ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26nov366

Local Perceptions Regarding the Sustainable Valorization of Wetlands in the Mbuji-Mayi Savanna Region, Kasaï-Oriental Province, Democratic Republic of the Congo

Nyembo Kabemba Faustin[1]; Ngoyi Kalewu Junior[1,2]; Kalonji Icky[3]

[1]Official University of Mbujimayi
[2]MapBiomas_DRC
[3]Synergy of Skills for the Comprehensive Success of Agricultural Development (SCRID'AGRI)

Publication Date: 2026/11/19

Abstract: This study aimed to provide a preliminary assessment of local perceptions as a basis for the mapping and valorization of wetlands in the savanna region of Mbuji-Mayi, Kasai Oriental Province, Democratic Republic of the Congo. A cross-sectional survey was conducted among 50 respondents selected through random sampling across the 37 neighbourhoods of Dibindi Municipality. Descriptive statistical analysis was used to evaluate community perceptions regarding wetland-related problems, associated diseases, and ecosystem services. The results showed that diseases (56%) were perceived as the major problem associated with wetlands, followed by environmental pollution (34%), flooding (8%), neighbourhood conflicts (6%), and mortality (2%). Malaria (50%) and skin diseases (42%) were the most frequently reported health problems linked to wetlands, whereas diarrhoeal diseases (16%), other diseases (28%), and typhoid fever (5%) were less frequently mentioned. Despite these environmental and health concerns, respondents acknowledged the significant socio-economic importance of wetlands, particularly for ecosystem services (72%), agricultural production (64%), fish production (42%), and domestic activities (36%). However, 28% of respondents considered wetlands to have no significant utility. These findings demonstrate that local communities perceive wetlands as multifunctional ecosystems that simultaneously provide essential livelihood benefits and present considerable environmental and public health challenges. Integrating local ecological knowledge with remote sensing, Geographic Information Systems (GIS), and ecosystem service assessment would strengthen wetland mapping, support evidence-based conservation planning, and promote sustainable management strategies in the savanna regions of the Democratic Republic of the Congo.

Keywords: *Wetlands; Ecosystem Services; Local Perception; Public Health; Agriculture.*

How to Cite: Nyembo Kabemba Faustin; Ngoyi Kalewu Junior; Kalonji Icky (2026) Local Perceptions Regarding the Sustainable Valorization of Wetlands in the Mbuji-Mayi Savanna Region, Kasaï-Oriental Province, Democratic Republic of the Congo. *International Journal of Innovative Science and Research Technology*, 11(11), 805-815. https://doi.org/10.38124/ijisrt/26nov366

I. INTRODUCTION AND LITERATURE REVIEW

Wetlands are among the most productive and valuable ecosystems on Earth because of the wide range of ecosystem services they provide to both human societies and the natural environment. They regulate hydrological processes, support biodiversity, store carbon, improve water quality, mitigate floods, and contribute significantly to food security through agriculture, fisheries, and the provision of natural resources. Globally, wetlands cover approximately 6% of the Earth's land surface but support nearly 40% of all known species and provide ecosystem services whose economic value is estimated at several trillion US dollars annually (Davidson et *al.*, 2023; Convention on Wetlands, 2024). Despite their ecological and socio-economic importance, wetlands are disappearing at an alarming rate because of urbanization, agricultural expansion, pollution, climate change, and unsustainable land-use practices.

In Sub-Saharan Africa, wetlands constitute strategic ecosystems that sustain the livelihoods of millions of people, particularly in regions where seasonal water availability limits agricultural production. These ecosystems provide fertile soils for dry-season cultivation, support inland fisheries, supply domestic water, and contribute to climate resilience. However, rapid population growth and increasing anthropogenic pressure have accelerated wetland degradation, resulting in declining ecosystem services and growing environmental and public health challenges. Recent

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26nov366

studies published in *Scientific Reports* and Elsevier journals have demonstrated that wetland degradation is associated with deteriorating water quality, biodiversity loss, increased flood vulnerability, and higher exposure to vector-borne and water-borne diseases (Chuma et *al*., 2024; Mirenge et *al*., 2023).

The Democratic Republic of the Congo (DRC) contains one of the largest wetland systems in Africa, extending from the Congo Basin to numerous floodplains, marshes, and inland valleys distributed across different ecological regions. Although these ecosystems provide critical ecological functions and contribute substantially to local livelihoods, they remain insufficiently documented, particularly in the savanna landscapes of central DRC. In rapidly growing urban centres such as Mbuji-Mayi, wetlands are increasingly converted into agricultural land, residential areas, and informal settlements without adequate environmental planning. Consequently, these ecosystems are subjected to multiple pressures, including pollution, land degradation, uncontrolled resource exploitation, and loss of ecological integrity.

Recent scientific literature increasingly emphasizes that sustainable wetland management should not rely exclusively on ecological inventories and remote sensing techniques but should also incorporate the perceptions, knowledge, and experiences of local communities. Community perceptions provide valuable information on ecosystem services, environmental risks, and resource use, thereby complementing spatial analyses and improving conservation planning. Integrating social perception with geospatial information has become a key recommendation for ecosystem-based management and participatory environmental governance (Davidson et *al*., 2023; Chuma et *al*., 2024).

Within this context, the present study constitutes a preliminary assessment for the mapping and valorization of wetlands in the savanna region of Mbuji-Mayi, Kasai Oriental Province, Democratic Republic of the Congo. The study investigates local perceptions regarding three major dimensions of wetland ecosystems: (i) the principal environmental and socio-economic problems associated with wetlands, (ii) the diseases perceived to be linked to these ecosystems, and (iii) the ecosystem services and socio-economic benefits that wetlands provide to surrounding communities. By combining local ecological knowledge with future geospatial analyses, this research aims to establish a scientific baseline for wetland inventory, mapping, ecosystem service assessment, and sustainable management.

Ultimately, the findings are expected to contribute to evidence-based decision-making for wetland conservation and restoration while supporting sustainable urban planning, biodiversity conservation, climate change adaptation, and the improvement of local livelihoods in the savanna ecosystems of the Democratic Republic of the Congo.

II. APPLIED RESEARCH METHODS

- *Study Design*

This study adopted a descriptive cross-sectional design with an exploratory approach to investigate local perceptions of wetlands in the Municipality of Dibindi, Mbuji-Mayi, Democratic Republic of the Congo (DRC). Descriptive studies are appropriate for characterizing the opinions, attitudes, and perceptions of a target population and are particularly useful for preliminary environmental assessments that support subsequent ecological investigations (Creswell & Creswell, 2018). The study combined quantitative social survey methods to document community perceptions regarding the environmental, health, and socio-economic importance of wetlands.

- *Study Area*

The study was conducted in Dibindi Municipality, one of the five municipalities constituting the city of Mbuji-Mayi, the capital of Kasai Oriental Province in south-central Democratic Republic of the Congo. Dibindi comprises 37 neighbourhoods and is characterized by rapid urban expansion and numerous wetlands distributed within valleys, floodplains, depressions, and lowland areas. These wetlands support a variety of livelihood activities, including vegetable farming, domestic water collection, artisanal fishing, and the harvesting of natural resources. However, increasing urbanization and inadequate environmental management have intensified anthropogenic pressures on these ecosystems.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26nov366

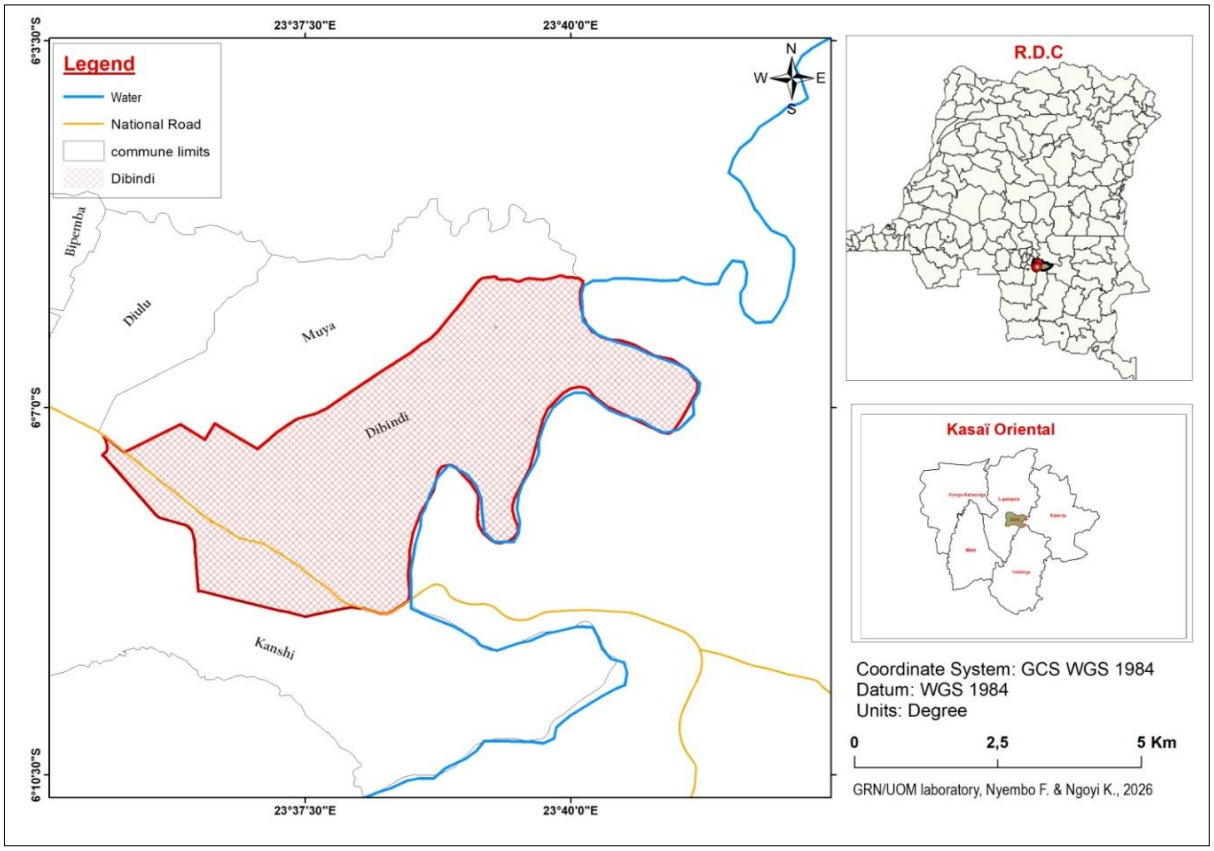


Fig 1 Location of the Study Area Showing the Five Municipalities of Mbuji-Mayi City, with Dibindi Municipality Highlighted.

➢ *Sampling Strategy*

The target population consisted of adult residents living within or near wetland areas and possessing sufficient knowledge of these ecosystems. A simple random sampling technique was employed to minimize selection bias and ensure that each eligible individual had an equal probability of participation (Taherdoost, 2016).

A total of 50 respondents were interviewed between October and November 2022. To ensure adequate spatial representation, interviews were conducted across all 37 neighbourhoods of Dibindi Municipality.

➢ *Data Collection*

Primary data were collected through face-to-face interviews using a structured questionnaire administered by trained interviewers. The questionnaire was developed to capture information on respondents' socio-demographic characteristics and their perceptions of wetlands.

- *The Questionnaire Comprised Four Sections:*

✓ Socio-demographic characteristics of respondents;
✓ Perceptions of wetlands;
✓ Environmental and socio-economic problems associated with wetlands;
✓ Diseases and ecosystem services attributed to wetlands.

Most questions were closed-ended to facilitate data coding, statistical analysis, and comparison among respondents, as recommended by Fowler (2014). The questionnaire was designed to generate standardized information suitable for descriptive statistical analysis (Dillman et al., 2014).

The questionnaire consisted mainly of closed-ended questions, allowing standardized responses and facilitating statistical analysis.

➢ *Variables Investigated*

The study focused on three principal perception-based variables.

The first variable concerned the perceived problems associated with wetlands, including diseases, environmental pollution, flooding, neighbourhood conflicts, and mortality.

The second variable examined the diseases associated with wetlands, namely malaria, typhoid fever, diarrhoeal diseases, dermatological diseases, and other diseases identified by respondents.

The third variable assessed the perceived ecosystem services and socio-economic benefits of wetlands, including agricultural production, fish production, domestic water use, other ecosystem services, and the absence of perceived utility.

The selection of perception indicators was based on previous environmental perception studies emphasizing community knowledge of ecosystem services, environmental risks, and public health issues associated with wetlands (Ramsar Convention Secretariat, 2021).

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➢ *Data Analysis*

Completed questionnaires were coded and entered into Microsoft Excel 2019 for statistical processing. Data analysis relied exclusively on descriptive statistics, including frequencies and percentages, which are widely recommended for summarizing responses obtained from social and environmental perception surveys (Agresti, 2018).

Percentages were calculated according to the following equation:

$$P=(n/N)*100$$

Where:

- *P* represents the percentage of respondents;
- *n* is the number of responses recorded for a given category;
- *N* is the total number of respondents (N = 50).

The results were presented using frequency tables and graphical representations to illustrate the distribution of respondents' perceptions regarding wetlands.

➢ *Ethical Considerations*

Participation in the survey was entirely voluntary. Before each interview, respondents were informed about the objectives of the study, and verbal informed consent was obtained prior to data collection. No personal identifiers were recorded, and all information was treated confidentially and anonymously. The research complied with internationally accepted ethical principles governing social and environmental research involving human participants. (World Medical Association, 2013).

III. RESULTS

➢ *Perceived Problems Associated with Wetlands*

These findings indicate that local perceptions of wetlands in Mbuji-Mayi are primarily shaped by concerns related to public health and environmental degradation (Figure 2) :

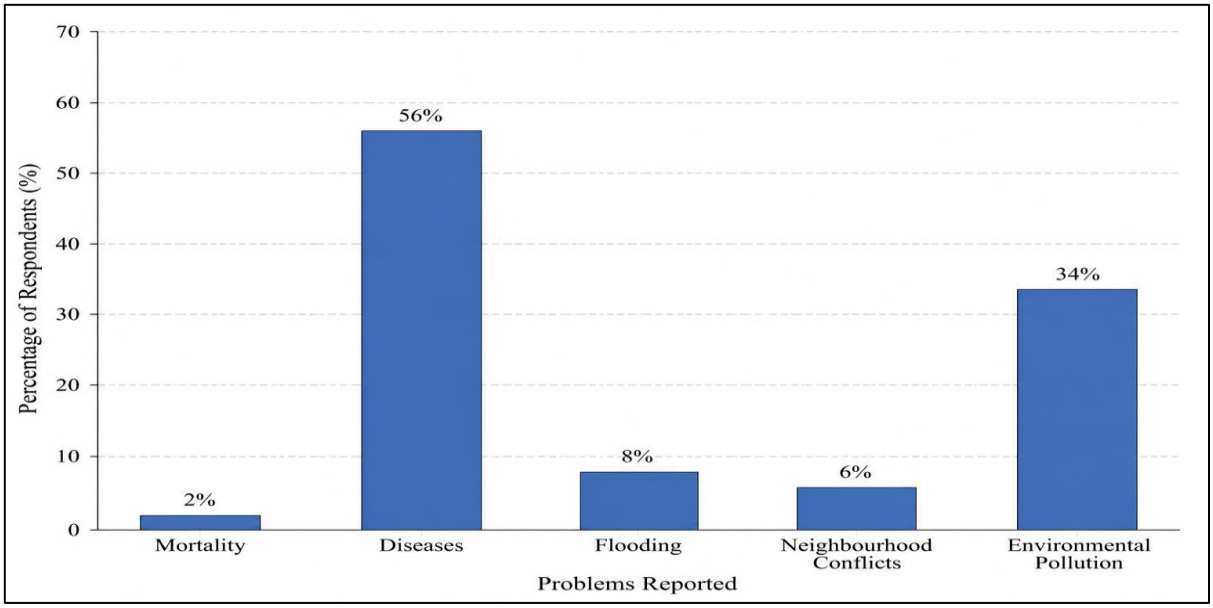


Fig 2 Major Problems Associated with the Presence of Wetlands in the Local Environment of Mbuji-Mayi, Democratic Republic of the Congo.

The results indicate that diseases are perceived as the most significant problem associated with wetlands, accounting for 56% of respondents' answers. This finding suggests that local communities primarily associate wetlands with public health risks, particularly vector-borne and water-related diseases, which are common in poorly managed wetland environments.

The second most frequently reported problem is environmental pollution (34%), reflecting increasing anthropogenic pressures on wetlands. Improper disposal of household waste, wastewater discharge, and unsustainable land-use practices likely contribute to the degradation of these ecosystems and reduce their capacity to provide essential ecosystem services.

Flooding (8%) represents another concern, although it was reported by a relatively small proportion of respondents. This result may indicate that while flooding occurs periodically, it is perceived as less frequent or less severe than health-related problems. Nevertheless, the occupation of wetlands and inadequate urban drainage systems can increase flood vulnerability in rapidly expanding urban areas.

Similarly, neighbourhood conflicts (6%) were identified as a minor but noteworthy issue. These conflicts are likely related to land tenure disputes, competition for agricultural land, and the increasing pressure on wetland resources resulting from urban expansion.

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Finally, mortality (2%) was the least frequently reported problem. Although reported by only a few respondents, this result should not be overlooked because it may represent indirect consequences of wetland-related diseases, flooding events, or environmental degradation affecting vulnerable populations.

➢ *Diseases Associated with Wetlands*

The results indicate that local communities predominantly associate wetlands with vector-borne and water-related health risks, particularly malaria and dermatological diseases.

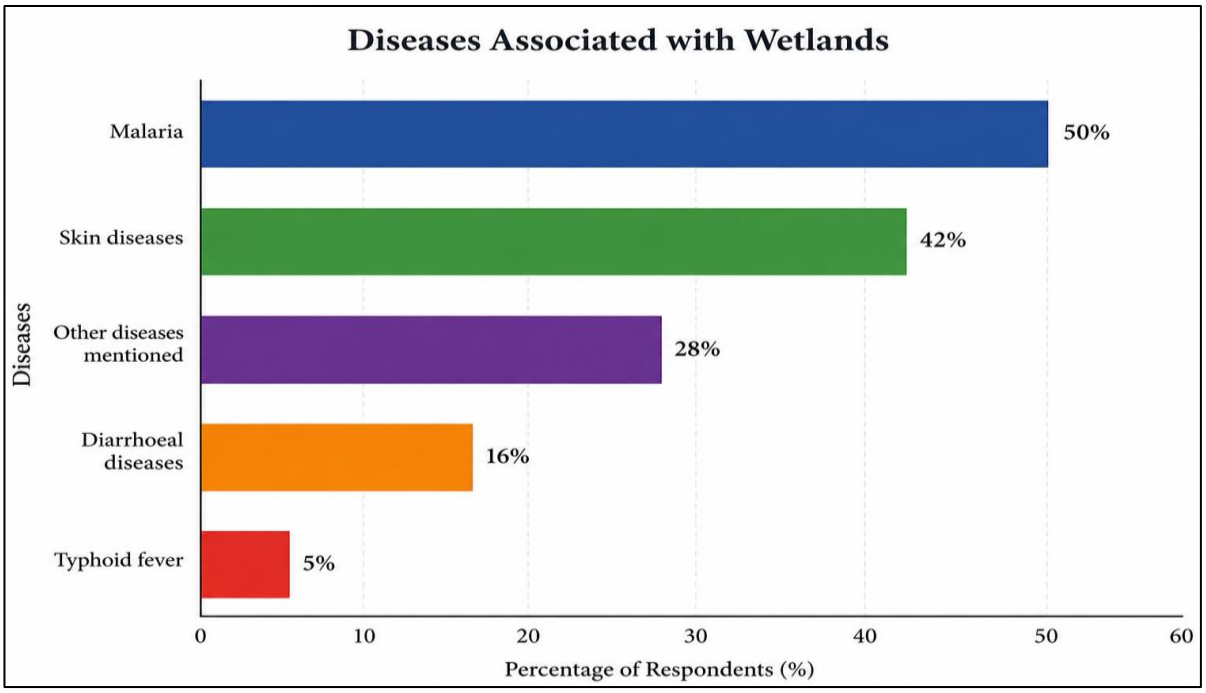


Fig 3 Local Communities' Perceptions of Diseases Associated with the Presence of wetlands in Mbuji-Mayi, Kasai Oriental Province, Democratic Republic of the Congo.

The results indicate that malaria (50%) is the disease most frequently associated with the presence of wetlands by the respondents. This perception reflects the widespread recognition that wetlands provide suitable breeding habitats for *Anopheles* mosquitoes, the primary vectors of malaria, particularly where water stagnation and inadequate environmental management occur.

The second most frequently reported disease is skin diseases (42%). This finding suggests that prolonged contact with contaminated water, poor sanitation, and exposure to polluted wetland environments are perceived as important risk factors for dermatological infections among local communities.

Other diseases (28%) ranked third, indicating that respondents associate wetlands with a broad range of additional health problems that were not specifically identified in the survey. These may include parasitic infections, respiratory illnesses, or other water-related diseases commonly observed in wetland-dependent environments.

Diarrhoeal diseases (16%) were also mentioned by a considerable proportion of respondents. These diseases are generally associated with inadequate access to safe drinking water, poor sanitation, and contamination of surface water, conditions that are frequently encountered in degraded wetland ecosystems.

Finally, typhoid fever (5%) was the least frequently reported disease. Although its frequency is relatively low, it remains an important public health concern because it is closely linked to poor water quality and inadequate hygiene practices.

➢ *Wetlands Map of Dibindi*

The spatial analysis indicates that wetlands within Dibindi Commune exhibit a discontinuous and heterogeneous spatial distribution. Their occurrence appears to be closely associated with the local hydrographic and topographic characteristics of the area. Wetland units are particularly concentrated in the vicinity of the Lubilanji River, as well as within topographic depressions and poorly drained areas where water accumulation is favored.

A relatively greater concentration of wetland features is observed in several sectors of the central and southern parts of Dibindi. Rather than forming a single continuous wetland complex, these ecosystems occur as multiple spatially distinct wetland units, varying in size, shape, and degree of connectivity. This spatial configuration suggests that wetland distribution in Dibindi is influenced by local variations in drainage patterns, surface-water dynamics, and topographic conditions.

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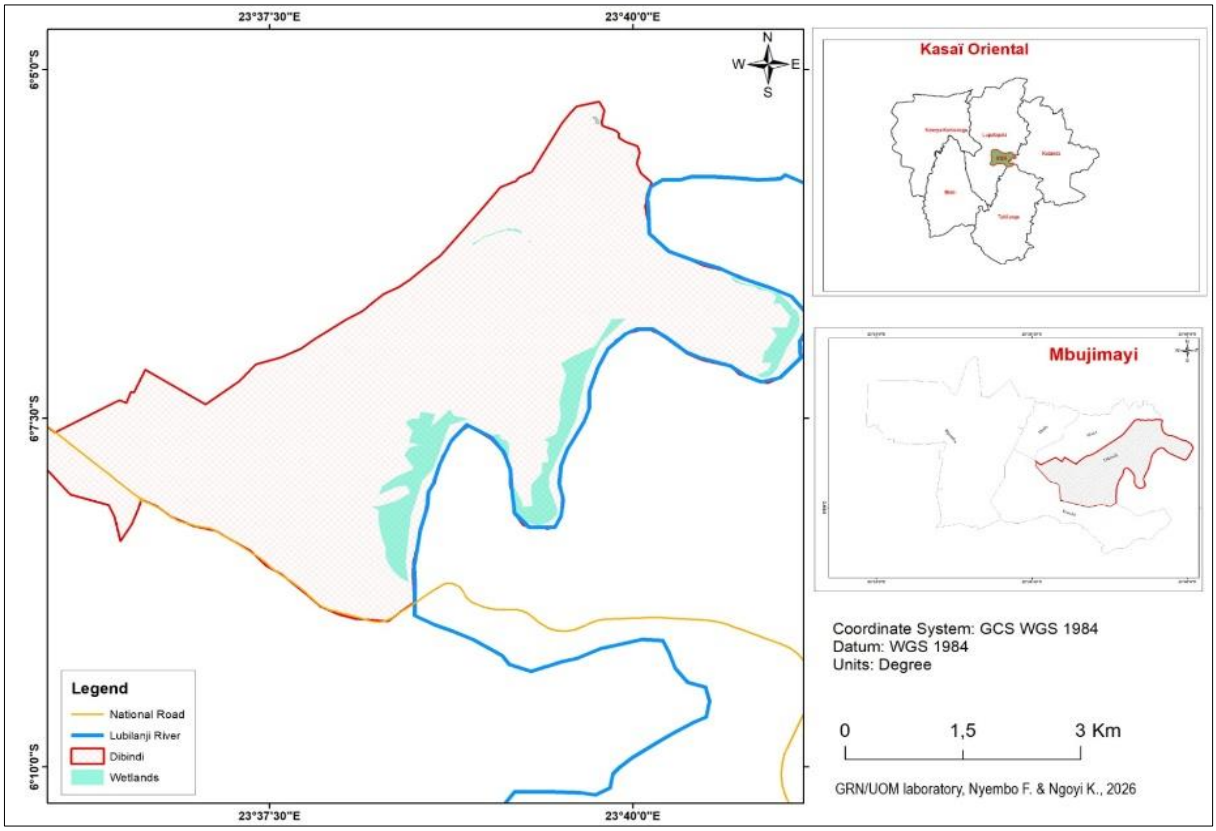


Fig 4 Spatial Distribution of Wetlands in Dibindi Commune, Mbuji-Mayi, Kasaï Oriental Province, Democratic Republic of the Congo

➢ *Perceived Ecosystem Services and Socio-Economic Benefits*

The survey findings (Figure 5) underscore the multifunctional role of wetlands, which are perceived as essential ecosystems supporting agricultural production, fisheries, domestic livelihoods, and numerous ecosystem services.

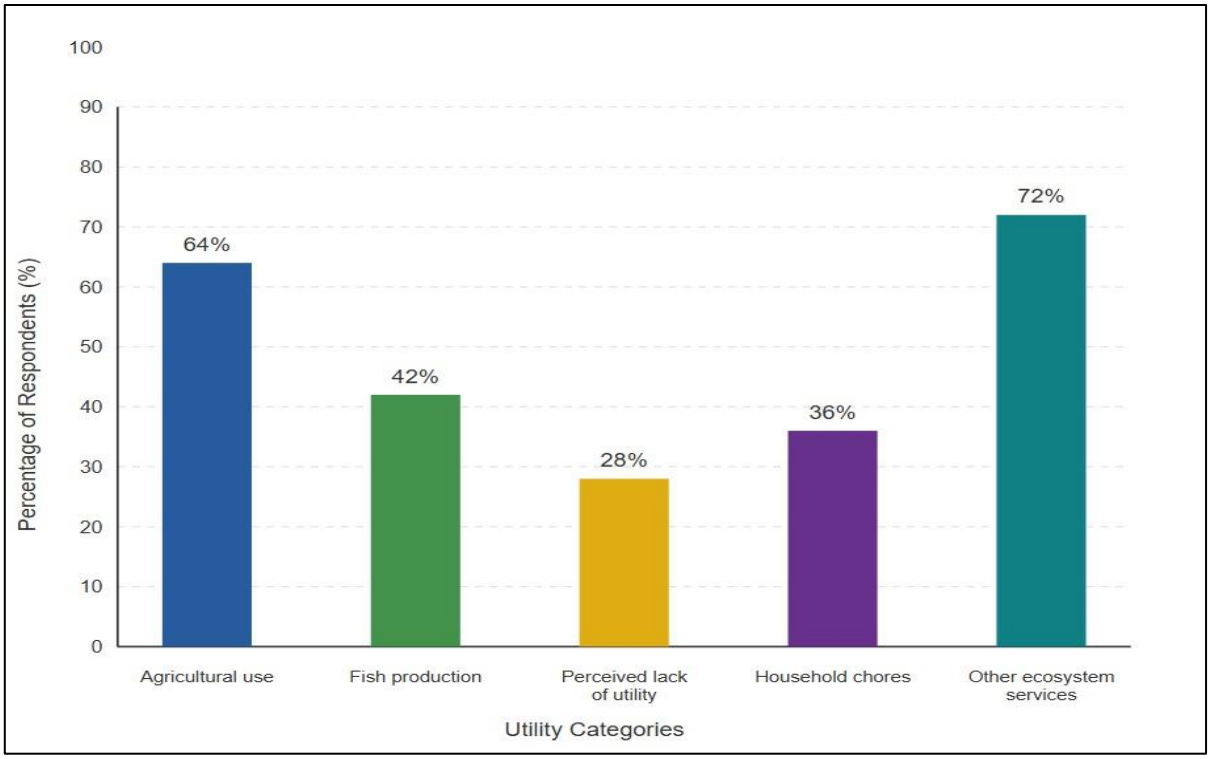


Fig 5 Percentage of Respondents Reporting the Perceived Utility of Wetlands, in Mbuji-Mayi (DR Congo).

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26nov366

The results indicate that other ecosystem services (72%) were the most frequently perceived benefits provided by wetlands. This finding suggests that local communities recognize that wetlands deliver multiple ecological functions beyond their direct economic uses, including water regulation, biodiversity conservation, groundwater recharge, climate regulation, and the provision of natural resources essential for livelihoods.

Agricultural use (64%) ranked second among the perceived utilities. This high percentage reflects the importance of wetlands as productive agricultural areas, particularly during the dry season when their fertile soils and permanent water availability support vegetable cultivation and other farming activities. Wetlands therefore constitute an important component of household food security and income generation in Mbuji-Mayi.

Fish production (42%) was also identified as a significant ecosystem service. Respondents recognize wetlands as habitats that support fish populations and contribute to local food supplies and livelihoods, although fishing activities appear to be less important than agricultural use in the study area.

Domestic activities (36%), including water collection, washing, and other household uses, were reported by over one-third of respondents. This result highlights the dependence of local communities on wetlands for daily domestic needs, particularly where access to improved water infrastructure remains limited.

Finally, 28% of respondents reported that wetlands have no perceived utility. This proportion suggests that a segment of the population either lacks awareness of the ecological and socio-economic benefits of wetlands or primarily associates these ecosystems with environmental problems such as diseases, flooding, and pollution. Such perceptions underscore the need for environmental education and community awareness programmes aimed at improving public understanding of the multiple ecosystem services provided by wetlands.

IV. DISCUSSIONS

- *The Principal Environmental and Socio-Economic problems Associated with Wetlands,*

The findings indicate that diseases (56%) are perceived as the most important problem associated with wetlands, followed by environmental pollution (34%), flooding (8%), neighbourhood conflicts (6%), and mortality (2%). These results demonstrate that local communities primarily associate wetlands with health and environmental risks rather than with their ecological functions. Similar patterns have been documented in several studies conducted in Sub-Saharan Africa and the Democratic Republic of the Congo (DRC).

The predominance of diseases is consistent with the findings of Anthonj et al. (2019), who investigated health-risk perceptions among wetland-dependent communities in Kenya. Their study revealed that local populations correctly identify wetlands as environments that may facilitate the transmission of water-related and vector-borne diseases, including malaria, typhoid fever, diarrhoeal diseases, and skin infections. The authors further demonstrated that these perceptions closely reflect the actual health risks associated with poor sanitation, inadequate water supply, and frequent human contact with contaminated wetland environments. These observations support the high proportion of respondents in Mbuji-Mayi who identified diseases as the principal problem associated with wetlands.

The importance attributed to environmental pollution (34%) is also supported by recent studies on tropical wetlands. According to Mirenge et al. (2023), wetlands in eastern DRC are increasingly threatened by agricultural expansion, urbanization, and uncontrolled waste disposal, all of which contribute to declining water quality and reduced ecosystem services. Similarly, Chuma et al. (2024) reported that anthropogenic pressures and climate variability significantly impair the ecological functioning of wetlands in the Ruzizi Plain, thereby reducing their capacity to regulate water resources and support local livelihoods. These findings suggest that pollution is both a consequence and a driver of wetland degradation in rapidly growing urban centres such as Mbuji-Mayi.

Although flooding (8%) was reported by a relatively small proportion of respondents, it remains an important environmental concern. Wetlands naturally regulate runoff and store excess water during periods of heavy rainfall. However, when they are degraded or converted for agriculture and urban development, their flood-buffering capacity declines considerably. Recent studies in eastern DRC emphasize that the loss of wetland functions increases the vulnerability of surrounding communities to flooding and other climate-related hazards, highlighting the importance of integrated wetland conservation for disaster risk reduction.

The relatively low percentage of respondents reporting neighbourhood conflicts (6%) may reflect localized disputes over land ownership and resource use. Urban expansion, increasing demand for agricultural land, and weak land governance often intensify competition for wetlands. Although these social conflicts are less frequently reported than health-related issues, they constitute an important dimension of wetland management because they may accelerate ecosystem degradation through uncontrolled occupation and exploitation.

Finally, mortality (2%) was the least frequently cited problem. Nevertheless, this result should not be underestimated, as mortality may occur indirectly through severe malaria, water-borne diseases, or flood-related disasters. The relatively low percentage suggests that local communities perceive mortality as an occasional consequence of broader environmental and health problems rather than as a direct impact of wetlands.

Overall, the present findings are consistent with the scientific literature, which recognizes wetlands as ecosystems

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26nov366

providing substantial socio-economic benefits while simultaneously posing health and environmental challenges when they are poorly managed. Elsevier studies emphasize that inadequate water, sanitation, and hygiene (WASH) conditions, combined with environmental degradation, substantially increase exposure to infectious diseases in wetland environments. Likewise, recent *Scientific Reports* studies conducted in the Democratic Republic of the Congo demonstrate that sustainable wetland management is essential for preserving ecosystem services, improving public health, and enhancing climate resilience. Consequently, the perceptions documented in Mbuji-Mayi provide valuable baseline information for future wetland mapping, conservation planning, and ecosystem-based urban management strategies.

- *Local Communities' Perceptions of Diseases Associated with the Presence of Wetlands*

The results indicate that malaria (50%) is the disease most frequently associated with wetlands by the respondents, followed by skin diseases (42%), other diseases (28%), diarrhoeal diseases (16%), and typhoid fever (5%). These findings demonstrate that local communities primarily perceive wetlands as environments that increase exposure to vector-borne and water-related diseases. Similar observations have been reported in several studies conducted in Sub-Saharan Africa and the Democratic Republic of the Congo (DRC), highlighting the close relationship between wetland ecosystems, environmental conditions, and public health.

The predominance of malaria is consistent with the findings of Mitchell et al. (2022), who investigated the influence of environmental changes on malaria prevalence in the Democratic Republic of the Congo. Published in *Scientific Reports*, their study demonstrated that land-use change, wetland disturbance, and human activities that create stagnant water significantly increase suitable breeding habitats for *Anopheles* mosquitoes, thereby enhancing malaria transmission. The authors concluded that environmental degradation, rather than wetlands themselves, is a major determinant of malaria risk in rapidly expanding urban and peri-urban landscapes.

The high proportion of respondents identifying skin diseases (42%) is also supported by previous research. Anthonj et al. (2018) reported that communities living in or around wetlands frequently experience dermatological infections because of repeated contact with contaminated water during agricultural activities, fishing, and domestic water use. Their study further showed that poor sanitation, inadequate hygiene, and polluted wetlands substantially increase exposure to pathogenic microorganisms responsible for skin infections.

Although diarrhoeal diseases (16%) and typhoid fever (5%) were reported less frequently than malaria, they remain important indicators of inadequate water quality and sanitation. According to Anthonj et al. (2018), degraded wetlands receiving untreated domestic wastewater often become reservoirs of pathogenic bacteria and parasites, increasing the incidence of diarrhoeal diseases and typhoid fever among nearby populations. The relatively low percentage reported for typhoid fever in the present study may reflect either lower disease prevalence or limited awareness among respondents regarding its association with contaminated water sources.

Approximately 28% of respondents referred to other diseases, suggesting that local communities recognize a broader spectrum of health problems related to wetlands. These may include parasitic infections, respiratory diseases associated with humid environments, or other vector-borne diseases. Similar findings have been reported by Mbanzulu et al. (2020), whose review of mosquito-borne diseases in the Democratic Republic of the Congo emphasized that environmental degradation and expanding wetland habitats may facilitate the emergence or persistence of multiple infectious diseases beyond malaria.

The perceptions documented in this study are also consistent with recent research on wetland degradation in eastern DRC. Mirenge et al. (2023) demonstrated that anthropogenic activities, including agricultural expansion, settlement development, and improper waste disposal, significantly deteriorate wetland water quality. Such environmental degradation increases human exposure to contaminated water and disease vectors while simultaneously reducing the capacity of wetlands to provide essential ecosystem services. Likewise, Chuma et al. (2024) showed that conserving wetlands improves water regulation and environmental quality, thereby contributing indirectly to the reduction of public health risks in surrounding communities.

- *Wetland Distribution and Sustainable Valorization*

The spatial analysis indicates that wetlands within Dibindi Commune exhibit a discontinuous and heterogeneous spatial distribution, with wetland units occurring predominantly along the Lubilanji River, within topographic depressions, and in poorly drained areas. This spatial configuration reflects the influence of local hydrological and topographic conditions on wetland occurrence and functioning. Similar relationships between wetland distribution, hydrological conditions, landform characteristics, and human use have been documented in several African wetland systems (Mirenge et al., 2023).

Beyond their ecological functions, the wetlands of Dibindi represent potentially important multifunctional spaces for local livelihoods and food production. Wetlands provide a range of provisioning and regulating ecosystem services, including water supply, food production, agricultural land, fish production, flood regulation, and nutrient retention. In urban and peri-urban environments, these functions may become particularly important because wetlands can provide productive spaces where access to water is relatively more reliable than in surrounding upland areas (Mirenge et al., 2023).

- *Potential for Market Gardening*

The spatial concentration of wetlands around the Lubilanji River and in poorly drained depressions suggests significant potential for the development of small-scale

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26nov366

market gardening. Wetland agriculture can benefit from relatively high soil moisture and water availability, allowing farmers to cultivate vegetables during periods when water becomes limiting in upland agricultural areas. In Bamenda, Cameroon, for example, wetlands are extensively used for vegetable cultivation, particularly during the dry or off-season period, when access to water gives wetland farmers an important production advantage (Asongwe et al., 2017; Dingha et al., 2025).

However, wetland agriculture also presents environmental risks when development is poorly controlled. Asongwe et al. (2017) showed that the use of urban wetlands as vegetable gardens can contribute to environmental and food-safety concerns when agricultural practices are not adequately managed. Consequently, the development of market gardening in Dibindi should be based on appropriate land-use planning, soil and water-quality assessment, controlled use of agricultural inputs, and maintenance of natural drainage and hydrological processes.

- *Potential for Fish Farming and Aquaculture*

The proximity of several wetland units to the Lubilanji River also indicates potential for small-scale fish farming and integrated aquaculture. Fish production could contribute to improving household access to animal protein, diversifying sources of income, and strengthening local food systems. Evidence from the Democratic Republic of the Congo is particularly relevant. In South Kivu, agriculture and aquaculture are among the major uses of marshlands, demonstrating the importance of wetlands for both crop production and fish production (Chuma et al., 2021).

Nevertheless, the South Kivu experience also demonstrates that increasing pressure from agriculture, aquaculture, settlement, and other activities can threaten wetland ecological functions. Chuma et al. (2021) reported that anthropogenic pressures are contributing to the transformation of marshlands and potentially affecting their capacity to provide ecosystem services. Therefore, aquaculture development in Dibindi should be implemented through controlled fish ponds and appropriate water management rather than through uncontrolled conversion of natural wetland habitats.

- *Integrated Wetland Valorization*

The combination of wetland agriculture and aquaculture could provide an opportunity for developing an integrated wetland production system in Dibindi. Such an approach could combine fish production with market gardening while promoting more efficient use of water and nutrients. The objective should not be to convert all wetlands into agricultural or aquaculture areas, but rather to identify zones where productive activities can occur without compromising the ecological functions of sensitive wetland units.

This perspective is particularly relevant in the Democratic Republic of the Congo, where marshlands are increasingly recognized as important agricultural spaces but also as fragile ecosystems requiring sustainable management. Balasha (2025) emphasizes that Congolese marshlands possess important agricultural potential because of their water availability, organic matter, and nutrient-rich soils, while simultaneously warning that their intensification can threaten their ecological integrity if management practices are inappropriate.

The situation observed in Dibindi should therefore be considered within the broader framework of sustainable wetland valorization, in which food production, income generation, ecosystem conservation, and local community needs are considered simultaneously. Research in South Kivu has shown that farmers already use different strategies to adapt agricultural production to climatic variability, including crop diversification, mulching, drainage management, and the use of organic manure (authors, 2023). Such approaches could provide useful lessons for the development of more resilient agricultural practices in Dibindi.

- *Implications for Planning and Management*

The cartographic inventory developed in this study provides an important baseline for subsequent assessment of the ecological and economic potential of Dibindi's wetlands. The next stage should combine wetland mapping with field measurements of surface area, soil properties, water availability, water quality, current land use, fish resources, and ecosystem services.

From a planning perspective, the wetlands could be classified into three broad management categories: (1) conservation areas, where ecological functions should be maintained; (2) controlled-use areas, where market gardening or aquaculture may be permitted under appropriate management practices; and (3) restoration or rehabilitation areas, where ecological degradation has already occurred. Such zoning would help reconcile the economic value of wetlands with the need to maintain their hydrological and ecological functions.

Thus, the wetlands mapped in Dibindi should not be considered merely as vacant or waterlogged spaces. They constitute natural assets with ecological, agricultural, nutritional, and socio-economic value. Their sustainable valorization through appropriately managed market gardening and fish farming could contribute to local food security and livelihood diversification, provided that these activities remain compatible with the conservation of wetland ecosystem functions.

➢ *Perceived Ecosystem Services*

The present study revealed that other ecosystem services (72%) were the most frequently perceived benefits of wetlands, followed by agricultural use (64%), fish production (42%), domestic activities (36%), and the absence of perceived utility (28%). These findings demonstrate that local communities recognize wetlands as multifunctional ecosystems that provide a wide range of provisioning and regulating services essential for their livelihoods. Similar observations have been reported in recent studies conducted in Sub-Saharan Africa and the Democratic Republic of the Congo (DRC), emphasizing the critical contribution of wetlands to rural and urban livelihoods.

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26nov366

The high proportion of respondents acknowledging other ecosystem services (72%) suggests that local populations recognize the ecological importance of wetlands beyond their direct economic value. These services include water regulation, groundwater recharge, flood mitigation, biodiversity conservation, carbon sequestration, and climate regulation. This finding is consistent with the conclusions of Chuma et al. (2024), published in *Scientific Reports*, who demonstrated that wetlands in the Ruzizi Plain (eastern DRC) play a crucial role in integrated water resources management and climate resilience. Their study showed that conserving wetlands significantly improves hydrological regulation while enhancing ecosystem resilience under future climate change scenarios.

The perception of agricultural use (64%) as one of the principal benefits is consistent with studies conducted in eastern DRC. Mirenge et al. (2023) reported that wetlands are extensively used for crop production because of their fertile soils and year-round water availability. However, the authors also demonstrated that agricultural intensification contributes to land-cover change and water quality degradation, reducing the long-term capacity of wetlands to provide ecosystem services. Similar conclusions were reached by Chuma et al. (2021), who identified agriculture as the dominant driver of wetland utilization around South-Kivu urban centres while emphasizing the need for sustainable land management practices.

The relatively high proportion of respondents reporting fish production (42%) confirms the importance of wetlands as habitats supporting aquatic biodiversity and local food security. According to Davidson et al. (2023), wetlands are among the world's most productive ecosystems because they sustain fisheries, maintain aquatic habitats, and contribute significantly to household nutrition and income generation. Their synthesis emphasizes that inland wetlands provide essential provisioning services for millions of people, particularly in developing countries where fisheries remain a critical source of protein.

Approximately 36% of respondents identified wetlands as important for domestic activities, including water collection, washing, and other household uses. This finding reflects the continued dependence of many African communities on wetlands where access to improved water infrastructure remains limited. Anthonj et al. (2018) demonstrated that wetlands simultaneously provide valuable water resources while exposing users to health risks when water quality is compromised. Their study highlights the dual role of wetlands as both indispensable livelihood resources and potential sources of disease where sanitation conditions are inadequate.

Interestingly, 28% of respondents considered wetlands to have no perceived utility. This perception may result from the fact that many communities associate wetlands primarily with flooding, pollution, mosquitoes, and disease outbreaks rather than with their ecological functions. Similar observations have been reported by Schuyt (2005) and more recently by Davidson et al. (2023), who noted that the benefits of wetlands often remain undervalued because many ecosystem services, particularly regulating and supporting services, are indirect and therefore less visible to local populations. This underestimation frequently contributes to wetland degradation through land conversion and unsustainable exploitation.

V. CONCLUSIONS

This preliminary study provides valuable insights into local perceptions of wetlands in the savanna region of Mbuji-Mayi (Kasai Oriental Province, Democratic Republic of the Congo) and constitutes an important first step toward their mapping and sustainable valorization. The findings demonstrate that local communities perceive wetlands as ecosystems characterized by both significant socio-economic benefits and considerable environmental and public health challenges.

From a health perspective, respondents primarily associated wetlands with diseases, particularly malaria and skin diseases, reflecting concerns related to inadequate sanitation, environmental degradation, and vector proliferation. These perceptions are consistent with current scientific evidence indicating that degraded wetlands and poor environmental management increase exposure to water-related and vector-borne diseases.

At the same time, the study highlights the substantial economic importance of wetlands for local livelihoods. Respondents recognized agriculture, fish production, domestic water use, and a broad range of ecosystem services as the principal benefits derived from these ecosystems. Such perceptions confirm that wetlands play a fundamental role in food security, household income generation, and the provision of essential ecosystem services, including water regulation, biodiversity conservation, and climate resilience.

The coexistence of perceived benefits and environmental risks illustrates the complex relationship between local communities and wetlands. While these ecosystems represent valuable natural assets, increasing anthropogenic pressures—including urban expansion, agricultural intensification, pollution, and inadequate land-use planning—threaten their ecological integrity and long-term sustainability.

The results of this study therefore emphasize the necessity of integrating local ecological knowledge with geospatial technologies, including remote sensing, Geographic Information Systems (GIS), and field surveys, to improve wetland inventory, mapping, and ecosystem service assessment. Such an integrated approach would support evidence-based planning and facilitate the identification of priority areas for conservation, restoration, and sustainable use.

Ultimately, the sustainable management of wetlands in Mbuji-Mayi requires multidisciplinary collaboration involving researchers, local communities, environmental authorities, and development partners. Strengthening

ISSN No:-2456-2165 https://doi.org/10.38124/ijisrt/26nov366

environmental education, improving sanitation infrastructure, promoting sustainable agricultural practices, and implementing participatory wetland management strategies will be essential for maintaining the ecological functions of wetlands while enhancing the well-being and resilience of local populations.

This preliminary assessment provides a scientific basis for future ecological mapping, ecosystem valuation, and policy development aimed at ensuring the sustainable conservation and management of wetlands in the savanna landscapes of the Democratic Republic of the Congo.

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