

Final Evaluation Report

We ask all grant recipients to complete a project evaluation that helps us to gauge the success of your project. This must be sent in **MS Word and not PDF format**. We understand that projects often do not follow the predicted course but knowledge of your experiences is valuable to us and others who may be undertaking similar work – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please DO NOT fill in and submit this form until the project has been completed.

Complete the form in English. Note that the information may be edited before posting on our website.

Please email this report to jane@rufford.org.

Your Details	
Full Name	Magoti Ernest Ndaro
Project Title	Conserving Lake Victoria's Endangered Haplochromine Cichlids Through Mitigating Disease Risks from Cage Fish Farms (Savecichlids)
Application ID	45091-1
Date of this Report	16/09/2025

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
<p>To evaluate stakeholders' knowledge and practices on fish diseases, and assess biosecurity measures among cage fish farmers in the Lake Victoria Basin.</p>				<p>Interviews were conducted successfully. A total of 120 cage fish farmers and 20 fishers were interviewed using structured questionnaires. Additionally, 20 key informant interviews (five per district) were conducted with fisheries and aquaculture officers, lead farmers, and fishing group leaders. Results showed that;</p> <ul style="list-style-type: none"> i. Bacterial diseases were the most prevalent in cage fish farms, particularly fin and tail rot and <i>Streptococcus</i> sp-related eye infections. ii. The main causes of disease in cage fish farms were poor handling, contaminated feeds, and inadequate biosecurity. iii. Average mortality was 15.9%, with some cage fish farms reaching up to 45%. <p>These findings highlight poor biosecurity and limited disease management training as key constraints</p>
<p>To identify and characterize bacterial pathogens affecting haplochromine cichlids in Lake Victoria and develop effective measures to reduce disease transmission</p>				<p>We conducted a field study in Lake Victoria to investigate bacterial pathogens in cage farmed tilapia and wild haplochromine cichlids, to Assess the prevalence and transmission risk of bacterial pathogens from farmed to wild fish, focusing on endangered</p>

			<p>haplochromine cichlids:</p> <ul style="list-style-type: none"> i. <i>Haplochromis obesus</i> ii. <i>Haplochromis teunisrasi</i> iii. <i>Haplochromis igneopinnis</i> <p>120 Tilapia samples were collected from cage farms, while 158 haplochromine cichlids were sampled near fish cages and 142 from areas without aquaculture activities. Laboratory analysis revealed three pathogenic bacteria in both Nile tilapia from cages and wild haplochromines:</p> <ul style="list-style-type: none"> i. <i>Streptococcus agalactiae</i> ii. <i>Aeromonas hydrophila</i> iii. <i>Pseudomonas aeruginosa</i> <p>The detection of identical pathogens in farmed and wild fish through the phylogenetic analysis provides evidence of pathogen exchange between caged tilapia and endangered haplochromine cichlids. These findings highlight the potential risks of bacterial spillover from aquaculture to wild populations, emphasizing the need for improved biosecurity and management practices. The results informed training sessions with cage fish farmers on:</p> <ul style="list-style-type: none"> i. Practical measures to reduce disease transmission risks ii. Safeguard aquaculture production iii. Conserve wild fish biodiversity in Lake Victoria.
<p>To raise awareness and train stakeholders on best practices in disease prevention and management</p>			<p>We conducted five training workshops in June 2025 across five districts, reaching over 128 participants stakeholders including fish farmers, fishers, and fisheries officers with locally tailored materials</p>

				<p>and practical demonstrations. In addition, social media content including a YouTube video was prepared and shared to highlight the interactions between haplochromine cichlids and cage fish farms. We also participated in the National Farmers' Exhibition to raise public awareness about the conservation of wild fish populations in Lake Victoria.</p> <p>These workshops trained stakeholders on:</p> <ul style="list-style-type: none"> • Identification of common fish diseases • Biosecurity practices • Disease prevention and control • Conservation of haplochromine cichlids and littoral habitats
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2. Describe the three most important outcomes of your project.

a) Scientific Identification of Pathogenic Bacteria Threatening Endangered Cichlids

The project successfully identified and characterized three major pathogenic bacteria *Streptococcus agalactiae*, *Aeromonas hydrophila*, and *Pseudomonas aeruginosa* infecting threatened haplochromine cichlids near fish cages in Lake Victoria, the sequences for identified bacteria are published in GenBank with **accession number(s) PX171334- PX171349**

- Infection rates were observed to be less high in wild fish near cage sites compared to non-cage areas. This finding, highlighted through the SaveCichlids project, has drawn attention to the importance of training fish farmers on best management practices. We believe that with the adoption of these practices, cage farming in Lake Victoria can continue sustainably.
- Molecular and phylogenetic analyses confirmed the likelihood of cross-contamination between farmed and wild populations. However, although infectious bacteria were detected in wild haplochromines, this study does not attribute cage farming as the direct source of these pathogens.

b) Established Baseline Data on Fish Diseases and Their Transmission

The project generated the first detailed dataset on disease prevalence, distribution, and genetic diversity of fish pathogens in endangered Haplochromine cichlids in Lake Victoria.

- Baseline data allows for monitoring of disease dynamics over time.
- It supports future research, policymaking, and evidence-based conservation strategies.

c) Implementation of Stakeholder Training and Awareness Campaigns

The project designed and launched training seminars and awareness campaigns across five districts.

- More than 128 fish farmers, fishers, and fisheries officers were targeted for training on biosecurity, disease recognition, and prevention.
- Locally tailored educational materials (booklets, videos, WhatsApp groups) were created and distributed.
- These efforts are improving stakeholder capacity, encouraging the adoption of sustainable aquaculture practices, and fostering community involvement in conservation.

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

- i. It was challenging to organize eight training and awareness-raising seminars and bring together all stakeholders, particularly cage fish farmers, as they spend most of their time operating and managing their cages.

How It Was Tackled:

The team adapted by shifting to on-farm training sessions, which allowed us to reach farmers directly at their cage sites. This approach made it possible to gather them in their working place and provide practical, hands-on training.

ii. Delays in Laboratory Reagent Procurement for Molecular Work

There were delays in the delivery of essential laboratory reagents (e.g., DNA extraction kits and PCR chemicals), which temporarily stalled bacterial characterization and sequencing activities.

How It Was Tackled:

The team leveraged co-funding support from the DigiFish project at Sokoine University of Agriculture, which allowed to access shared reagents and equipment. This ensured continuity of lab work without compromising the project timeline. Additional procurement processes were also streamlined in advance to avoid repeat delays.

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

Involvement of Local Communities and Their Benefits from the SaveCichlids Project

i. **Active Participation in Research and Fieldwork**

Local communities, especially **fishers and cage fish farmers** in the Mwanza and Mara regions, were actively involved in **data collection and sample provision**. They helped identify disease hotspots, shared their experiences with fish mortality, and supported the collection of wild cichlid and tilapia samples from cage and non-cage sites.

This promoted community ownership of the project and built trust between researchers and fishers.

ii. **Training and Capacity Building**

The project organized **on-farm training seminars** in five wards (e.g., Sota-Rorya, JKT Musoma, Luchebele, and Sengerema). These workshops trained **over 128 stakeholders** including fish farmers, fishers, and fisheries officers on:

- Identification of common fish diseases
- Biosecurity practices
- Disease prevention and control
- Conservation of haplochromine cichlids and littoral habitats

This empowered the local community with practical skills and knowledge to improve fish health management and protect biodiversity.

iii. **Educational Materials and Information Sharing**

The team developed **locally tailored, culturally appropriate educational materials** (booklets, videos, posters in English and Swahili languages) in collaboration with district and ward-level authorities. These materials were:

- Distributed to participants
- Shared via WhatsApp groups for ongoing learning and disease alerts
- Used in awareness campaigns through social media and local events

This improved community awareness of fish disease risks and sustainable aquaculture practices.

iv. **Conservation Awareness and Attitude Change**

Through training, poster presentation during farmers national exhibition (Nane Nane), and dialogue, community members developed a deeper understanding of how **disease spillover from cages can threatens endangered wild cichlids**. This led to improved attitudes toward conservation, better protection of breeding habitats, and increased support for regulatory disease management.

5. Are there any plans to continue this work?

Yes, we are actively planning to continue and expand the SaveCichlids project beyond its initial phase. Building on the successful identification of pathogens, stakeholder training, and community engagement, our future plans include:

i. **Long-Term Monitoring and Surveillance**

We aim to establish a community-based disease surveillance system in collaboration with local fishers and fisheries officers to:

- Monitor disease outbreaks in real-time
- Track pathogen trends
- Detect early warning signs of spillover to endangered wild cichlids

ii. **Expanding Geographic Coverage**

The next phase will involve scaling the project to other parts of the Lake Victoria Basin, to understand regional disease dynamics and conservation needs.

iii. **Strengthening Biosecurity Adoption**

We plan to work more closely with local governments and BMUs to integrate biosecurity guidelines into local bylaws and fisheries training programs.

- Pilot farms will be selected to demonstrate “best practice” disease management for replication across the region.

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

We plan to share our findings through close collaboration with relevant government authorities. The data collected will be shared with the IUCN SSC Freshwater Fish Specialist Group and the Ministry of Livestock and Fisheries to support evidence-based decision-making and guide conservation and management strategies for haplochromine cichlids and their habitats. In addition, we aim to disseminate our results through peer-reviewed publications, conference presentations, social media platforms including Facebook, Instagram, LinkedIn, and other platforms, awareness campaigns, training workshops, and national exhibitions such as Nane Nane.

Currently, we have shared our preliminary results through our YouTube channel (youtu.be/WJIA4cEV6pY) and LinkedIn, as well as through five awareness campaigns and training workshops conducted in LVB, Tanzania. Furthermore, the findings were showcased at the National Agricultural Exhibition (Nane Nane) in 2025, reaching a wide audience of policymakers, students, and community members.

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

1. Scale Up Monitoring Efforts by establishing long-term disease surveillance in Lake Victoria to track pathogen transmission and outbreaks among farmed and wild fish.

2. Expand Geographic and Species Scope to include more regions and additional endangered cichlid species to assess broader ecosystem health and conservation needs.
3. Engage policymakers and stakeholders to adopt evidence-based guidelines that balance aquaculture growth with biodiversity conservation.

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?

Yes, The Rufford Foundation logo was used on all educational materials, including training booklets, posters, and presentations produced during the SaveCichlids project.

Additionally, the Foundation received publicity through:

- Acknowledgments in presentation slides during my Master's proposal presentation, peer-reviewed publications and conference proceedings
- Acknowledgments in the research report ("*From Cages to the Wild*")
- Recognition during training workshops and community awareness events
- Mentions in social media posts and communications shared with stakeholders and partners

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

Name	Position/Role	Affiliation	Responsibilities
Magoti Ernest Ndaro	Principal Investigator (PI)	Sokoine University of Agriculture (SUA)	Project coordination, field supervision, stakeholder engagement, reporting, training delivery
Dr. Alexander Mzula	Laboratory Lead / Microbiologist	SUA	Laboratory supervision, bacterial isolation and molecular analysis, sequencing, research supervision, development of educational materials
Dr. Anthony Funga	Research Assistant	SUA	Field sampling

	(Biosciences)		support, bacterial sample processing, data entry and logistics
Ms. Rehema Simwanza	Fisheries Officer / Field Coordinator	Ministry of Livestock and Fisheries	Organizing training seminars, coordinating with local farmers and authorities, field mobilization
TAFIRI Staff-SOTA (Collaborators)	Technical Support & Field Assistance	Tanzania Fisheries Research Institute	Field logistics, fisher coordination, assistance during sample collection and farmer training

10. Any other comments?

We sincerely thank The Rufford Foundation for their generous support of the SaveCichlids Project Conserving Lake Victoria's Endangered Haplochromine Cichlids. The grant enabled us to identify pathogens, establish baseline data, and conduct community training and awareness campaigns. This support not only generated meaningful scientific knowledge but also equipped local communities with practical fish health and conservation skills. Through this partnership, we strengthened capacity, promoted sustainable aquaculture, and laid the foundation for long-term biodiversity protection in Lake Victoria.

ANNEX – Financial Report
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