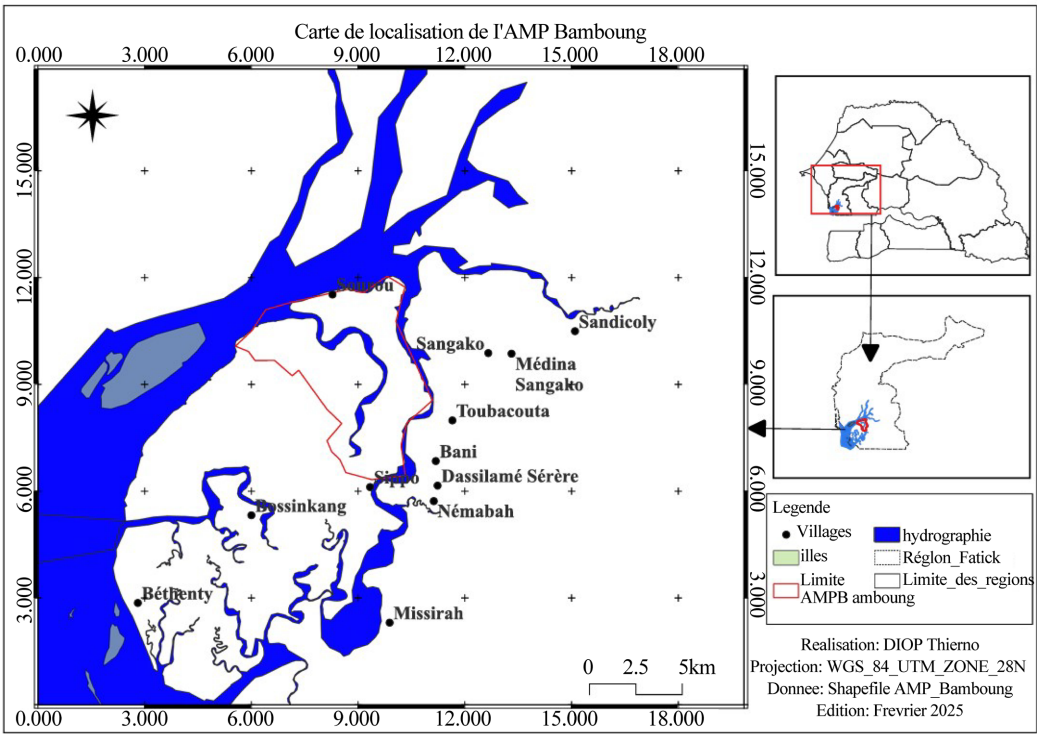

Figure 1. Location of the study area and villages.

2.2. Materials and Methods

2.2.1. Sampling Method

Out of a total of thirteen (13) villages centred around the Bamboung Marine Protected Area (BMPA), nine (09) were selected in a participatory and inclusive manner. The selection of villages was based on the intensity of conflicts between the various stakeholders. The selection was based on participatory mapping and exploratory interviews with key informants (BMPA agents, management committee members and community leaders). The nine villages selected (Toubacouta, Soukouta, Sourou, Bany, Dassilamé Sérère, Missirah, Bossinkang, Sipo and Sandicoly) had both a high frequency of documented conflicts and a diversity of conflict types (land, human-wildlife, organisational), thus allowing for a representative comparative analysis of the study area (**Figure 2**).

A snowball survey was conducted. This involved initially identifying a few key

individuals, who then recommended other individuals whose main activities were centred around the BMPA. All surveys were conducted with the informed consent of the participants.

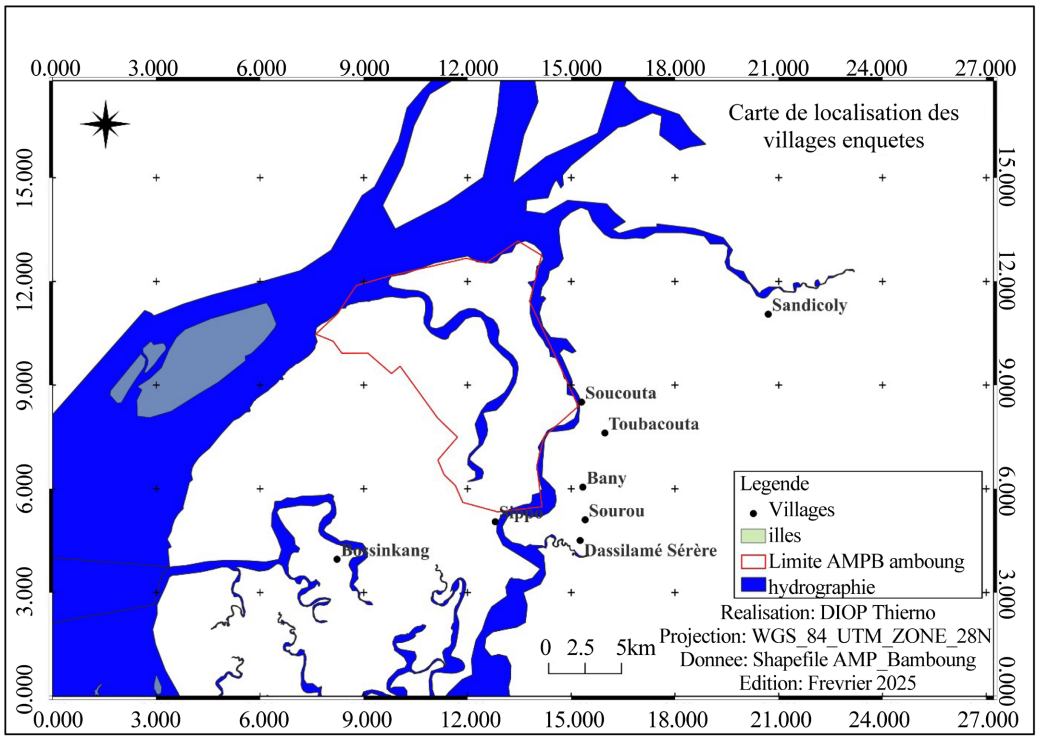

Figure 2. Villages selected for the surveys.

The total sample size (n) was obtained using the normal approximation of the binomial distribution [21], the formula for which is given below:

$$n = p(1-p)\frac{\mu^2_{1-\frac{\alpha}{2}}}{d^2} \quad (1)$$

n: Sample size to ensure good statistical representativeness of the population.

$\mu^2_{1-\alpha_2}$: Critical value of the normal distribution for a risk α. With a confidence level of 95%, we obtain a value equal to 1.96. d: Margin of error tolerated in the estimate set at 6% or 0.06 for this study.

p: Estimated proportion of the population exhibiting the characteristic under study, *i.e.* the existence of conflicts in the study area. To determine the value of p, a pre-sampling was carried out among thirty (30) people from the nine selected villages, of whom twenty-seven (27) confirmed the existence of conflicts, *i.e.* p = 0.9.

$$n = 0.9(1-0.9)\frac{1.96}{0.06^2} \quad (2)$$

$$n = 96$$

The sample size was therefore rounded up to 100 respondents in the nine vil-

lages (Table 1).

Table 1. Number and proportion of respondents per village.

Villages	Number of respondents surveyed	Proportion
Toubacouta	12	12
Soukouta	7	7
Sourou	9	9
Bany	10	10
Dassilamé Sérère	16	16
Missirah	13	13
Bossinkang	10	10
Sipo	10	10
Sandicoly	13	13
Total	100	100

2.2.2. Data Collection

A structured questionnaire was administered to the various stakeholders involved in the Bamboung Marine Protected Area (BMPA), mainly fishermen, farmers, processors, etc. At the same time, an interview guide was developed to collect qualitative information on conflicts in the area. These interviews were conducted with local administrative authorities, including the sub-prefect of the Toubacouta district, the mayor of the municipality of Toubacouta, the president of the Local Development Support Committee (CADL), the head of the Toubacouta water and forestry office, representatives of the livestock and fisheries services, the coordinator of the Toubacouta Local Artisanal Fisheries Council (CLPA), and development partners such as the NGO Nebeday in Toubacouta.

To conduct this study effectively, semi-structured interviews were carried out with the people surveyed to find out, among other things (Figure 3):

Figure 3. Surveys of stakeholders involved in BMPA.

- The socio-economic structure of the respondents and the relationships that exist between these different groups of stakeholders;
- The actors involved in the governance of natural resources in the BMPA;
- The types of conflicts that exist and the methods used to resolve them around the BMPA;
- The relationships between the various authorities present in the study area.

The information obtained at the end of this work provided a deeper understanding of the mechanisms for managing natural resources and the processes for managing conflicts in the marine protected area. This approach was supplemented by direct observations in the field and a fairly exhaustive literature review.

2.2.3. Data Processing

QGIS version 3.32 software was used to map the study area. The questionnaire was designed using the KoboToolbox platform, while data collection was carried out using the KoboCollect application.

The data collected from respondents during the interviews was processed and analysed using Excel and R 4.4.0. Excel was used to design graphs for the presentation of the results. In addition, Khi² independence tests followed by correspondence factor analysis (CFA) were applied to classify villages according to the wildlife species present in the area.

3. Results

3.1. Characteristics of the Respondents

In socio-professional Soukoil terms (Figure 4), the survey results showed that the majority of the socioprofessional hierarchy is structured as follows: Fishermen (35%), Processors (29%) and Farmers (14%). Furthermore, women are mainly involved in the processing of fishery products.

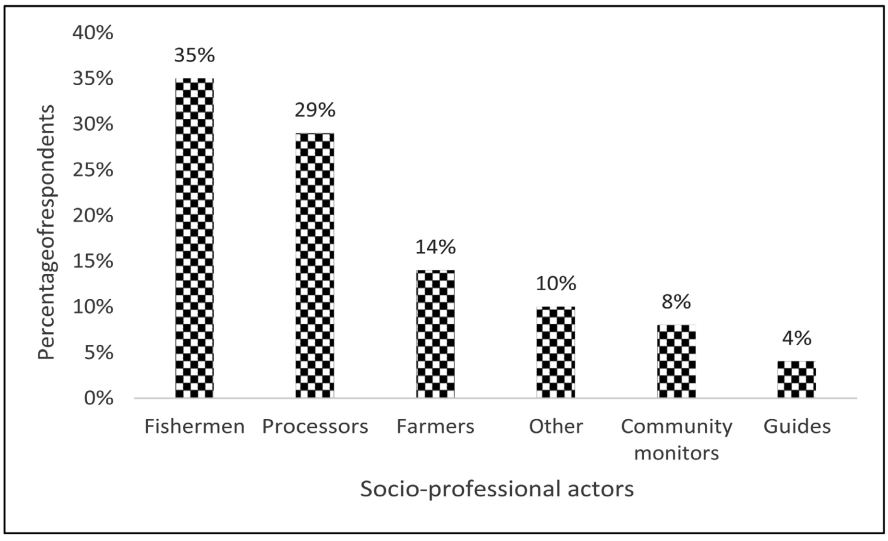

Figure 4. Distribution of respondents by professional category.

In terms of age group, the results (Figure 5) showed that 60% of respondents were aged between 31 and 60, falling into the 31 - 45 and 46 - 60 age brackets. The most represented age group was 46 to 60.

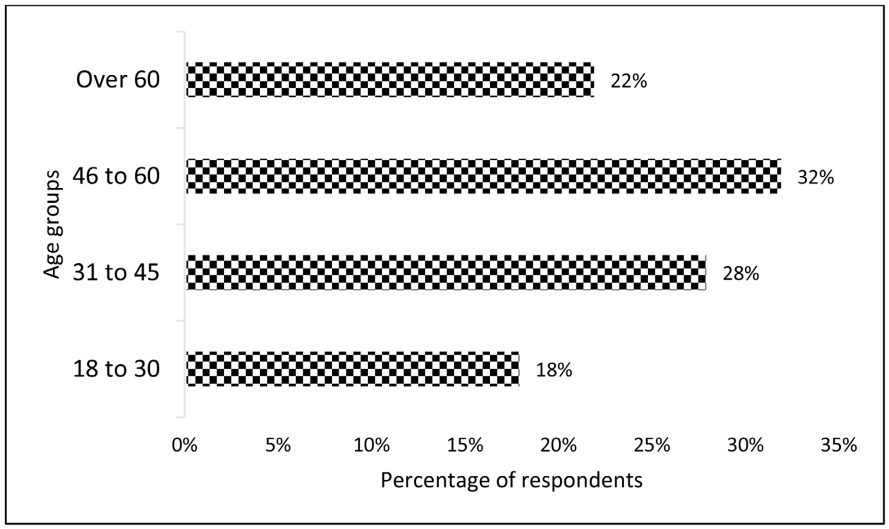

Figure 5. Distribution of respondents by age group.

The distribution of respondents by ethnicity highlights a predominance of Serers (57%), followed by Socès (32%). Figure 6 shows the different ethnic groups present in the villages around the BMPA.

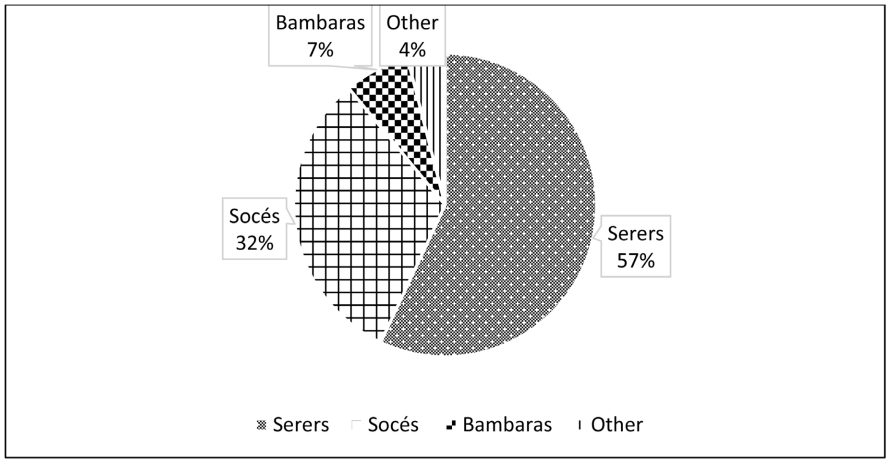

Figure 6. Distribution of respondents by ethnicity.

Figure 7 illustrates the distribution of participants according to their educational background. It should be noted that the term "Koranic school" here refers to religious or complementary education, distinct from formal levels of education (primary, secondary, etc.). Although it does not belong to the traditional school system, this type of education is of considerable cultural and social importance within the community studied. Thus, 45% of respondents reported having attended

a Koranic school

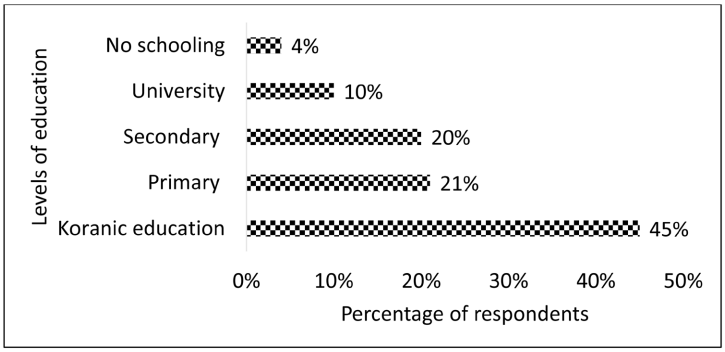

Figure 7. Educational background of respondents.

3.2. Organisational Conflicts Surrounding the Management Committee

3.2.1. Selection of Management Committee Members

The survey results (**Figure 8**) revealed that 49% of female respondents were completely unaware of the committee member selection process, while 51% of male respondents felt that there was a lack of transparency and fairness in the process and choice of members for the management committee.

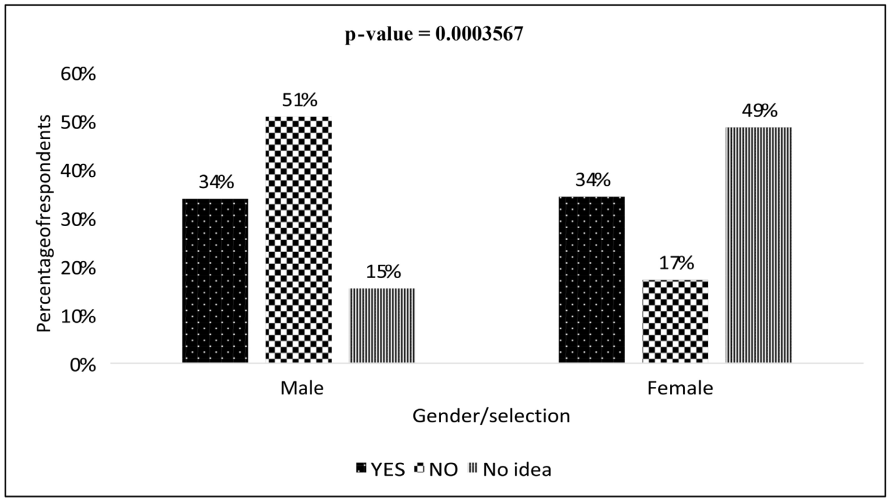

Figure 8. Stakeholders' perceptions of the selection of management committee members by gender (n = 100).

3.2.2. Causes of Organisational Conflicts

The surveys revealed that most of the conflicts between communities and the management committee are due to non-collegial decisions (40%) taken by the chair of the management committee without consultation with the management committee. The lack of transparency in the distribution of resources from the management of Campement Keur Bamboung and the closure of the bolong are other causes of conflict between stakeholders and the management committee. They account for 22% and 21% conflicts related to committee management, re-

spectively (Figure 9).

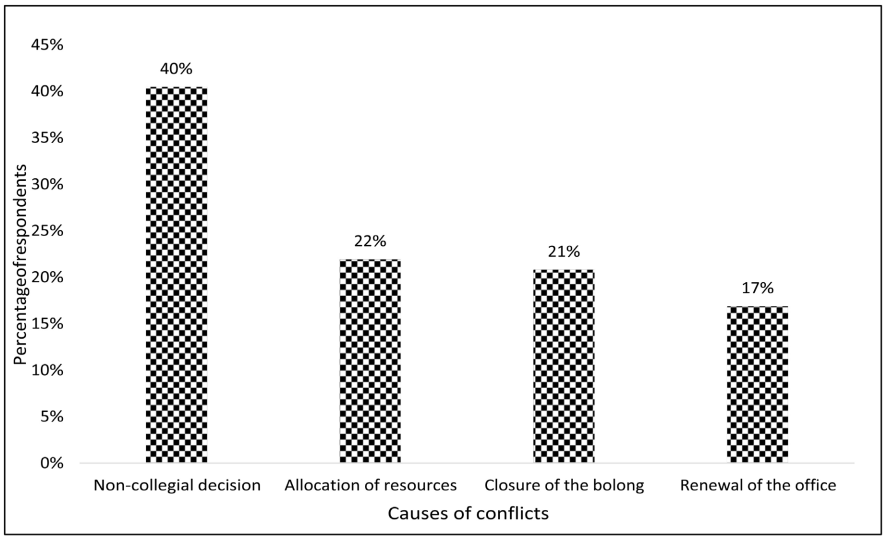

Figure 9. Causes of organisational conflicts between the community and the management committee.

3.3. Conflicts of Use and the Stakeholders Involved

3.3.1. Sources of Conflict

Figure 10 shows that the destruction of fields is the main source of conflict (33%), followed by land disputes (22%) around the BMPA. Officials challenging fishermen for non-compliance with fishing rules, particularly regarding the wearing of life jackets and net mesh size, accounts for 18% of the conflicts observed in this area.

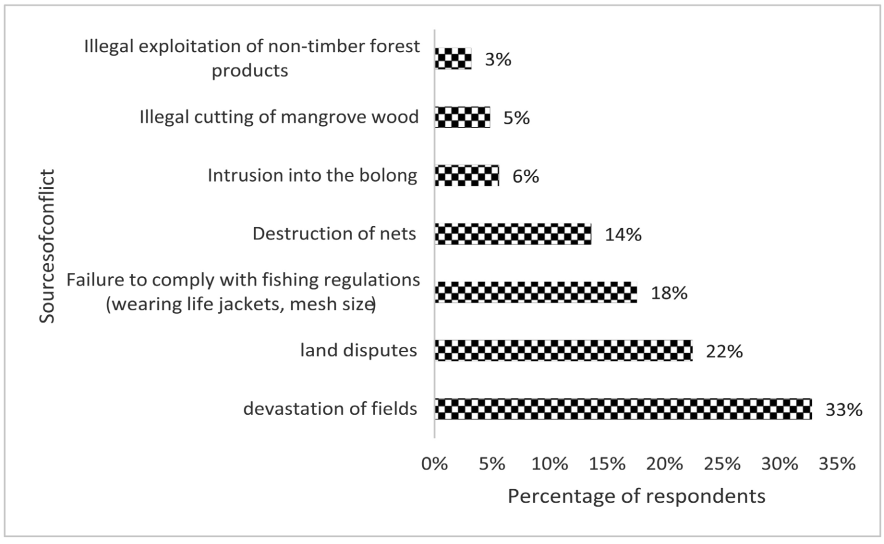

Figure 10. Sources of conflicts of use around the BMPA.

3.3.2. Types of Conflicts

About the typology of conflicts, the survey results (Figure 11) revealed that hu-

man wildlife conflict is the most common (34%), followed by conflict with fishermen (20%).

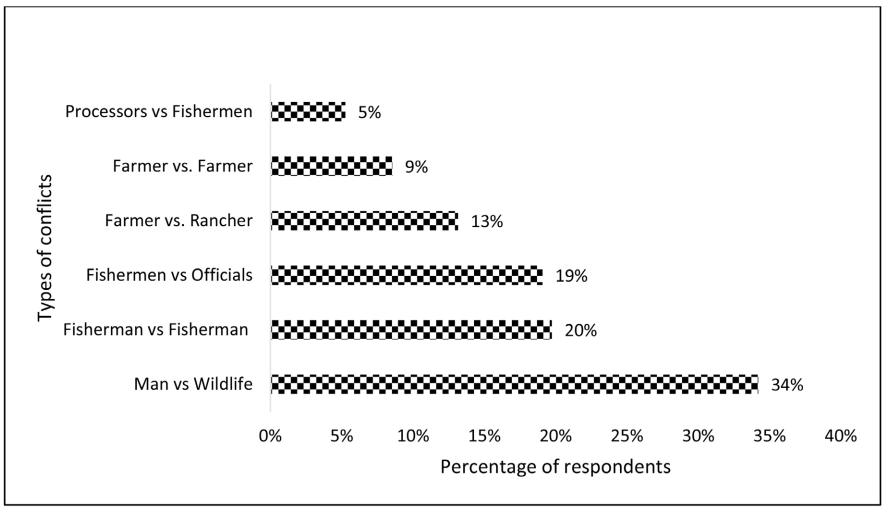

Figure 11. Types of conflicts.

3.3.3. Nature of Conflicts

Figure 12 illustrates the nature of conflicts of use around the BMPA. It should be noted that many conflicts are non-violent (79%).

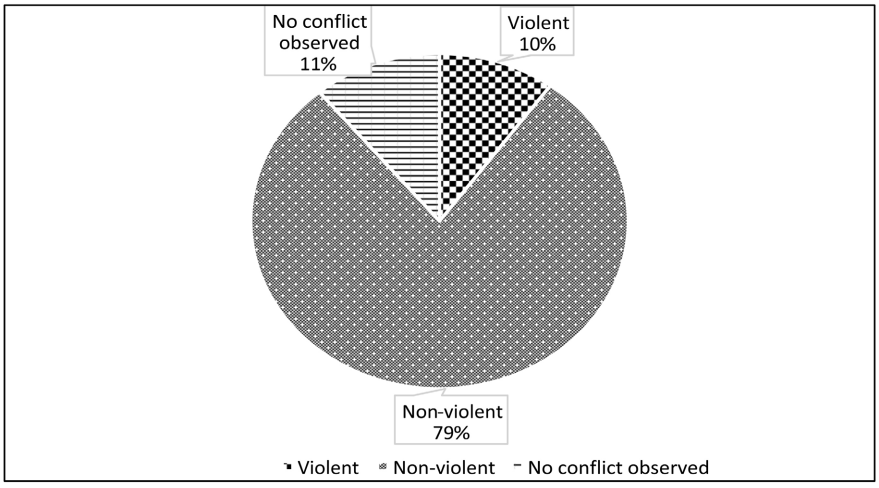

Figure 12. Nature of conflicts.

3.4. Human-Wildlife Conflicts

3.4.1. Distribution of Wildlife According to Village

According to distribution sites, the animals that cause the most conflict with humans in the area are monkeys, baboons, warthogs and seed-eating birds. The damage caused by these animals includes the destruction of crops (**Figure 13**).

The Khi^2 independence test showed a strong dependence between species and villages in the study (*P-value* < 0.001). The factorial correspondence map (**Figure 14**) shows that warthogs are only found in the island villages (Sipo and Boss-

inkang). Baboons, on the other hand, are only found in the villages of Sandicoly, Soukouta and Toubacouta.

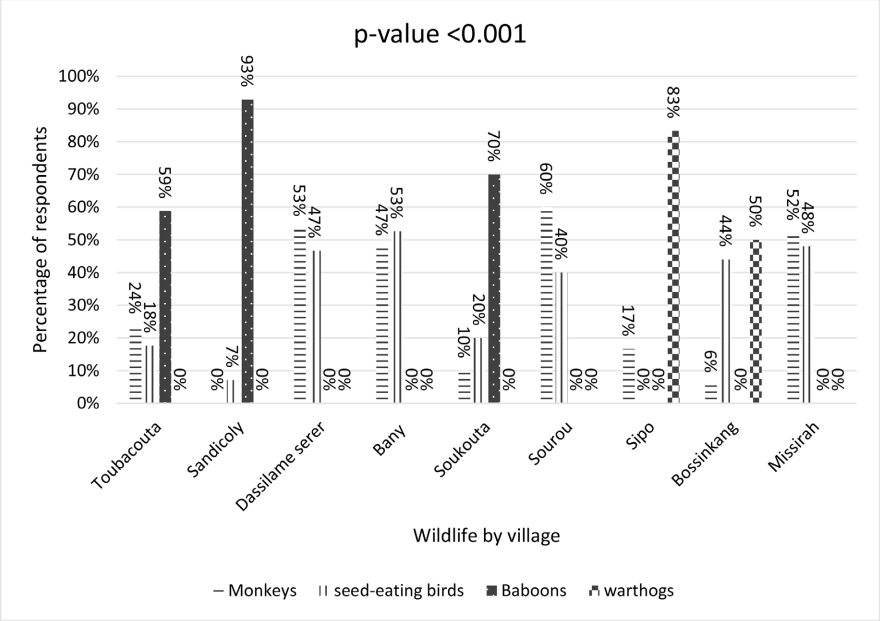

Figure 13. Distribution of wildlife by village.

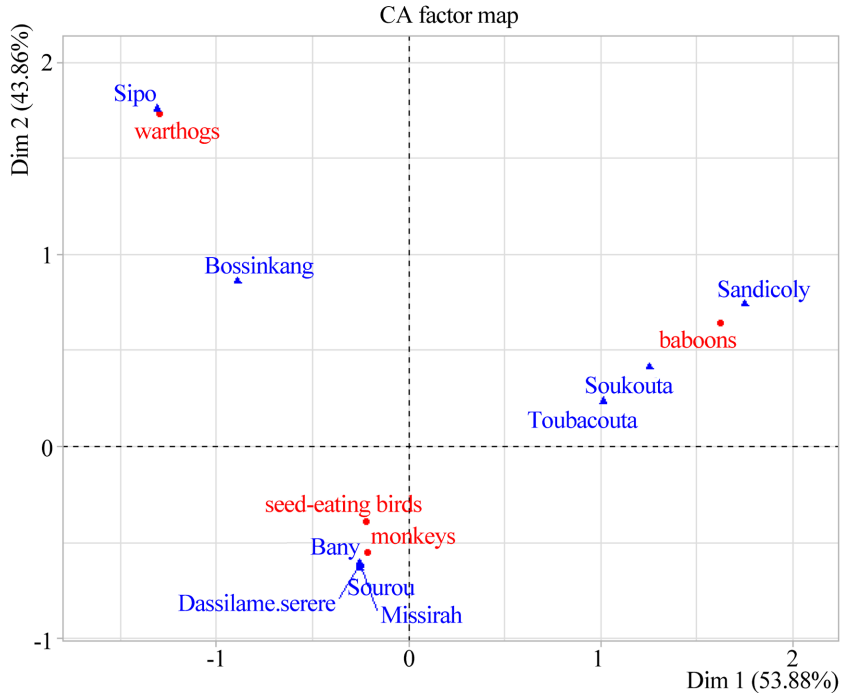

Figure 14. Factorial map of wildlife distribution by village.

3.4.2. Stakeholders' Reactions to CHF

To deal with the damage caused by animals, different reactions (**Figure 15**) were noted during the surveys. It should be noted that no effective solution was found

by the respondents and the request for assistance was the most frequently mentioned by the various stakeholders (35%).

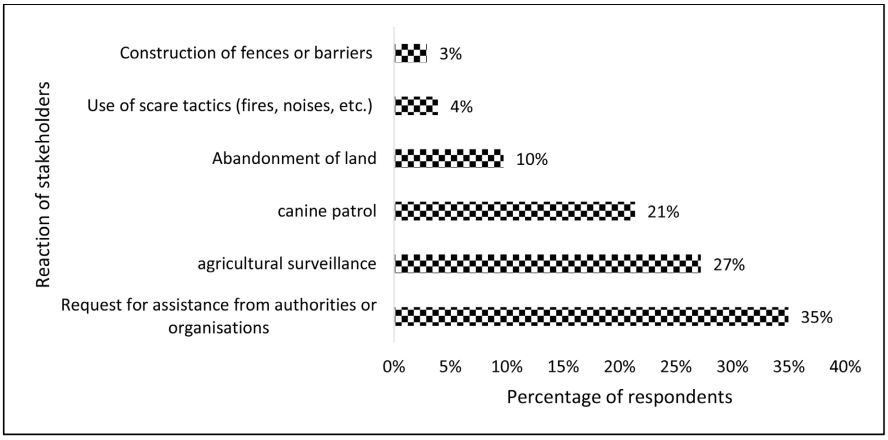

Figure 15. Stakeholders' reactions to wildlife damage.

3.5. Conflict Resolution

3.5.1. Conflict Resolution Bodies

The different resolution bodies in each village are clearly illustrated in **Figure 16**.

Traditional authorities remain the most frequently used bodies for conflict resolution.

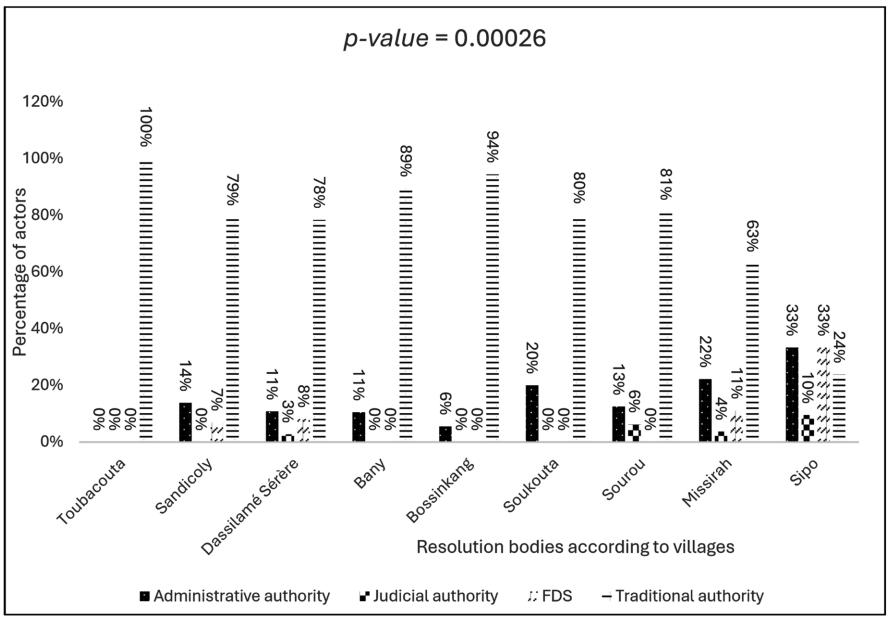

Figure 16. Conflict resolution bodies by village.

3.5.2. Effectiveness of Resolution Bodies

Regarding the effectiveness of the resolution bodies mentioned above, the majority of conflicts are resolved with the consent of the parties involved (72% for processors and 63% for fishermen). However, for farmers, 57% of their conflicts are

not resolved, as illustrated in Figure 17.

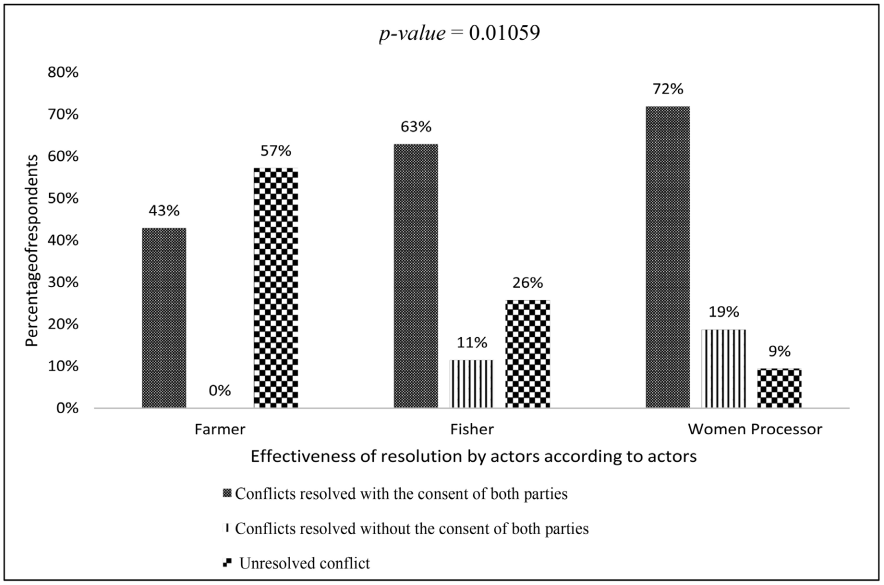

Figure 17. Effectiveness of conflict resolution by actor.

The independence test shows a different level of conflict resolution appreciation among the various stakeholders (p-*value* = 0.01059). The factorial map shows that most of the conflicts observed among farmers are unresolved. On the other hand, most conflicts among fishermen and processors are resolved with the consent of the various stakeholders involved in the conflict (Figure 18).

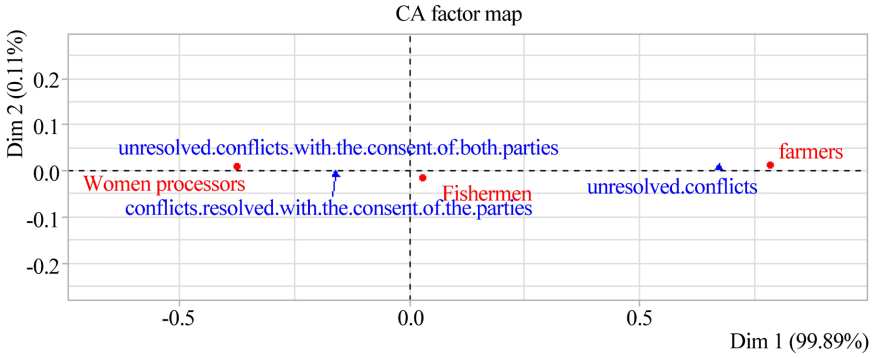

Figure 18. Factorial map of conflict resolution effectiveness by stakeholder.

4. Discussion

4.1. Characteristics of the Actors Surveyed

The results reveal a predominance of fishermen (35%) and processors (29%) in the study area, reflecting a local economy heavily dependent on fishery resources. The three main activities carried out by the populations living around the BMPA are fishing, processing and agriculture. These results corroborate those of [22] [23] respectively in the Saint-Louis and Sangomar MPAs, where fishing is the

main activity. Furthermore, the results showed that women are mainly involved in the processing of fishery products. This observation confirms the study conducted by [24] showing that the fishery and forestry product processing sector is predominantly controlled by women, who account for more than 80% of the workforce.

4.2. Organisational Conflicts Surrounding the Management Committee

The study reveals that 49% of women are completely unaware of the selection process for Management Committee members, while 51% of men believe that there is a lack of transparency in the selection process. The Management Committee, composed of 39 members from 13 riverside villages, should have its representatives elected in a village assembly. In reality, however, it is the village chiefs who make these appointments, which can deprive a significant portion of the population, particularly young people and women, of representation in decision-making bodies (the Management Committee office). These results corroborate those of [25], which highlights the lack of knowledge among women processors about how the management committee operates. He concludes that the lack of representation of the real stakeholders in the MPA (fishermen, women processors, OCEANIUM) is sufficient to criticise the lack of transparency in the process of setting up and operating this committee. It should be noted that Oceanium, a Senegalese association for the protection of marine resources, proposed and led the *Narou Heuleuk* project ("tomorrow's share" in Wolof) to establish the first community Marine Protected Area with the Rural Community of Toubacouta, the Bamboung MPA, with funding from the French Global Environment Facility (FFEM) via the French Development Agency (AFD).

Furthermore, the study showed that organisational conflicts within the management committee are mainly linked to non-collegial decision-making (40%), with the chair often imposing decisions without prior consultation with committee members. In addition, 22% of the people surveyed complain about the poor distribution of resources from the management of the Keur Bamboung camp. These results corroborate those of [11], which reveal that the rare funding received or revenue generated is used to organise meetings and distribute per diem, often among the members of the management committee's bureau.

The closure of the bolong is a major source of conflict (21%). Some resource users claim that the permanent closure of the Bamboung bolong is unfair to them. Indeed, these stakeholders believe that the closure should last no longer than one year. After this period, some of them showed signs of reluctance towards the MPA by violating the established management measures and were arrested and sent to prison before being tried. For them, this measure leads to the death of unexploited shellfish, whose short lifespan makes the closure unnecessary and wasteful. These results are in line with those of [25], who assert that some users want the bolong to be opened on a temporary and rotational basis, contrary to the *DAMPC* and *OCEANIUM*, which favour permanent closure. These two opposing viewpoints

are a source of antagonism due to the conflicting interests and rationales of the various stakeholders.

The management committee has not been renewed since 2020, even though its mandate should be renewed every two years according to the statutes (currently, the term of office is set at three years by a simple majority of votes cast, in accordance with Article 13 of the new Decree No. 2024-790 establishing the rules for the organisation and management of marine protected areas and reserves under maritime influence), is also a point of conflict between the local community and the members of the management committee. This situation compromises the generational succession of co-management teams, as it keeps young people out of the participatory governance dynamic and generates a permanent climate of conflict between internal members and external actors. Surveys have revealed that the youngest member of the current board is over 40 years old. These results corroborate those of [11], which confirm that, beyond the Bamboung MPA, the Joal and Saint-Louis MPAs, after more than fifteen years of operation, are still run by the same chairpersons. This blocks the emergence of new leaders.

The governance failures identified (lack of transparency in committee selection, failure to renew bodies, non-collegial decisions and poor redistribution of resources) exacerbate community conflicts. The low involvement of women and young people in decision-making processes limits the perceived legitimacy of the committee and encourages non-compliance with the rules. This breakdown in dialogue between the management committee and the social base weakens the collective capacity to resolve conflicts of use, transforming technical management problems into crises of lasting legitimacy.

4.3. Conflicts of Use around the BMPA

Crop destruction (33%) and land conflicts (22%) are the most significant sources of conflict according to 55% of the stakeholders observed around the BMPA. Crop destruction is caused by both livestock and wildlife (monkeys, seed-eating birds, baboons, warthogs). Livestock herds grazing close to fields encroach on crops and trample seedlings as they pass through. These phenomena are major concerns for those surveyed. These results corroborate those of [26] in the *Lac Fitri* Biosphere Reserve (Chad), revealing that the real source of conflict is the devastation of fields by livestock (32% of respondents). [27] considers that several animal species have adapted their feeding habits to include crop raiding in order to gain access to a range of energy-rich foods.

Land disputes are also a source of conflict between stakeholders in the BMPA. These conflicts could be explained by the fact that landowners informally lease their land (through a kind of verbal agreement, without a written contract) to people from other areas who want to farm. Sometimes the terms of the agreement are not respected by the tenant, who, after a few years of farming, appropriates the land, applies for title to the local authority and refuses to return the land to its owner, who may later lose their rights. These findings are consistent with those of

[12], who stated that land speculation has become a major problem in the villages of Saloum (Toubacouta).

4.4. Human-Wildlife Conflicts

The results show that the wildlife species responsible for the damage are monkeys, seed-eating birds, baboons and warthogs. The spatial distribution of these species varies significantly between villages (*P-value* < 0.001). Warthogs are only present in island villages, while baboons are absent, probably due to the natural barriers provided by water. These results corroborate those of [17], which reveal that, apart from elephants, the species most responsible for crop destruction around Bénoué National Park in northern Cameroon are seed-eating birds, baboons, warthogs, buffalo and antelopes. No effective measures have been identified to mitigate these conflicts, and 35% of respondents call on the authorities to put compensatory mechanisms in place. Although current mitigation strategies, often based on traditional scare tactics, are proving ineffective in the face of behavioural adaptation by animals. In the absence of robust protection measures, stakeholders express an urgent need for compensatory mechanisms to offset the loss of their food crops, which account for 33% of sources of conflict. The assistance requested by respondents mainly includes: the establishment of a compensation fund for damage caused by wildlife and support for securing agricultural areas with effective fencing.

4.5. Conflict Resolution

4.5.1. Conflict Resolution Body

The study revealed that the most frequently used conflict resolution body is the traditional authority in the villages surveyed around the BMPA. Traditional authority, as used in this study, refers to local customary actors, mainly embodied by the village chief. The latter acts as a first-line mediator and plays a central role in mediating disputes and enforcing ancestral social and land norms. This demonstrates the unquestionable trust and legitimacy of these actors. This method of resolution is based, according to [28], on the intervention of a third party, in this case the village chief, who facilitates negotiation. This form of resolution, considered more democratic than recourse to the courts or arbitration in mediation, is voluntary in nature as it requires the consent of the parties involved. The village chief, who must build trust and allow discussion to develop, must also be more interested in the process of dispute and resolution than in the content of the conflict. He will seek to reach a compromise that is acceptable to all. These results are in line with those of [12], which emphasises that in the villages of the Saloum Delta, the village chief is the first port of call for the protagonists at the village level. He arbitrates conflicts and gives his judgement according to the prerogatives granted to him, based on the rules of customary law accepted by the population because they are better known, and the settlement is reached amicably after negotiation.

In some villages, local rules are established for the resolution of certain conflicts. For example, in the village of Dassilamé Sérère, it is established that the

owner of a herd pays a fine if part of his livestock causes damage to someone else's field (1500 CFA francs for small ruminants and 5000 CFA francs for cattle).

4.5.2. Effectiveness of Resolution Bodies

The results revealed that the majority of conflicts are resolved with the consent of the parties (72% for women processors and 63% for fishermen), highlighting the effectiveness of mediation as a means of regulation, as it opens up opportunities for compromise between opposing interests without causing too much social disruption. This approach makes it possible to tailor solutions to local specificities and to overcome the limitations of legal rules, which are necessarily incomplete, especially in the context of resource management, where several parameters must be considered. These results corroborate those of [26], indicating that many actors manage to find acceptable solutions. This suggests a willingness to cooperate and mutual acceptance of the results of conflict resolution. The acceptance of resolution methods, particularly among livestock farmers, fishermen and farmers, highlights the importance of involving all stakeholders in the decision-making process. However, the results showed that 57% of conflicts among farmers remain unresolved. This could be explained by the fact that the conflicts observed among these actors are mainly related to land and wildlife, which resolution bodies are still unable to resolve in a sustainable manner. The study thus reveals a striking disparity in the effectiveness of conflict resolution: while disputes between fishermen are often resolved by consensus, 57% of conflicts involving farmers remain unresolved. This low-resolution rate can be explained by the structural and technical nature of the conflicts faced by farmers: land disputes often involve informal property issues and external actors, making it difficult to apply customary law without stronger administrative or judicial recognition. In addition, the damage caused by wildlife exceeds the mediation capacity of traditional authorities, who have neither the technical means to prevent it nor the financial resources to compensate for it. Unlike conflicts between fishermen and processors, which are often related to issues of price or compliance with verbal agreements that are mostly transactional and settled through local negotiation.

5. Conclusions

This study on conflicts around the Bamboung Marine Protected Area (BMPA) has highlighted the complex socio-economic and ecological dynamics that characterise this area. The overall objective of this study is to contribute to the characterisation of conflicts between the different stakeholders around the Bamboung Marine Protected Area. The results reveal a predominance of fishing activities among local populations, with conflicts mainly related to natural resource management, management committee decisions, and human-wildlife interactions. Conflicts within the management committee, marked by a lack of transparency and low inclusion of women and young people, highlight gaps in participatory governance. Furthermore, conflicts over land use, particularly crop destruction and

land disputes, reflect the challenges of reconciling conservation and livelihoods. Although conflict resolution mechanisms, such as the intervention of traditional authorities, are widely used by stakeholders, their effectiveness remains limited for certain groups, particularly farmers.

Following this study, a number of recommendations were made to the conservation authorities:

- Establish quotas to ensure the representation of women and young people on the management committee and organise training to strengthen their leadership skills;
- Make the selection process for committee members and the decisions taken public, using accessible communication tools (village meetings, posters, etc.).
- Allow BMPA agents to participate in the selection of management committee members in villages in order to enforce the law and predefined selection quotas (with at least one young person and one woman);
- Strictly apply the statutory rules for renewing the committee to prevent the monopolisation of power and encourage the emergence of new leaders.
- Adapt bolong closure periods in consultation with fishermen to reconcile stock regeneration with economic needs.

Consider compensation mechanisms or economic alternatives (e.g. crops that are less attractive to animals) for damage caused by wildlife.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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