Final Project Evaluation Report

Your Details	
Full Name	Mushagalusa Cirhuza Deo
Project Title	Ecological evidences of *Boulengerochromis microlepis* (Cichlidae) leading to management measures of Lake Tanganyika littoral cichlid fishes (Congolese side).
Application ID	25299-1
Grant Amount	£5,000
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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
Provide, share and disseminate knowledge of Kuhe and associated littoral cichlid fishes throughout the local community in the northern of Lake Tanganyika				-Critical socio-economic information within the communities involved in the littoral fisheries at the study area are regularly assessed, but this was not effective in some fishing villages due to both difficult to attain and effectively identify all stakeholders and the limitted time/means. -The data are not exhaustively collected and are partially disseminated/shared with all stakeholders in the fishing sector, but considerable efforts are still being performed. -The involvement of communities toward effective implementation and sustainable fishery management measures at the study area appeared to be more complex than expected in project time scale, particularly because of multitude in stakeholders to be actively involved and we propose to develop activities in medium/long term.
Collect, analyze and publish baseline data on population status (density, reproduction, growth habitat-uses and fishing status) of Kuhe and associated species in local catches of the northwestern Congolese shores of Lake Tanganyika.				-Littoral fish data are collected monthly, processed and partially analysed (which allow the awareness step). Some main results are interesting although still insufficient as some important sites/villages are not yet investigated regularly due to limited time and material resources. -The physicochemical parameters were not regularly collected in all sampling sites due to logistical difficulties and malfunction in the equipment used, which needs to be corrected for the future.
Assessing the distribution and abundances				Fish samplings are performed in the different lake habitats, which

patterns of Kuhe in relationship with selected environment variables at the lake study locations				allowed obtaining data on kuhe/associated fish distribution, but sampling efforts should be increased for consistent results in a next step of this study.

2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

Irregularity in collecting limnological parameters and failure in fish tagging due to equipment (i.e., probe) dysfunction: we only consider data from limited sampling sites as well as those collected regularly two years ago from our research station. Fish tagging was only effective for large fishes that were very rare in our sampling and in fisher's catches and those tagged were not effectively re-caught.

Difficulties of accessing some important sites or surveying/interviewing all stakeholders in the fishery sector and low/irregular sampling effort in other sites selected at the study area for some reasons (e.g., insecurity, limited time and resources): To solve this, the support from local authorities is required, which sometimes takes enough time/effort or leads to irregular sampling/monitoring in these sites. Also, fishery sector structure in the study area is complex with many stakeholders, which needs enough time to be identified at first, and involved in the sensitisation of management measures in the project short-term activities, although sustainable fruitful contacts were knotted up.

Non-cooperation by some stakeholders during surveys/sampling: some fishers do not provide with fishes (of large size and market value) from their catches during sampling. For this, we administratively involved/sensitise their leaders and local authority to raise awareness and communication by explaining the interest of our study; we should also kindly negotiate with fishers so that they agree to provide with some fishes through a motivation or by buying.

3. Briefly describe the three most important outcomes of your project.

1. Inventory with an updated list of littoral fish species identified and their relative abundances according to different lake habitats in the extreme northwestern part of Lake Tanganyika (but some sites still requiring sampling effort). More than 70% of species identified are in sandy habitats in which almost all fishing gears identified are commonly used in comparison to rocky and mixed habitats. Although rare in many sites, *Boulengerochromis microlepis*, *Bathybates* sp, *Hemibates* sp, and *Limnotilapia dardennei* are among the frequent and abundant species in the catches respectively as well as small fish of the genus *Xenotilapia*. But their distribution does vary according to the sites and the lake habitats.

2. Identification of fishing gears/techniques used and their impacts on littoral fishery resources in the study area: Various types of fishing gears/techniques are employed, but beach seine and gillnet of various sizes/meshes are common depending on the sampling sites and type of littoral habitat.

Following species, beach seines (lengths: 100-300 m) are more frequently used (days and night) and globally capture more immature fishes (high fishing effort) with negative effects on resources and critical lake habitats compared to other techniques. ii) Socio-economic surveys describing and identifying all stakeholders in the littoral fishery sector: Many stakeholders identified in the littoral fishery sector are young workers who seem to be insufficiently educated about the threats/pressures on resources they rely due to the frequent use of inadequate fishing gears/techniques. We therefore noted fishing community ignorance on their practices or about any fishery management measures and legal instruments presence in the sector, which is apparent through the lack of development, extension, sensitization and non-application of legal texts on the fishing regulation. iii) Preliminary sensitisation/exchanges with community leaders on implementation of sustainable fishing measures in the study area are started in the study area.

3. Indicative data on the length-weight relationships, catch composition, size at catch and at first maturity (gonad examination) of the main littoral cichlid species in commercial catches from the study area are being reported. This outcome allows to suggest sustainable management measures for littoral species to stakeholders and decision-makers in the study area. Unlike few species (e.g., *Bathybates* sp. and *Hemibates* sp.), many fish caught are sexually immature, including kuhe for which mature fish were scarce. Correlated analysis of fishing catches, fish gonads and fishing gear features showed strong pressures on resources mainly due to intense and unregulated fishing activities especially for kuhe fishes and associated commercial species of large size or value.

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

From the beginning of the project, stakeholders are identified at the sampling sites/villages and then invited to collaborate in the project objectives. Mainly, their leaders and local authorities from the sites are contacted, invited and informed on the project main objectives. From historical/present fishing data collected in the study area, two seminars were organised (at Uvira and Baraka cities) in which community leaders, fishery agencies, educational/research institutions and local authority discussed about fishery (strengths and challenges) management and suggested solutions.

In the field, we conduct surveys on the structure and fishing activities by involving fishers through their beach management committees at each site. During fish sampling and identification of fishing gears/techniques used at the study area, experienced fishers and their knowledge are involved in collecting data related to common names of identified species and the type of lake habitat in which they are frequently caught. Such collaboration was fruitful and enabled the team to develop collaboration and discuss with community toward the implementation of sustainable strategies to preserve Lake Tanganyika littoral resources. High quality photos with a brief caption on fish caught were compiled and shared with fishers leaders at the landing sites to facilitate the exchanges with the community during the surveys and

sensitisation steps. But this awareness-raising activity needs to be stepped up in order to involve all stakeholders in developing collaborative efforts in the study area. Stakeholders suggested the strengthening of constant collaboration within local communities in the fishery sector and engage them in development of fishery management measures and strategies. They wished to be involved through a legal institutional framework regrouping all fisher's associations for regular monitoring and collaboration as well as effective implementation of sustainable measures.

5. Are there any plans to continue this work?

The data collected for this first project step although significantly basic are preliminary and need to be improved in the immediate future by:

- Further social surveys, communication and awareness efforts within stakeholders should be strengthened: From first findings, local communities wish to be involved in both planning and implementing management measures in the medium and long term. Thereby, the communication and awareness techniques must involve them to constantly collaborate through a structural, legal and institutional framework regrouping mainly their beach management committees/associations. Further efforts to foster that regular collaboration and to seek for collecting and sharing accurate information on fishing gears/techniques and species status will be developed, exchanged and monitored regularly by all stakeholders in the next project activities.

- Further fish sampling data, fishing surveys and environmental features are important: Additional regular and seasonal fish and fishing sampling still highly need in many important sampling sites/villages along the lake. This will allow covering a wide range of information and get a global view on littoral fish species composition from each sites or their exploitation level; these features will enhance good awareness of all stakeholders as fishers can regularly move on the lake. Also, littoral fishing at Lake Tanganyika involve a wide range of different species and sizes or ecological conditions, such as one fishing haul could caught more than 20 different species. This feature makes the management efforts often to fail in providing sustainable fishing nets with accurate size meshes following specific diversity in the littoral area. Therefore, complete data on the specific composition in each site and the size at first maturity are important for the next step; without these, it will be difficult to effectively preserve that diversity of littoral cichlids at long term. These future data will be deepen by the trophic web analysis (seasonality and fish diet composition) in the littoral zone.

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

A report giving details of the findings and recommendations to the lake managers and decision-makers is being produced. The main project results are presented at workshops where all stakeholders in the fishery management at Lake Tanganyika (extreme northwestern) participate and discuss for development and implementation of legal fishing management measures. These results will be summarised as articles to be published in scientific journals and to be shared with

project key stakeholder groups for permanent exchanges. Using social networks and articles in the local/national media and, seminars in the local educative/research institutions, the team sensitises communities on sustainable use of the fishery resources. This effort can regularly strengthen community collaboration and increase fishing monitoring from fishing agencies and local authorities or decision-makers. The results of the project are fully accessible to all stakeholders as scientific reports, checklist files, presentation resumes, printed documents, and via local social media/networks.

7. Timescale: Over what period was the grant used? How does this compare to the anticipated or actual length of the project?

The grant was used more in the following subsequent project activities:

- Visit sites/villages, identify stakeholders and inform communities about the importance of the project objectives, gain their support and share their knowledge in the project activities.
- Conduct surveys/interviews of local communities (fishers and their associations, fishery services, etc.) to gather information on fishing status/effort (gears features, pressures or not, etc.) of Kuhe and associated littoral cichlid fishes.
- Collect Kuhe and associated littoral fish samples monthly using both experimental and artisanal fishing in selected sites/villages as well as environmental features at each sampling site.
- Data processing, lab analysis, pre-reporting of data collected for auto-monitoring and Analysis of data collected.

Some of these project activities exceed the length scheduled mainly because of both the multiplicity of stakeholders and the high number of sites visited; due to that, they are partially achieved and some still running such as data collection, processing and analyses or sensitization activities.

8. Budget: Provide a breakdown of budgeted versus actual expenditure and the reasons for any differences. All figures should be in £ sterling, indicating the local exchange rate used. It is important that you retain the management accounts and all paid invoices relating to the project for at least 2 years as these may be required for inspection at our discretion.

Item	Budgeted Amount	Actual Amount	Difference	Comments
Report production, update checklist creation and results dissemination: Printing of final report and stakeholder meetings	150		-150	

Fuel for transportation: to fieldwork, community surveys, outreach activities, stakeholder' meeting	1000	1240	+240	increase in sampling sites' number and stakeholders structure
Tents and related equipment: Tent, Sleeping bag and mat, Light, Waterproof	100		-100	
Digital Camera and memory to document project activities	20		-20	
Paper/notebook and Pencil, marker pen and water resistant papers	60		-60	
Engine boat/vehicle maintenance and Engine oil	100	185	+85	unscheduled engine/vehicle troubles
Boat captain and vehicle driver perdiems	240	335	+95	increase in field trips or sampling/ survey sites' number
Stipends for local fisher for their capture; field helping fisher' motivation	250	450	+200	some fisher were used during sampling or their catches (large fish of market value) purchased
Local fisher' motivation	150		-150	
Workshops: Venue conveniences, Projector hire, Food/local transportation for participants	500		-500	
Outreach/education activities and materials: Pamphlet, posters, banners, t-shirts	723		-723	
GIS training for two team members, training on fish sampling designs and handling techniques for 4 team members	200		-200	
Field trip reconnaissance /sites selection and survey/sampling: Fuel and project team light meal/motivation	957	1115	+158	increase in field trips' number or sampling/surveys sites and fuel price fluctuations
Local communication on project objectives and stakeholder contacts	100		-100	

(including field research permit fees when necessary)				
Books on cichlids, Field guides for pre-checklist creation, Maps of the area , libraries/journal articles subscription and printed/photocopied support	400		-400	
Software, internet and local communication with stakeholders; contacts and research permit fees	300	350	+50	Increase in stakeholders number or weak communication capacity of some
Scientific/field supplies: gillnets, seine hire others gears		300	+300	some of our nets are destroyed or lost during sampling and we repaired or replaced them
TOTAL	**5000**	**3975**	**-1025**	

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

Important next steps include:

Share and disseminate the results obtained in order to encourage stakeholders to sustainably use fishery resources and decision-makers to effectively monitor these resources at long term.

Strengthen collaboration among stakeholders, train and sensitise the community on sustainable fishing practices toward the preservation of Lake Tanganyika littoral fishes. This collaboration will implement fishery legal instruments and establish legal institution that can regroup and regularly monitor all fisher' associations at the study area.

Regularly collect data (over 1 additional year) on coastal cichlids as well as monitor the gears/techniques employed in all sites at the study area in order to propose optimum fishing gears/technique for the sustainability of resources and to eradicate inappropriate ones (beach seine).

Mobilise additional efforts to properly implement project activities through regular collaboration, monitoring and awareness leading to effective management of littoral fishery resources at Lake Tanganyika.

10. 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?

Yes, we used it during surveys and sampling on field sheets and questionnaires, posters, banners, t-shirts, and stickers on some laboratory and field equipment. The logo is also useful during seminar presentations and all materials used by participants such as invitation letters, badges and programs. This will be same for any final report and papers to be submitted as well as other subsequent outreach activities.

11. Please provide a full list of all the members of your team and briefly what was their role in the project.

Team main members involved in the project activities are:

Dr. Mushagalusa Deo (associate researcher at the CRH-Uvira): project management (shared), research design, data processing, data collection and analysis, monitoring, and report/paper writing.

Mr. Lubunga Dunia (researcher at CRH-Uvira): data collection, education and outreach coordination, project management (shared), project planning, implementation, evaluation and communications

Mr. Mukerania Simon and **Mr. Muzaire Kisaro** (technicians at CRH): field preparation, data collection/recording, surveys, lab analysis, communications, education and outreach activities.

Mr. Kimanuka Moise and **Mr. Barasta Napala** (experienced fishers): project field and sites selection assistance, communication facilities with local communities, data collection and awareness.

Mr. Mbirize Joseph (captain): boat driver and field assistance, project field work and data collection.

Mr. Amisi Aochi (driver): car driver, field attendance and assistance.

Many leaders of fisher 'Beach Management Committees and local fishing officers helped with their knowledge in fishing activities at the study area.

12. Any other comments?

We present our sincere thanks to the Rufford Foundation for supporting our research activities and for many other supports for researchers from developing countries.