Final Evaluation Report

Your Details	
Full Name	WASSO SHUKURU Dieudonne
Project Title	Development of a community-based approach of protection of fish and crab's biodiversity from disastrous effects of mining activities in DR Congo
Application ID	38797-1
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1. Indicate the level of achievement of the project's original objectives and include any relevant comments on factors affecting this.

Objective	Not achieved	Partially achieved	Fully achieved	Comments
To inventory the freshwater fish and crab species available in Mwenga territory, South Kivu province, DR Congo.			■	Freshwater fish and crab species have been identified using identification keys and the confirmation was done using molecular tools. The molecular biology identification brought more precision in the identity of the different fish and crab species.
To assess the effect of mining activities on the biodiversity of crab and fish species available in Mwenga territory, South Kivu province, DR Congo.			■	Mining activities affect the Mwenga aquatic biodiversity through changes in water quality parameters and the impact of heavy metals on the survival of fish and crab species.
To determine the population perception about the effect of mining activities on the fish and crab's yield and biodiversity as well as on the revenue of farmers/fishers,			■	Population perceptions varied depending on the specific areas (Kabonge and Wamuzimu fishers showed the highest risk of perceiving the negative effects of mining activities compared to Basile fishers). In addition, these were also affected by the age (older fishers were more likely to observe negative effects than younger ones). Perceptions were also affected by the gender and the distance separating the fishing site to the mining areas.
To develop and vulgarize community-based strategies that will enable the protection of the fish			■	Through focus group discussions held with the different stakeholders, community-based strategies have been developed. We realised that miners were hesitant to adopt and

and crabs' biodiversity				accept suggested strategies as mining activities represent their main source of income. Thus, among the suggested solutions included the creation of alternative source of incomes for miners in the study areas as this will decrease the intensive mining.
To empower stakeholders including fishers, farmers, mining operators, environmentalists, government representatives and local communities who will be applying the defined community-based strategies for the protection of fish and crab biodiversity against mining activity threats.				This empowerment was effective thanks to the interest shown by the various stakeholders in the project, who made themselves available for the various empowerment sessions and shared the knowledge they acquired with other members of the community.

2. Describe the three most important outcomes of your project.

a) Identification of Declining Fish and Crab Species: One crucial outcome of this project is the identification of declining fish and crab species in Mwenga territory, South Kivu province, DR Congo. Through the collection and analysis of samples, as well as histological assessments, this project has highlighted the alarming trend of decreasing biodiversity in the region. This insight is crucial for understanding the impact of mining activities on local aquatic ecosystems and can serve as a baseline for conservation efforts. Fish species whose trend is showing a decrease include *Oreochromis* sp., *Amphilius* sp., *Microctenopoma* sp., *Piramboia* sp., *Astatotilapia* sp., and *Clarias* sp..

b) Community-based Management Strategies: Another significant outcome is the development of community-based strategies aimed at protecting fish and crab biodiversity against the threats posed by mining activities. By engaging with stakeholders, conducting focus group discussions, and involving local communities, this project has proposed a comprehensive set of strategies to safeguard aquatic biodiversity. These strategies, ranging from strict water management to fostering conservation initiatives, have the

potential to make a meaningful impact on preserving the local fish and crab populations.

Suggested strategies include:

1. The strict channelling of water used for fish farming (suggested by more than 80% of stakeholders). This water should not be in contact with any mining canalisation.

2. Raise awareness: Conduct community education programmes and workshops to create awareness of the detrimental impacts of mining on fish and crab populations and their habitats. By informing the community about the potential consequences, they can better understand the need to protect fish and their ecosystems.

3. Creation of local regulations: Collaborate with local authorities, fishery management agencies, and community members to establish regulations that specifically address mining activities and their impacts on fish populations. This can include restrictions on mining practices near water bodies or setting limits on pollutant discharge into rivers and streams.

4. Strengthening monitoring and enforcement: Empower local communities to monitor mining activities and report any suspicious or illegal mining practices that may harm fish and crab populations. By working closely with law enforcement agencies, community members can play an active role in ensuring compliance with environmental regulations.

5. Foster community-led conservation initiatives: Encourage the formation of community-based organisations or fishery cooperatives that aim to protect the local fish populations and their habitats. These groups can promote sustainable fishing practices, establish protected areas or fish sanctuaries, and actively engage in habitat restoration efforts.

6. Engage in dialogue and negotiation: Facilitate dialogue between mining companies, government agencies, and local communities to find common ground and develop mutually beneficial solutions. This can involve negotiating for responsible mining practices, mitigating negative impacts, and compensating communities for any damages caused to fish and crab populations.

7. Implement alternative livelihood options: Support the development of alternative income-generating activities for local communities, such as ecotourism or sustainable agriculture, which reduce the reliance on

mining. By providing viable alternatives, communities may be more inclined to protect their fish populations and habitats.

8. Building capacity: Provide training and capacity-building programmes to local communities, empowering them to monitor water quality, assess fish and crab populations, and implement sustainable fishing practices. Building local expertise will ensure the long-term protection and management of fish and their habitats.

c) Empowerment of Stakeholders: The empowerment of stakeholders, including fishers, farmers, mining operators, environmentalists, government representatives, and local communities, is a crucial outcome of this project. By involving these key players in the assessment of the effects of mining activities on fish and crab populations, as well as in the development and implementation of conservation strategies, this project has created a sense of ownership and responsibility among stakeholders. This empowerment is essential for ensuring the sustainability of conservation efforts and the long-term protection of aquatic biodiversity in the region.

3. Explain any unforeseen difficulties that arose during the project and how these were tackled.

1. Logistical Challenges: One of the main difficulties encountered was accessing sampling locations in challenging terrain and coordinating with local authorities and communities. To overcome these challenges, the project team established strong communication channels with local partners and procured suitable transportation options. Building strong relationships with local stakeholders and developing efficient logistical plans helped in mitigating these challenges.

2. Weather-related issues: Unpredictable weather conditions, such as heavy rainfall, posed challenges during the fieldwork, affecting data collection activities and sample processing. To address these issues, the project team closely monitored weather forecasts, adjusted fieldwork schedules accordingly, and ensured that safety protocols were strictly followed to protect the team members and equipment.

3. Community Engagement: Engaging with local communities and obtaining their cooperation in data collection and conservation efforts proved to be more challenging than anticipated. Some communities were initially hesitant to share information or participate in the project due to trust issues or concerns about the project's objectives. To tackle this challenge, the project team organised community meetings, built rapport with community leaders, and conducted awareness campaigns to explain the project's aims and benefits. By actively involving community members in decision-making processes and emphasising the

importance of their contributions, the team was able to overcome these initial barriers and foster meaningful collaboration.

4. Describe the involvement of local communities and how they have benefitted from the project.

The involvement of local communities has been a fundamental aspect of the project, and their active participation has contributed significantly to its success. Here is a description of the keyways in which local communities have been involved and the benefits they have derived from the project:

1. Collaborative Data Collection: Local communities have actively participated in data collection activities, such as assisting in sampling fish and crab populations, providing information on local biodiversity, and sharing their traditional knowledge of the aquatic ecosystems in the region. By involving community members in these tasks, the project has not only benefited from their insights and expertise but has also empowered them to take ownership of the conservation efforts.

2. Capacity Building: The project has organised training sessions and workshops for local community members to enhance their understanding of biodiversity conservation, sustainable resource management, and the impact of mining activities on aquatic ecosystems (fish and crab species). These capacity-building initiatives have equipped community members with valuable skills and knowledge to actively contribute to the protection of fish and crab populations in the region.

3. Awareness and Education: The project has conducted outreach programmes and awareness campaigns within local communities to educate residents about the importance of conserving aquatic biodiversity and the threats posed by mining activities to fish and crab biodiversity. By raising awareness and promoting environmental stewardship, the project has helped community members develop a deeper appreciation for their natural surroundings and encouraged them to become advocates for conservation initiatives.

4. Empowerment and Engagement: Through meaningful engagement with local communities, the project has empowered community members to actively participate in decision-making processes concerning conservation strategies and sustainable resource management practices. By involving stakeholders in the development and implementation of conservation plans, the project has fostered a sense of ownership and responsibility among community members, leading to more sustainable and effective conservation outcomes.

5. Are there any plans to continue this work?

Yes, there are plans in place to continue the work initiated by this project and further consolidate the conservation efforts in the region. Here are some key plans for the continuation of this work:

1. Further studies assessing the impact of mining residues found in fish and crab on consumers (humans) are crucial.

2. Long-Term Monitoring Programs: Establishing long-term monitoring programmes to track the population trends of fish and crab species in Mwenga territory will be crucial for assessing the effectiveness of conservation measures and understanding the impact of ongoing environmental changes. By collecting data over an extended period, researchers can identify patterns, detect any emerging threats, and adapt conservation strategies accordingly.

3. Community Engagement and Capacity Building: Continued engagement with local communities will be essential for sustaining conservation initiatives and ensuring the active participation of community members in conservation efforts. Building on the existing relationships and partnerships established during the project, there will be ongoing efforts to involve communities in decision-making processes, capacity-building activities, and awareness campaigns to promote environmental stewardship.

4. Policy Advocacy and Stakeholder Collaboration: Collaborating with policymakers, government agencies, non-governmental organisations, and other stakeholders will be crucial for advocating for policy reforms and promoting sustainable resource management practices in the region. By engaging with relevant stakeholders and sharing research findings, the project aims to influence conservation policies and promote the integration of biodiversity conservation into environmental regulations and development plans.

5. Research Expansion and Interdisciplinary Studies: Expanding the scope of research to include interdisciplinary studies that investigate the broader ecological, social, and economic impacts of mining activities on aquatic ecosystems will be a priority. By incorporating diverse perspectives and expertise, the project aims to generate comprehensive data that can inform holistic conservation strategies and facilitate a more nuanced understanding of the complex interactions between human activities and biodiversity.

6. How do you plan to share the results of your work with others?

Sharing the results of the project with a wider audience is essential to maximise the impact of the research findings and promote awareness of the conservation efforts undertaken in Mwenga territory. Here are some key strategies planned for disseminating the results of the project:

1. Scientific Publications: The first publication arising from results of this study has been submitted to 'Aquaculture" journal. We intend to make one more publication (scientific paper) from the results of this project. By disseminating findings in reputable scientific publications, the project aims to reach the academic community, researchers, and policymakers who can benefit from the insights and recommendations generated by the project.

2. Conferences and Workshops: One conference and workshops have been organised during the project execution time. Presenting the research findings at conferences, workshops, and seminars provides an opportunity to engage with a diverse audience of experts, practitioners, and stakeholders in the field of biodiversity conservation. By participating in academic events and sharing insights through presentations and discussions, the project aims to stimulate dialogue, exchange knowledge, and gather feedback from the broader conservation community.

3. Community Outreach and Awareness Campaigns: Engaging with local communities through outreach programmes, public lectures, and awareness campaigns has been crucial for sharing the results of the project with community members and promoting environmental education. By translating scientific findings into accessible formats and engaging with residents in a culturally relevant manner, the project aimed to raise awareness about the importance of conserving aquatic biodiversity and encourage community involvement in conservation efforts.

4. Digital Platforms and Media Outreach: Leveraging digital platforms, social media channels, and media outlets to communicate the results of the project to a broader audience has been done and we intend to pursue such actions. This is a key strategy for reaching a diverse range of stakeholders, professionals, and members of the public interested in environmental conservation. By sharing updates, infographics, and other multimedia content online, the project aims to raise visibility, disseminate information widely, and inspire action towards biodiversity conservation.

7. Looking ahead, what do you feel are the important next steps?

Looking ahead, there are several important next steps that should be considered to build on the progress made during the research project on fish and crab biodiversity

conservation in Mwenga territory. Here are some key actions to further enhance the impact of the project and promote sustainable conservation efforts:

1. Monitoring and Evaluation: Implementing a robust monitoring and evaluation framework to track the long-term impact of conservation interventions, assess changes in biodiversity, and measure the effectiveness of conservation measures. Regular monitoring will help to evaluate the success of conservation strategies, identify emerging threats, and adapt management practices accordingly.

2. Assessment of the impact of mining residues found in fish and crab on consumers (humans): This is very crucial as fish and crabs are not the only living organisms who may be affected by mining residues, there is an urgent need to assess also the effect of mining residues on human being, consumers of fish and crabs in the study area.

3. Partnerships and Collaboration: Strengthening partnerships with local organisations, government agencies, academic institutions, and international conservation groups to leverage expertise, resources, and support for conservation initiatives. Collaborating with diverse stakeholders can broaden the impact of conservation efforts, facilitate knowledge exchange, and catalyse collective action towards achieving conservation goals.

4. Community Engagement: Deepening engagement with local communities through participatory approaches, community-led initiatives, and inclusive decision-making processes. By involving community members in conservation planning, implementation, and monitoring activities, the project can foster a sense of ownership, promote cultural sensitivity, and enhance the social acceptance of conservation measures.

5. Policy Advocacy: Engaging with policymakers, legislators, and government agencies to advocate for the integration of biodiversity conservation priorities into national and regional policies, laws, and strategies. By influencing policy development, advocating for protected area management, and promoting sustainable resource governance, the project can contribute to shaping a conducive policy environment for conservation efforts.

By prioritising these next steps and building on the momentum generated by the research project, the conservation efforts in Mwenga territory can be further strengthened, sustained, and scaled to promote biodiversity conservation, safeguard aquatic ecosystems, and support the wellbeing of local communities in the region.

8. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the Foundation receive any publicity during the course of your work?

The Rufford Foundation logo was printed on t-shirts made for speakers during a conference aiming at publicising the results of the project. In every workshop and conference organised during the project execution period The Rufford Foundation was acknowledged and the last slide of the PowerPoint document always contained the Rufford logo for the expression of acknowledgement.

In the paper submitted for publication (to the "Aquaculture" journal), The Rufford Foundation was acknowledged for the financial support that enabled the execution of the project from which the paper's results originated.

9. Provide a full list of all the members of your team and their role in the project.

Akilimali Itongwa Justin: He is a PhD holder in Aquaculture and Fisheries Science from the Lilongwe University of Agriculture and Natural Resources. He has good experience in Aquaculture and Fisheries related research projects. His skills related to project management especially in the aquaculture and fisheries sector were valuable in this project.

Mutewa Wakandwa Clement: He has a BSc degree in Social Sciences, specifically in the area of resolution of conflicts related to natural resource management. He contributed to this project as a social worker with good experience in mobilization and empowerment of local communities. Additionally, he contributed with his experience in the assessment of the population perception about the threats of anthropogenic activities on natural resources and environment.

Patrick Baenyi: He is a geneticist, early career scientist with a PhD degree in Animal genetics. He was helpful in this project on works related to DNA extraction, amplification of marker genes and analysis of sequencing data.

Ayagirwe Basengere Rodrigue: He is a Professor at the Faculty of Agricultural and Environmental Sciences of the Evangelical University in Africa. He is a lecturer and researcher in biodiversity and animal resource management, genetic improvement and production systems and biotechnology. He has provided guidance during the implementation of this project and supervise the write up of the manuscript that was submitted to the "Aquaculture" Journal.

Daud Kassam: He is a Professor in Fish Biotechnology and Biodiversity Conservation at Lilongwe University of Agriculture and Natural Resources. He has provided

guidance during the implementation of this project and supervised the write up of the manuscript that has been submitted to the "Aquaculture" Journal.

10. Any other comments?

We would like to express our heartfelt gratitude for your generous support and funding for our biodiversity conservation project. Your contribution has been instrumental in enabling us to conduct critical research, implement conservation initiatives, and make a positive impact on the preservation of aquatic biodiversity in the region. We are deeply appreciative of your partnership and commitment to environmental conservation.

Thank you for believing in our vision and empowering us to protect and sustainably manage the natural resources of Mwenga territory. Your support has been invaluable in advancing our conservation efforts and promoting the wellbeing of both the unique ecosystems and the communities that depend on them.