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Urban political ecology of wetland resources in Bamenda town, north west region, Cameroon

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Abstract: Wetlands are unique ecosystems that play a critical role in the preservation of biodiversity and the provision of ecological services. This work on the Urban Political Ecology (UPE) of wetland resources in Bamenda has as objective to examine stakeholder participation and power relations resulting from the exploitation and management of wetlands. It looks at the challenges of wetland conservation in context of rapid urbanization. Using a mixed methods approach and the specific case of Bamenda III municipality, data was collected from secondary and primary sources. A household questionnaire survey was conducted with 150 households while 12 in-depth interviews were carried out with key informants. Data was analyzed quantitatively and qualitative and results were critiqued using the lens of UPE. Results show that between 1988 and 2022, wetlands reduction was more than 6.78%. This reduction is caused by agriculture, land reclamation and expansion of urban infrastructure. As such, Conservation has become a huge challenge due to overlapping responsibilities and an ambiguous regulatory system that focuses on biodiversity conservation only. This has created conflictual power relations and a complexified management system. The UPE approach has revealed that the consideration of socio-economic and cultural ecosystem services in wetland management is key to sustainability.

Keywords: urban political ecology; wetland resources; power relations; resource management; Bamenda; Cameroon

1. Introduction

Wetlands are very important ecosystems with economic, ecological and environmental values. They occupy about 6% of the global land area [1] and occur in a great variety of forms, including areas of salty and fresh waters. Apart from supplying useful products and sustaining the livelihood of the population, they perform vital functions such as carbon storage, water purification and climate regulation [2–4]. Due to its importance, an International Treaty was signed in the city of Ramsar in Iran in 1971 for the conservation and sustainable use of wetlands. By this Convention, wetlands are defined as “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres” [5]. The Ramsar convention as it is called has designated about 600 wetlands of International importance all over the world [6].

Given the rapid growth in the world’s population and concentrations in urban centres, urban and peri-urban wetlands are increasingly at risk of degradation due to anthropogenic pressures. According to UNO [7], it is expected that the world’s population will be about 9.8 billion by 2050 and most of them will live in urban areas. The need to expand construction space will have a negative impact on

wetlands and its resources. However, urban wetlands can either be natural (rivers, lakes, swamps) or artificial such as canals, artificial lakes and water reservoirs [8]. Whatever the nature and either permanent or temporal, these wetlands play a vital role in hosting urban biodiversity, regulating heat, purifying water, reducing the effects of climate, providing recreation and leisure services and providing a resource base for livelihood sustainability [9–11]. Nonetheless, urban wetlands have been highly threatened by unsustainable human activities. Challenges include the loss of biodiversity and water shortages due to land reclamation for the construction of urban infrastructures, pollution by contaminated wastewater and refuse, chemicals from agricultural activities and the planting of trees such as eucalyptus [12,13]. As such, there is a need for the conservation and sustainable use of wetlands. Extant literature on wetlands has focused on resources but failed to analyze the complex judicial systems, ambiguity in the roles of multiple actors and power relations that shape access to wetlands. This scientific gap is bridged in this study using the Urban Political Ecological (UPE) approach.

The Cameroon government signed and ratified the Ramsar Convention in 1987 and in 2006, it gained access to the convention with seven Ramsar wetlands of international importance [14,15]. The implementation of the strategies arrived at is ensured every year by the Conference of Parties (COP) in which Cameroon is an active participant and by the Ramsar Convention Secretariat. At the National level, the legal framework includes law No. 98/005 of 14 April 1998 which lays down regulations governing water Resources and law No. 96/12 of 05 of August 1996 relating to environmental management. The state through this law has transferred the management of these wetlands to decentralized authorities. Bamenda town has several wetlands whose management is ensured by the municipalities. However, challenges in the implementation of laws and attempts to ensure a sustainable exploitation of these resources have resulted in conflicting power relations enshrined within the Urban Political Ecology (UPE) perspective. The environmental management code provides inadequate legal protection for wetlands as it fails to ensure the protection of all wetlands due to their socio-economic importance but rather protects only mangroves and floodplains because of their rich biodiversity [16]. The Ramsar Convention definition of wetlands includes almost all land areas and studies by Tume [16] opines that such considerations could lead to many landuse conflicts in urban areas where land is used for diverse purposes and landowners may not agree its wetland status. Based on this backdrop, this work seeks to examine the role of actors and power relations that influence the sustainable exploitation of wetlands in the urban centres of Cameroon where demographic pressure is on the rise.

2. Theoretical framework

Urban Political Ecology (UPE) is an interdisciplinary approach that examines the relationships between political ecology and environmental change that shape and reshape access to and use of resources in the urban area [17,18]. With rapid urbanization in developing countries, UPE scholars have focused on power relations resulting from unequal access to resources and how the society-nature relations have

led to the production of urban spaces [17]. As such, Wittmer [19] thinks that urban nature is not given but produced by socio-economic, political and cultural values. The Marxist understanding of UPE emphasizes the material conditions of the environment which are manipulated by those in power for their interest without taking into consideration the needs of the population [20]. In so doing, they have focused attention on natural resources in the urban environment and their use as a political instrument [17]. However, this Marxist perspective is based on capitalist discrimination between the rich and the poor, and social class differences between the governing and governed [21].

Recent UPE studies have gone beyond the capitalist perspectives to explain the flow and exchange of material elements, commodities and money in what is termed urban metabolism [8,22]. These material flows result from the interaction between the natural and human societies. Post-structural political Ecology has equally tackled issues of conservation and sustainability and links the re-naturing of cities with cultural ecosystem services [23]. Efforts are made at various levels to ensure resource sustainability and safeguard cultural values. Hence, this work builds on UPE to examine the socio-economic and cultural importance of wetlands and power relations resulting from the exploitation and conservation of wetland resources in urban areas. The consideration of wetlands as a livelihood asset for the urban poor, and as protected by laws and regulations in Cameroon have led to conflicts.

There is growing literature on the UPE of resources such as waste and water in urban spaces [18,19,24–26] but wetlands have not been given considerable attention in developing countries. Wetlands are a critical part of the urban environment that provides enormous ecosystem services. They improve on water quality, sequester carbon, host a wide range of flora and fauna species, reduce the effects of urban heat and create recreational facilities [9,27,28]. Nevertheless, wetlands in urban areas have been seriously threatened by the construction and expansion of urban infrastructures. Attempts to control and regulate wetland management have led to incessant conflicts between stakeholders [11,13,17]. These power relations shaping access to wetland resources and efforts to ensure sustainable exploitation are critiqued under the lens of UPE.

3. Materials and methods

3.1. The study area

Located between latitude 5°56' N and 5°58' N of the equator and longitude 10°09' and 10°11' East of the Greenwich Meridian, Bamenda III municipality is an integral part of Bamenda City in the Mezam Division of the North West of Cameroon (**Figure 1**). The municipality was created by the presidential decree No 2007/115 of 23 April 2007 and it is made up of the Nkwen and Ndzah villages [20]. It has a diverse physical setting that consists of the Ndzah plateau, and the Nkwen escarpment separating the Ndzah plateau from the undulating and well-drained lowlands as well as numerous streams and waterfalls. The lowlands are the flooded plains that comprise the Mbelem, Ntenesoh, Teken, Namoh and Alahie wetlands [12].

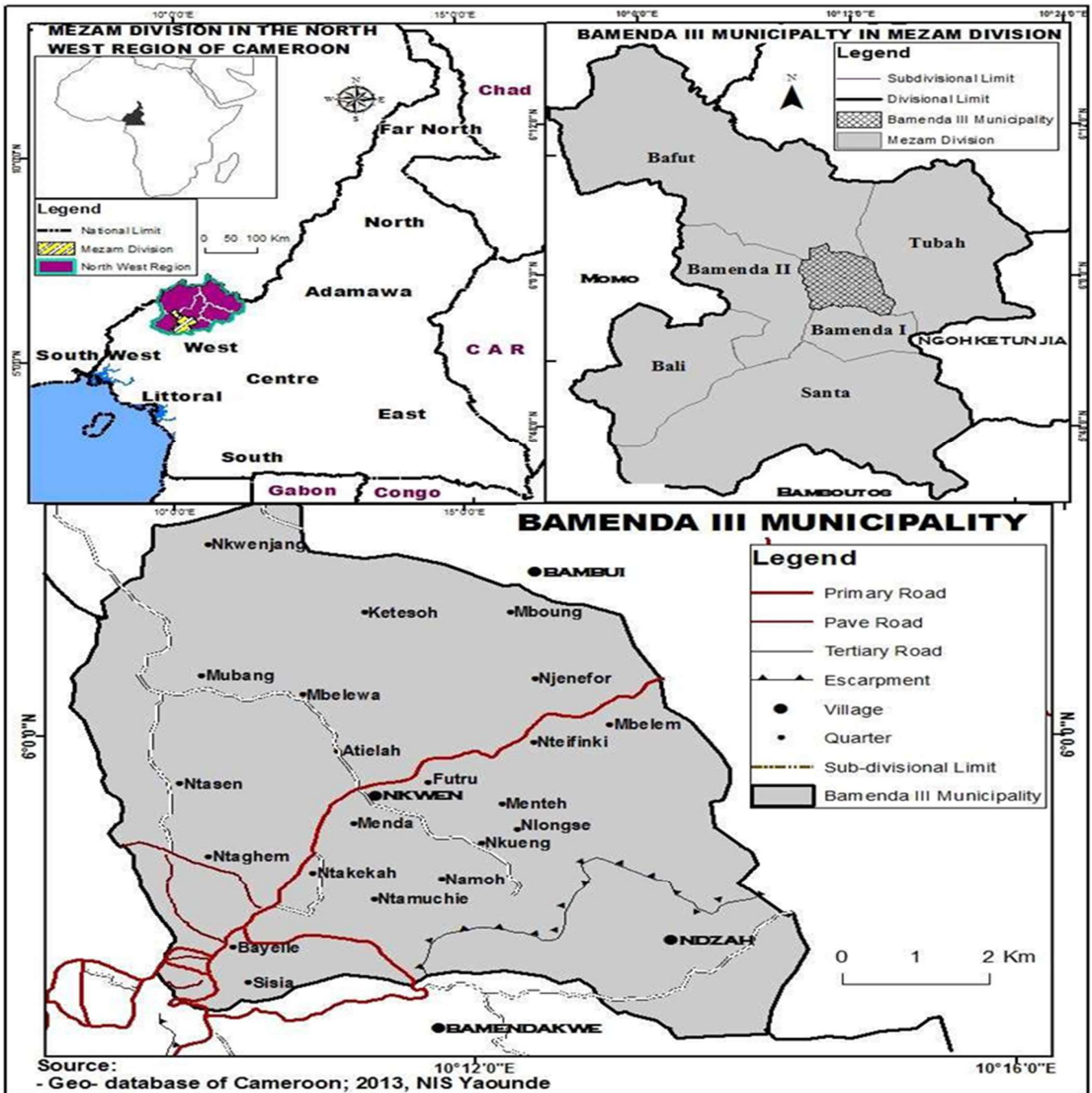


Figure 1. Location of Bamenda III sub division.

Bamenda III falls within the Guinea Savanah type of climate, characterized by two distinct seasons. The rainy season is long and runs from mid-March to mid-October and records annual rainfall amounts between 2000 to 3000 mm while the dry season runs from mid-October to mid-March. Average annual temperatures are about 20 °C [29]. However, recent climatic variability has disrupted the seasonal pattern and the population has perceived a rise in temperatures and a corresponding fall in rainfall amounts over the past few decades [16]. The population was estimated at 120,000 inhabitants and this number has been increasing rapidly due to the high rate of rural exodus, with implications on land use dynamics in the area [30].

3.2. Data collection and analysis

The study adopted a Mixed Research Design by which secondary and primary data were collected. Secondary data was collected from the internet, libraries, reports and archives at the councils and the Divisional Delegation of the Environment and Nature Protection for Mezam. Primary data on the other hand were collected through a household questionnaire survey and in-depth key informant interviews. Given that wetland areas are of different types and sizes, a stratified random sampling technique was used to select 150 households for the survey. Within the five wetland areas, 30% were administered in Teken, 26% in Ntenesoh, 18% in Namoh, 14.7% in Mbelem and 11.3% in Alahlie. This distribution was equally guided by the degree of accessibility, closeness to wetlands and the clusteredness of respondents. The administration of questionnaires was done on the spot by a team of three trained researchers. To supplement the household survey, 12 informant interviews were conducted with quarter heads (5), traditional authorities (2), municipal agents (3) and the Divisional Delegation for Environment and Nature Protection for Mezam (2). Discussions that lasted between 35 to 45 min were recorded with the consent of the interviewees.

Data collected were treated and analyzed quantitatively and qualitatively. Responses from questionnaires were coded and treated with the aid of the Sample Package Statistical Studies SPSS version 20. Results are presented in the form of charts, percentages and tables. Voice notes from interviews were treated using Atlas.ti. version 7.5. First, voice notes were transcribed into text and variables were coded according to the objectives of the study. Second, content and thematic analyses were done based on the groundedness (number of times an idea or a code is mentioned) and the density (number of links between codes) of coded items. In addition, excerpts were equally extracted to support some empirical facts.

4. Results

4.1. State of wetlands in Bamenda III municipality

With a temporal delimitation from 1988 to 2022, a diachronic analysis of wetlands using landsat images for the year 1988, 2001 and 2022 have shown that wetlands in Bamenda III municipality are not static but dynamic, reducing size from 1988 to 2022 (**Figure 2**). Changes are related to landuse dynamics and changing land use patterns over the years due to urbanization (**Table 1**). In 1988, wetlands were very visible in the municipality even in the area of tiny clustered settlements and farming activities were substantial around the center of the municipality. By implication, before 1988, wetlands dynamics was driven more by agriculture activities, but was not significant enough to trigger wetland loss. With agriculture as the main activity, wetland degradation was not rapid. However, wetland encroachment becomes very visible from 2001 till 2022 due to urban sprawl.

Figure 2 shows the evolution in wetlands from 1988 to 2022. This evolution is materialized by a reduction in the surface area of wetlands and the shrinking nature of water bodies. The reduction in the surface area of wetlands is caused the rapid rate of urbanization (**Table 1**).

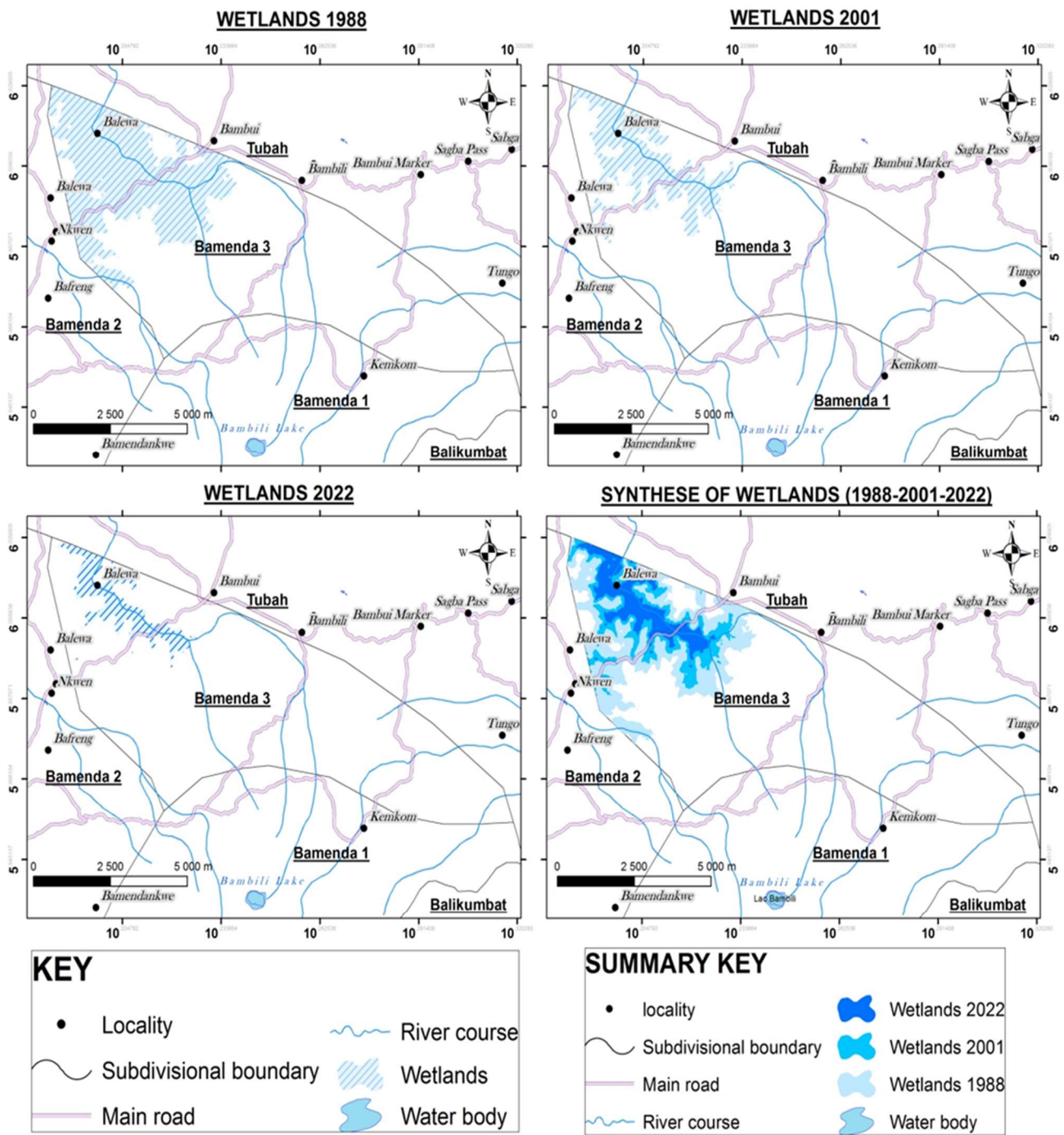


Figure 2. The state of wetlands in Bamenda III municipality 1988 to 2022.

Table 1. Land use dynamic in Bamenda III municipality from 1988–2022.

| Year | 1988 | | 2001 | | 2022 | |
|----------|---------------------------------|----------------|---------------------------------|----------------|---------------------------------|----------------|
| | Surface area (km ²) | Percentage (%) | Surface area (km ²) | Percentage (%) | Surface area (km ²) | Percentage (%) |
| Wetland | 13.58 | 20.49 | 11 | 16.6 | 9.09 | 13.71 |
| Build up | 4.98 | 7.51 | 8.14 | 12.28 | 13.99 | 21.11 |
| Farmland | 21.32 | 32.17 | 22.1 | 33.34 | 19.16 | 28.91 |
| Others | 26.4 | 39.83 | 25.04 | 37.78 | 24.04 | 36.27 |
| Total | 66.28 | 100 | 66.28 | 100 | 66.28 | 100 |

Statistics in **Table 1** are computed from the maps in **Figure 2**. It quantifies changes in land use pattern over the years, revealing that in 1988, wetlands covered an estimated surface of 13.58 km² or 20.49% of the total surface area but reduced to 11 km² (16.60%) in 2001 and 9.09 km² (13.71%) in 2022. There is a reduction of 6.78% over 34 years. This reveals that wetlands witnessed an enormous reduction as the built-up area increased greatly from 7.51% in 1988 to 12.28% in 2001 for the Bamenda III municipalities. On the other hand, farmland decreased from 32.17% in 1988 to 28.91% in 2022 while other services such as fishing reduced from 39.8% to 36.27%. Hence wetlands, including those used for agriculture were lost to built-up areas and other urban infrastructure. The increasing human footprint on wetlands is due to the exploitation of its enormous resources despite their protected nature.

4.2. Exploitation of wetland resources and challenges

Wetlands of Bamenda III have many resources that are exploited for different purposes. The household survey enabled the ranking of these resources based on their usefulness and the number of people exploiting the resource (**Table 2**). The usefulness was measured based on the contribution of each resource to the livelihoods of the population. Household heads were able to classify resources based on its contribution to the socio-economic wellbeing of the family. On the other hand, the number of households exploiting a particular resource was used as an indicator of its importance.

Table 2. Types of wetland resources and their uses.

| Type | Uses of wetland resources | Rank |
|-------------------------|--|------|
| Water | Water is used for cultivation of vegetables and other crops. It is used to irrigate crops during the dry season. Water is fetched for domestic use such as washing of dresses, cars etc. Fish ponds are also constructed in swamps for fish rearing. | 1 |
| Land | Land is used for cultivation and construction of urban infrastructure (roads, bridges, commercial sites and residential sites). | 2 |
| Raffia and fiber | Raffia palms are harvested and transformed into multiple outputs such as chair, beds, baskets and also as firewood. The raffia fruits are used as food, decorations when dried while the fiber is used in making mats and traditional bags. Raffia palm produces palm wine which is consumed and used for traditional rites. | 3 |
| Sand | Sand is excavated mostly along main river valleys by children during holidays to raise money for school resumption. Some households around wetland areas excavated sand for the construction of their houses. | 4 |
| Building poles | Building poles come from eucalyptus trees and bamboos from raffia bushes. Larger eucalyptus trees are often sawn into planks and used in roofing houses. It is a common practice for people to plant eucalyptus trees in swamps to drain the area due to its high water absorption ability. | 5 |
| Animals, fish and crabs | Fish such as tilapia and mud fish are caught and crabs are harvested occasionally in most swamps, flood plains and rivers. | 6 |
| Medicinal plants | Swamps contain a wide variety of herbs with a high medicinal value. For instance, young leaves of raffia are used to treat mumps, fiber used to treat swollen legs, Justicia Flava used calm fever etc. | 7 |

These wetland resources are exploited in different ways (**Figure 3**). However, some exploitation methods are more sustainable than others. Water occupies the first rank in terms of its availability and use by the population. Apart from collecting water from streams and springs for domestic use, water courses in these areas are mostly exploited for agriculture during the dry season. Crop farmers use water pumps and also channel water into the farms. This method is highly practiced during

the dry season when the water table falls and water courses shrink.

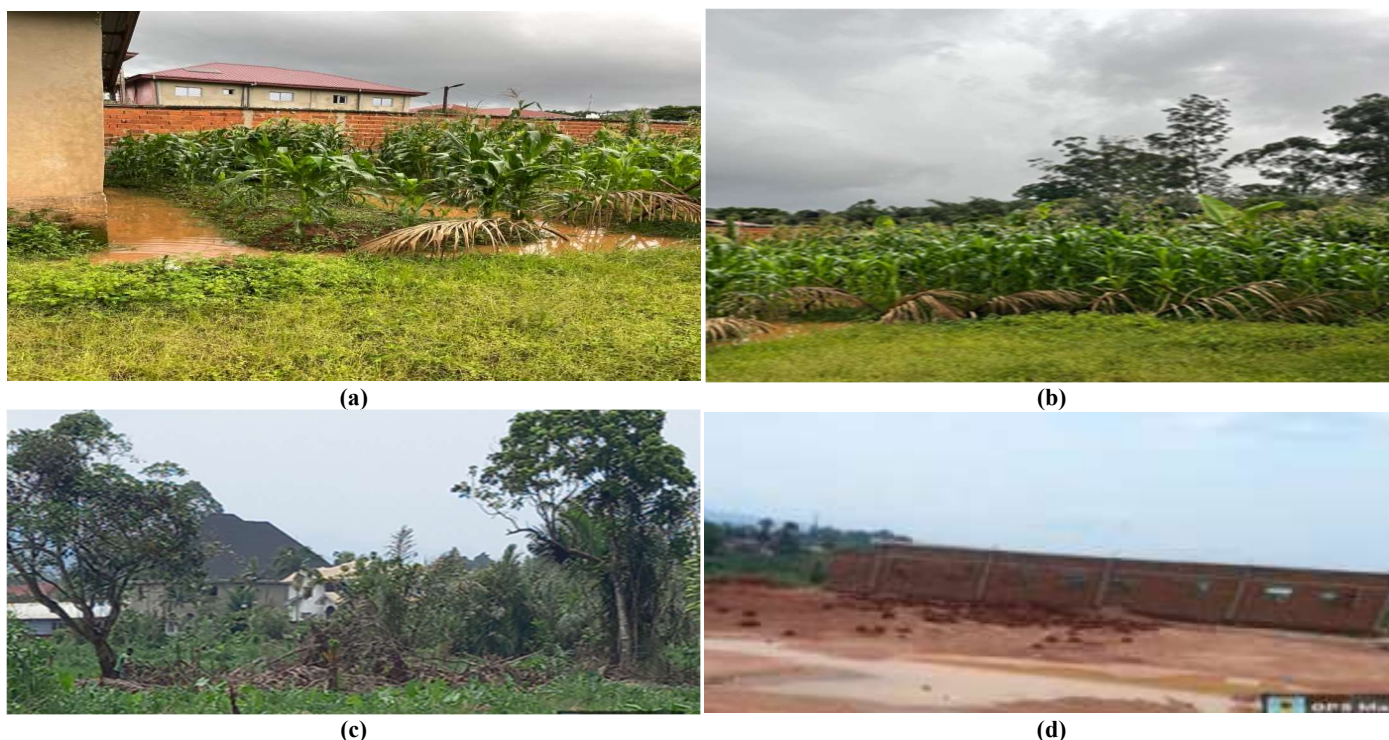


Figure 3. Wetland exploitation practices in Bamenda III municipality. **(a)** construction of houses in swamps; **(b)** maize farm with eucalyptus trees; **(c)** destruction of raffia palms; **(d)** land reclamation.

A household survey revealed that 67% of those exploiting wetlands are into agriculture (**Figure 3b**). Car wash points are equally constructed along water courses and water is extracted using water pumps. Unexploited urban spaces occupy the second rank and is exploited mainly for the construction of urban infrastructures, especially houses. Interviews have revealed that due to demographic pressure and the rising rural exodus, many dwellers are draining wetlands for the construction of houses (**Figure 3d**). First, the majority of such were the poor who buy land at relatively low prices but are equally exposed to catastrophes such as floods but nowadays, enterprises and rich individuals who have the means to drain and fill up wetlands now dominate the scene in Bamenda. Tree planting in swamps has been used as a strategy to keep wetlands dry as captured in the following excerpt:

“...it is a pity to see people in this town planting eucalyptus trees in wetlands because they want to drive away water. Such practices will have negative impacts on us all especially with the impacts of climate change that are already felt here...” (Interview, 2023).

Also, the construction of urban infrastructure on wetlands is considered a very unsustainable practice with more negative effects as compared to agriculture (**Figure 3a**). Construction of houses destroys the wetland ecosystem as water and biodiversity are hampered. Agriculture becomes dangerous when there is application of chemical fertilizers and insecticides. Survey shows that 82% of those practicing dry season farming on wetlands apply chemical fertilizers against only 12% who apply organic manure and compost.

The exploitation of other resources such as raffia palms (**Figure 3c**), sand and

fish are at an artisanal level and therefore cause little damage to the wetland ecosystem. Raffias are the dominant vegetation type in wetlands and are exploited in various ways. Palm wine tapping is a lucrative activity that generates an income for 12% of households and is widely consumed during traditional ceremonies. Bamboos are harvested and used for the fabrication of a variety of items (baskets, bags, beds) and the construction of houses. Only the mature bamboos are harvested and this limits over-exploitation.

Waste disposal has been identified as another activity that puts wetlands at risk. With urban expansion and challenges in municipal waste disposal, dwellers in Bamenda III have tended to dispose of their household waste in rivers and swamps. This has increased the rate of pollution and exacerbated the occurrence of floods.

4.3. Actors and power relations resulting from wetland exploitation

4.3.1. Socio-economic characteristics of the population

The socio-economic and cultural characteristics of a population are important in determining their level of resource exploitation and their ability to conserve the natural environment. Information on the age and sex structure, family size, level of education and the main occupation of a population is a pre-requisite for a livelihood analysis (**Table 3**). These population characteristics determine the types of livelihood activities carried, the techniques used and the exploitation frequency. Their cultural and socio-economic backgrounds can shape their practices and enhance sustainable exploitation of resources.

Table 3 shows that 62.7% of the population is women while 37.3% are male. A majority (70.7%) falls within the active age group (25 to 35 years and 35 to 45 years) and 60.7% are married and with kids. The average family size is large with 66% of household sizes ranging between 2 to 5 persons. The greatest proportion (37.3%) of the population only completed secondary education and as a result, they are mostly involved in petty trading and small-scale businesses (47.3%). These characteristics show a dynamic urban population struggling to sustain their livelihoods. As such, wetland resource exploitation has become an option. Urban agriculture has become the main livelihood activity as women cultivate vegetables in swamps and along river valleys.

Table 3. Socio-economic and demographic characteristics of the population.

| Characteristic | Frequency | Percentages (%) |
|--------------------|-----------|-----------------|
| Sex of respondents | | |
| Male | 56 | 37.3 |
| Female | 94 | 62.7 |
| Age distribution | | |
| Less than 25 years | 12 | 8 |
| 25 to 35 years | 43 | 28.7 |
| 35 to 45years | 63 | 42 |
| 45 and above | 32 | 21.3 |

Table 3. (Continued).

| Characteristic | Frequency | Percentages (%) |
|-----------------------|-----------|-----------------|
| Marital status | | |
| single | 32 | 21.3 |
| Married | 91 | 60.7 |
| Widow/widower | 19 | 12.7 |
| Divorced | 8 | 5.3 |
| Family size | | |
| Less than 2 | 33 | 22 |
| Between 2 and 5 | 99 | 66 |
| More than 5 | 18 | 12 |
| Level of education | | |
| Never went to school | 6 | 4 |
| Primary level | 28 | 18.7 |
| Secondary level | 56 | 37.3 |
| High school | 20 | 13.3 |
| University | 12 | 8 |
| Professional training | 28 | 18.7 |
| Main occupation | | |
| Farmer | 13 | 8.7 |
| Business | 71 | 47.3 |
| Civil servant | 54 | 36 |
| Builder | 11 | 7.3 |
| Arts and craft | 5 | 3.3 |
| Others | 6 | 4 |

4.3.2. Diversity of actors and their scales of intervention

Interviews revealed that a plethora of actors are involved in the management of wetlands and its exploitation. Their level of intervention was measured based on groundedness and density of responses provided by interviewees (**Table 4**).

Table 4 shows that actors are diverse and include households (36.8%), quarter heads (16.2%), traditional authorities (17.6%), Municipal authorities (14.7%), Divisional delegation of Environment and Nature protection (10.3%) and the Delegation of Lands and land tenure (4.4%) are actively involved exploitation and wetland management.

Table 4. Stakeholders involved in the management of wetlands.

| Actors | Groundedness | % |
|--|--------------|------|
| Households | 25 | 36.8 |
| Quarter heads | 11 | 16.2 |
| Traditional authorities | 12 | 17.6 |
| Municipality | 10 | 14.7 |
| Divisional Delegation of Environment | 7 | 10.3 |
| Divisional Delegation of lands and land tenure | 3 | 4.4 |
| Total | 68 | 100 |

Households play the greatest role in terms of exploitation (36.8%). Household members comprising men, women and children are the main actors involved in the exploitation of wetland resources because their livelihoods depend on wetlands. For instance, women are involved in dry-season farming as they benefit from the water potential of wetlands. This has helped them to cope with dry season water shortages and ensure livelihood sustainability. The methods of land acquisition vary. The household survey shows that 30% of farmers rent their farmlands, 57.3% of farmers inherited from their parents and 12.7% bought their land. On the other hand, men are into construction, raffia harvesting arts and crafts while children are actively involved in the harvesting of palm fruits, sand collection and fishing. This division of tasks has a socio-cultural implication. It should be noted that although 83% of households are civil servants and business persons, agriculture is practised as a secondary activity and it involves every member of the household.

Traditional authorities (17.6%) and village heads (16.2%) also play a vital role in wetland management. Traditional authorities from the Nkwen Palace have regulated the use of wetlands using traditional laws and costume beliefs. Raffia bushes for instance have much significance in the traditional setting as bamboo, fibre, palm fronds and palm wine are used during all traditional manifestations. As such, raffia palm exploitation is controlled by palace officials in collaboration with quarterheads. During an interview with a notable from the Nkwen palace, he revealed that sanctions are meted out to those who destroy raffia palms without a prior authorization from the traditional authority. It was also said that individuals wishing to transform their palm bushes into other land use patterns must get authorization from the palace (Interview, 2023). Traditional authorities serve as mediators between the community and the council and equally collaborate with the delegations of Environment and land tenure whenever major construction works are to be undertaken within the municipality. This has significantly reduced conflicts.

The Bamenda III Municipal authorities are key actors in wetland management (14.7%). Wetlands are managed by the technical committee in charge of all hydrographic points. This committee conducted an inventory of wetlands and monitored their exploitation by placing quarterheads and palace officials in some of these sites such as Mbelem and Alahie. They also research wetlands resources and conduct the restoration of degraded wetland resources (the case of raffia brushes) in collaboration with other stakeholders. Municipal authorities equally sensitize the community and create awareness of the importance of wetlands, develop wetland policy implementation plans in collaboration with other actors, monitor and evaluate the implementation of the policies in line with its mandate, resolve disputes and sanction culprits who go against the law (**Figure 4**).

The Divisional Delegation of Environment and Nature Protection (10.3%) and the Delegation of Lands and Land tenure (4.4%) are the state de-concentrated services that ensure the implementation of laws at the local level. They are Developing and/or reviewing in consultation with other stakeholders, appropriate policies, and legislation to facilitate the implementation of the wetlands policy in Cameroon. Also, they provide policy guidance on resource mobilization and facilitating the acquisition of resources for wetlands programs through innovative

financial instruments. These delegations equally take actions for the sustainability and conservation of wetlands and ensure rehabilitation of degraded wetland areas by promoting restoration of degraded species.



Figure 4. Methods used by municipal authorities to limit wetland exploitation. **(a)** warning against reclamation; **(b)** warning against waste disposal.

However, surveys have shown that these actors have lapses in the implementation of their role and therefore not fully engaged in ensuring the sustainability of these areas. Within the context of decentralization, we have noticed an overlap in responsibilities leading to poor power relations and conflicts.

4.4. Ambiguity in the regulatory system

Historically, after the United Nations Conference on Environment and Development held in Rio de Janeiro in 1992, Cameroon truly and practically inaugurated a systematic environmental policy. This policy has been translated institutionally into the creation of a ministry specifically responsible for environmental issues in 1992, followed by the development of the framework Law No 96/12 of 5 August 1996 relating to Environmental management. About wetlands, this law identifies continental waters, flood plains (Article 25), and biodiversity conservation (Article 27). The environmental law draws up the list of harmful or dangerous substances whose direct or indirect discharge, spilling, dumping, immersion or introduction into continental waters are either prohibited or subject to poor authorization (Article 30). Article 62, states that the protection of nature, the preservation of animal and plant species and their habitat, the maintenance of biological balances and ecosystems and the conservation of biodiversity and genetic diversity against all causes of degradation and threats of extinction are of national interest. No article is specific on wetlands and the categories of wetlands that should be exploited by the population.

However, in an attempt to ensure sustainability, Article 63 states that natural resources shall be managed rationally to meet the needs of the present generations without compromising the capacity of future generations to meet their own needs and the population is encouraged to participate in environmental management (Article 72). With population growth and urbanization, Article 41 stipulates that building permits shall be issued duly taking into account the presence of classified establishments and their impact on the environment, including urban wetlands. To strengthen environmental awareness in society and increase the sensitization on and

participation of populations in environmental issues, the Administration in charge of the environment and communication, as well as other Administrative units and public bodies concerned are compelled in Article 72 to carry out information and sensitization campaigns. These campaigns and environmental education programs are to be carried out using the media and other means of information. On the other hand, defaulters are liable to pay a fine of 1,000,000 (one million) to 5,000,000 (five million) CFA francs and a prison sentence of 6 (six) months to 1 (one) year or only one of these two.

This clearly shows a rich regulation that could ensure wetlands sustainability if properly implemented. Nonetheless, surveys have revealed lapses in its implementation and issues of corruption. For instance, many people in Bamenda III municipality have been issued land titles that permit them to construct houses on wetlands after extension reclamation works. Equally, the multitude of actors has led to overlapping interventions and conflicts. Within the context of decentralization, the municipal authorities and de-concentrated state authorities now have overlapping roles while traditional authorities, based on their customary law conflict with the municipal authorities over the management of wetlands.

Moreso, the 1996 framework law has mismatches with the Ramsar Convention for the conservation and sustainable use of wetlands signed and ratified by the Cameroon government in 1971. This Convention defined wetlands as “areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six metres” [23]. This definition is broad and considers aspects not included in the framework law on the environment. By the 1996 law, only floodplains, mangroves and continental waters are considered as wetlands and should be protected because of their importance as biodiversity hotspots. Given this limited scope, it has become difficult for authorities in urban areas with diverse land use patterns and land scarcity to effectively ensure the management of wetlands as indicated by the Ramsar Convention. In addition, the framework law on the environment emphasizes biodiversity conservation and completely neglects the socio-economic and cultural values of wetlands, especially within the traditional communities. This and many others have resulted in conflicts.

4.5. Power relations in wetland management and conflicts

Among the various stakeholders involved in the exploitation and management of wetlands, different power and social relationships occur at different levels of intervention (**Figure 5**). The relationship existing between households and traditional leaders is complimentary and creates conflicts because the traditional rulers regulate population actions. Also, these traditional rulers share an intermediate relationship with the Ministry of Environment and the council as they transmit information and activities from public authorities to the local population and vice versa. The local population have a conflictual relationship with the public Authorities as regards the sustainable use of wetlands resources. Lastly, the relationship between the Ministry and the council is a supervisory and technical relationship that ensures the implementation, monitoring, evaluation and sanctioning of various policies.

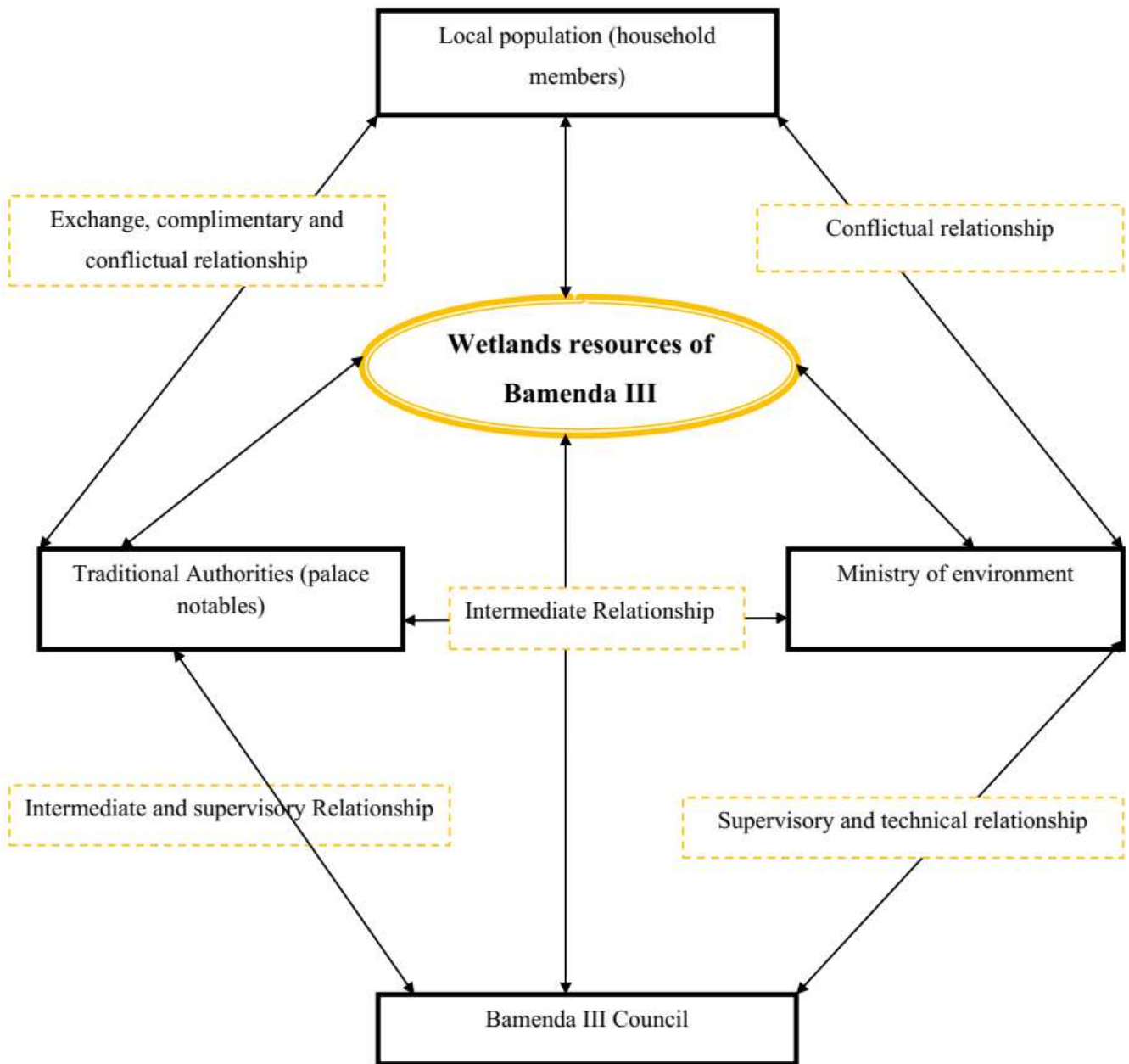


Figure 5. Different relationships between stakeholders involved on wetland management.

However, conflicts are dominant and result mainly from resource exploitation. Amongst wetland exploiters, they face the problem of land tenure and land ownership in wetland areas. Individuals cultivating along river valleys and swamps have had conflicts with their neighbours over water. Also, grazer-farmer conflicts resulting from animal encroachment into farmlands and destruction of crops are becoming common. This is particularly because cattle herders carry their herds into wetlands during the dry season when the hills are dry in search of fresh pasture and water. Regulating access to these resources is challenging due to the fact some claims on parcels of land in the wetlands are based on ancestral inheritance (Interview, 2023). Conflicts between traditional rulers and wetland users arise from raffia palm destruction by individuals who construct in this area, especially in the Mbelem locality. They destroy Raffia brushes and fill them up with ground for the

construction of houses without consulting the Nkwen palace authorities. Interviews revealed such conflicts as captured in the excerpt:

“... we had encounters with some traditional leaders collecting bribes from individuals who destroyed raffia palms for construction. Land reclamation is a common practice in this town and public authorities have failed to stop it nor sanctions individuals who construct houses on wetlands with no building permits...” (Interview, 2023).

Conflicts equally broke out between the Bamenda III council and washing point operators. Car wash points are constructed along the main river and in swamps where water is readily available. However, interviews revealed that due to pollution and disruptions in the normal flow of water, car wash operators have been asked to leave the Mile Four site but they refused. They demanded that the municipality should provide another site for them or provide an alternative livelihood activity as the households depended completely on their car wash business. This activity is continuously carried out in this area because the municipal authorities are unable to give them a new site.

Key informants have equally identified administrative tolerance as causing conflicts between the council authorities and the de-concentrated state agents. There are disagreements between state representatives at the Ministry of Environment and Bamenda III municipal authorities caused by the inapplicability of some laws and policies governing the environment and wetland management. Municipal authorities are politicians who would want not to lose their electorate by implementing stringent laws and sanctions on defaulters. As such, the quest for a next mandate has led to administrative tolerance and poor implementation of regulations.

5. Discussion

The UPE approach has permitted us to explore the roles of actors, their socio-economic and cultural interests as well as power relations that shape the nature-society in urban areas, using wetlands as a case study. Results have shown that wetlands in Bamenda III provide a wide range of ecological services and also act as a livelihood base for more than 60% of the population. The local population fetches water for domestic use; cultivates crops, and harvests raffia palms and fish from wetlands. These practices mostly carried out by the urban poor have fewer implications on wetlands degradation but the expansion of urban infrastructure has led to critical outcomes. The rate of wetland reclamation and destruction of raffia palms for the construction of houses is responsible for the degradation of more than 50% of wetlands. A land use and land cover analysis shows a 6.78% reduction in the surface area of wetlands over 34 years. A diachronic approach reveals that in 1988, wetlands covered an estimated surface of 13.58 km² or 20.49% of the total surface area but reduced to 11 km² (16.60%) in 2001 and 9.09 km² (13.71%) in 2022. This reduction of wetlands in Cameroon has been at the centre of scholarly debates and scientific writings [6,12,31,32] but this work has gone further to the politics revolving around wetland management.

The importance of wetlands is not to be over-emphasized. Rather than focusing on its diminishing potential, this paper looks at conservation challenges in the

context of rapid urbanization. The diversity of actors: Households (36.8%), quarter heads (16.2%), traditional authorities (17.6%), Municipal authorities (14.7%), Divisional delegation of Environment and Nature protection (10.3%) and the Delegation of Lands and land tenure (4.4%) that actively participate in the exploitation and management of wetlands in Bamenda III has led to overlapping in roles and conflicts. In 1971, the Cameroon government signed and ratified the Ramsar Convention for the conservation and preservation of wetlands and enacted law No 96/12 of 5 August 1996 relating to Environmental management. However, there are mismatches between these regulatory instruments. The Ramsar Convention is broader, considering wetlands to be both natural and artificial [33] the framework law on the environment has only focused on floodplains and continental waters. The framework law has been criticized for laying emphasis only on biodiversity conservation without considering the socio-economic and cultural importance of wetlands [16]. This has led to different orientations and conflicts.

The material, commodities and monetary flows that animate the urban wetlands metabolism are crucial in determining the type of land use practices carried out on wetlands and their implications for conservation. The perceptions of actors and the importance attached to cultural ecosystem services enshrined in the UPE approach provide the basis for a more participative approach in wetland resource management. This will enable us to examine the nature-society relationship on wetlands from a multidimensional perspective.

6. Conclusion

This work set out to examine power relations resulting from the exploitation and management of wetland resources in an urban area. Using the Bamenda III case study, the UPE approach was employed to explicitly show how unequal access to resources, political interest, and socio-economic and cultural motives have reshaped the link between nature and society in urban areas and inextricable power relations. Due to rapid urbanization that initiates varied options for urban wetlands, there has been a reduction of about 6.78% in the surface area of wetlands from 1988 to 2022. This reduction in wetlands is caused principally by unsustainable farming and the transformation of wetlands for the construction of urban infrastructure. Land reclamation has become a common practice and corrupt authorities issue land titles on wetlands. This has led to conflicts between the stakeholders. The local population use claims of their ancestral inheritance to continuously exploit wetlands against the warnings of the authorities. The environmental framework law in Cameroon stipulates that wetlands should be protected due to their rich biodiversity. However, the UPE approach has shown that the consideration of socio-economic and cultural ecosystem services of wetlands is key to multi-stakeholder participation and sustainable management of wetlands.

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References

1. Junk WJ, Piedade MTF, Lourival R, et al. Brazilian wetlands: their definition, delineation, and classification for research, sustainable management, and protection. *Aquatic Conservation: Marine and Freshwater Ecosystems*. 2013; 24(1): 5-22. doi: 10.1002/aqc.2386
2. Erwin KL. Wetlands and global climate change: the role of wetland restoration in a changing world. *Wetlands Ecology and Management*. 2008; 17(1): 71-84. doi: 10.1007/s11273-008-9119-1
3. Matthews G. *The Ramsar Convention on Wetlands: its History and Development*. Ramsar Convention Bureau; 2013.
4. Swyngedouw E, Heynen NC. Urban Political Ecology, Justice and the Politics of Scale. *Antipode*. 2003; 35(5): 898-918. doi: 10.1111/j.1467-8330.2003.00364.x
5. Shahjahan ATM, Ahmed KS, Said IB. Study on Riparian Shading Envelope for Wetlands to Create Desirable Urban Bioclimates. *Atmosphere*. 2020; 11(12): 1348. doi: 10.3390/atmos11121348
6. Mbanga L, Dingha C. Wetland Dynamics, Trends and Environmental Implications: Comparative Study in Bamenda II and III Municipalities, North West Region, Cameroon, *Coğrafya Dergisi*. *Journal of Geography*. 2022; 45: 1-14. doi: 10.26650/JGEOG2022-980928
7. United Nations Organization. World population projected to reach 9.8 billion in 2050, and 11.2 billion in 2100, Department of Economic and Social Affairs; 2018.
8. Véron R. Small Cities, Neoliberal Governance and Sustainable Development in the Global South: A Conceptual Framework and Research Agenda. *Sustainability*. 2010; 2(9): 2833-2848. doi: 10.3390/su2092833
9. Alikhani S, Nummi P, Ojala A. Urban Wetlands: A Review on Ecological and Cultural Values. *Water*. 2021; 13(22): 3301. doi: 10.3390/w13223301
10. Balgah S, Kimengsi J. Land Use Dynamics and Wetland Management in Bamenda: Urban Development Policy Implications. *Journal of Sustainable Development*. 2016. doi: 10.5539/jsd.v9n5p141
11. Missaka H, Tiffany H, McAlpine C. Power, politics and policy in the appropriation of urban wetlands: The critical case of Sri Lanka. *The Journal of Peasant Studies*. 2017. doi: 10.1080/03066150.2017.1393801
12. Ngwenwie R. Wetland resource exploitation and its contribution to sustainable livelihoods: case study of Bamenda III sub-division, North West Region of Cameroon [Master's thesis]. Pan African Institute for Development West Africa (PAID-WA) Buea; 2017.
13. Huque S, Pattanaik S, Parthasarathy D. Cityscape Transformation and the Temporal Metamorphosis of East Kolkata Wetlands: A Political Ecology Perspective. *Sociological Bulletin*. 2020; 69(1): 95-112. doi: 10.1177/0038022919899020
14. Kongnso EM, Yemmafou A, Moumbe JS, et al. Of Practices and (Micro) politics: Challenges of Organic Waste Segregation in Dschang, Cameroon. *The Journal of Environment & Development*. 2024. doi: 10.1177/10704965241246708
15. Yemele O, Mbezele Y, Gordon N. Stakeholder perceptions of wetlands management effectiveness in Cameroon. *Journal of Ecology and The Natural Environment*. 2023. doi: 10.5897/JENE2023.0959
16. Tume JP. Impact of Climate Change on Domestic Water Accessibility in Bamenda III Sub-Division, North West Region, Cameroon. *Journal of the Cameroon Academy of Sciences*. 2021. doi: 10.4314/jcas.v17i2.4
17. Champion B, Owusu-Boateng G. The Political Ecology of Wetlands in Kumasi, Ghana. *International Journal of Environment and Bioenergy*. 2013.
18. Cornea NL, Véron R, Zimmer A. Everyday governance and urban environments: Towards a more interdisciplinary urban political ecology. *Geography Compass*. 2017; 11(4). doi: 10.1111/gec3.12310
19. Wittmer J. Dirty work in the clean city: An embodied Urban Political Ecology of women informal recyclers' work in the 'clean city.' *Environment and Planning E: Nature and Space*. 2022; 6(2): 1343-1365. doi: 10.1177/25148486221102374
20. Coelho K. Reading History and Power in Urban Landscapes: The Lens of Urban Political Ecology. *Ecology, Economy and Society—the INSEE Journal*. 2018; 1(2). doi: 10.37773/eec.v1i2.33
21. Tabe N. Enhancing the enabling environment for illegal bushmeat exploitation in cameroon's wetlands for consumption and commercialisation: Causes, shortcomings of the law and effects to man and the environment. *Asian Journal of Multidisciplinary Research & Review (AJMRR)*. 2021.
22. Huque S, Pattanaik S, Parthasarathy D. Cityscape Transformation and the Temporal Metamorphosis of East Kolkata Wetlands: A Political Ecology Perspective. *Sociological Bulletin*. 2020; 69(1): 95-112. doi: 10.1177/0038022919899020
23. Pietta A, Tononi M. Re-Naturing the City: Linking Urban Political Ecology and Cultural Ecosystem Services. *Sustainability*. 2021; 13(4): 1786. doi: 10.3390/su13041786
24. Kongnso EM, Yemmafou A, Moumbe JS, et al. Of Practices and (Micro) politics: Challenges of Organic Waste Segregation in Dschang, Cameroon. *The Journal of Environment & Development*. 2024. doi: 10.1177/10704965241246708

25. Kooy M, Walter CT. Towards a Situated Urban Political Ecology Analysis of Packaged Drinking Water Supply. *Water*. 2019; 11(2): 225. doi: 10.3390/w11020225
26. Njeru J. The urban political ecology of plastic bag waste problem in Nairobi, Kenya. *Geoforum*. 2006; 37(6): 1046-1058. doi: 10.1016/j.geoforum.2006.03.003
27. Mallick PH, Chakraborty SK. Forest, wetland and biodiversity: Revealing multi-faceted ecological services from ecorestoration of a degraded tropical landscape. *Ecohydrology & Hydrobiology*. 2018; 18(3): 278-296. doi: 10.1016/j.ecohyd.2018.04.002
28. Shahjahan ATM, Ahmed KS, Said IB. Study on Riparian Shading Envelope for Wetlands to Create Desirable Urban Bioclimates. *Atmosphere*. 2020; 11(12): 1348. doi: 10.3390/atmos11121348
29. Azinwie AG, Yerima BPK, Tening AS, et al. Food Security and Environmental Implications of Urban Wetlands Utilisation as Vegetable Gardens: The Case of Bamenda Municipality Cameroon. *Journal of Agriculture and Environmental Sciences*. 2017. doi: 10.15640/jaes.v6n1a7
30. Kimengsi JN, Nguh BS, Nafoin AS. Peri-Urban Land Use Dynamics and Development Implications in the Bamenda III Municipality of Cameroon. *Sustainability in Environment*. 2017; 2(3): 273. doi: 10.22158/se.v2n3p273
31. Kometa SS, Kimengsi JN, Petiangma DM. Urban Development and its Implications on Wetland Ecosystem Services in Ndop, Cameroon. *Environmental Management and Sustainable Development*. 2017; 7(1): 21. doi: 10.5296/emsd.v7i1.12141
32. Ngwitoh Tanwie C, Fondo Ambebe T, Anjah Mendi G. An Assessment of the Biodiversity Status of Wetland Woody Flora in Bamenda III Sub Division, North West Region, Cameroon. *International Journal of Forestry and Horticulture*. 2024; 10(1): 1-7. doi: 10.20431/2454-9487.1001001
33. Ramsar Convention Secretariat Work Plan. Convention on wetlands (Ramsar, Iran, 1971). In: *Proceedings of the 34th Meeting of the Standing Committee Gland, Switzerland*.