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POLICY BRIEF

Biomonitoring of Lake Aheme, Benin, using macro-invertebrate diversity: state of the art & policy implications for sustainable management

GOALS

This study aimed at gathering information on physicochemical variables and on the qualitative composition of aquatic macroinvertebrate communities of Lake Aheme, Benin. This approach allows to identify which habitats are (more) polluted, and which sites are most in need of conservation. Environmental education building on bio-monitoring, will strengthen the awareness of stakeholders. This study provides baseline data for future biomonitoring routine.

APPROACH

The sampling was carried during one year at nine sites covering a range of key habitats from mangroves to agricultural areas, human settlements, and industrial outlet areas.

Organisms were identified to genus and family levels. Biological and environmental data were analysed according to sites and months to focus on the spatial and temporal assemblage pattern of macroinvertebrate communities in relation to environmental variables.

Results and policy recommendations

Environmental characteristics of Lake Aheme

The following parameters were measured: spatial and temporal variability of water column depth, transparency, dissolved oxygen, temperature, conductivity, total dissolved solids, pH, salinity, nitrite, nitrate, orthophosphate, total nitrogen, total phosphorus and Biochemical Oxygen Demand. Our findings suggested that seasonal and hydroclimatic changes (ocean Atlantic intrusion and inflow from the main connected rivers), as well as anthropogenic activities (acadjas i.e. artificial fish breeding sites, industrial discharges, domestic wastes) were affecting these variables. Most sites showed organic pollution.

Recommendations:

- Working with local populations to prevent new installations of acadjas in the channel of Aho that impede the lake's connection to the Atlantic Ocean.
- Maintain the permanent connection of the lake to the Couffo river, which contributes to the regulation of the physicochemical characteristics of the lake.
- Better treatment of the industrial waste water discharged at Possotomè, which regularly presents a foaming visual aspect, is necessary to limit the discharge impact on the lake characteristics.
- Raise awareness about municipal solid waste management, especially around densely populated southern localities.
- Raise awareness among local populations about better waste management. To ensure that the collection of household wastes is carried out by approved and affordable pre-collection structures to allow the participation of local communities, who do not have the means to pay the service. In this regard, local communities should be aware of waste management activities and have a strong understanding of the benefits of proper solid waste management.
- Develop regular monitoring of selected physicochemical variables (eutrophication and heavy metals indicators) of Lake Aheme, to follow up on lake management measures.

Results and policy recommendations

Macroinvertebrates ecology and biomonitoring for sustainability

During this study, representatives from 50 macro-invertebrate families were identified: 15 insects, 13 crustaceans, 1 arachnid, 8 gastropods, 7 bivalves, 2 oligochaetes and 4 polychaetes. The taxa collected showed spatial and seasonal variation in abundance and occurrence mainly in relation to salinity, temperature, transparency, dissolved oxygen, conductivity, pH, nitrate and nitrite. Generally, mangroves showed higher diversity, traditional sand dredging areas showed lower diversity.

Recommendations:

- Develop biomonitoring programme of the lake to collect large and diverse dataset. Data collected for ecological purposes limited in time and space will not reflect the full extent of local biodiversity and cannot be as effective. It will also allow detection of eventual shifts in species distribution.
- Biomonitoring tool should focus on macroinvertebrates relevant for local communities (e.g. as fished species) and relevant as bio-indicators (e.g. typical for polluted or for healthy sections of the lake).
- Adoption and enforcement of lake management policies against eutrophication and contributing to good health status favourable for establishment of large biodiversity.
- Set up an operational plan for the participatory monitoring and management of sensitive habitats, particularly mangroves. This includes mangroves reforestation at degraded riverbanks.
- During planned dredging, to put in place a safety strip of at least 100 m around the mangrove strips along the banks.
- Develop sanctuary biological reserve areas for local biota using both local and scientific knowledge.
- Use sectoral dredging option. The northern area (freshwater sites) of Agonsa and Yèmè, where traditional dredging has already taken place, should not be dredged simultaneously.
- Strictly limited dredging activities to surfaces necessary
- Protect as much as possible the sensitive ecosystems of the RAMSAR 1017 environment.
- Follow the suggestions made in the environmental and social impact assessment document produced for the dredging



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About this Policy Brief

This Policy Brief aims at providing recommendations to policy-makers and resources exploiters based on key research results of the biodiversity research project funded by Rufford Foundation.

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