

Final Evaluation Report

Your Details	
Full Name	Gizachew Teshome Ayele
Project Title	Spatiotemporal dynamics status of threatened Labeobarbus species in relation to environmental degradations in Megech River, Lake Tana sub-basin, Ethiopia
Application ID	36367-1
Date of this Report	June 20, 2023

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
Determine spatiotemporal status of threatened <i>Labeobarbus</i> species				Some threatened and vulnerable <i>Labeobarbus</i> species were absent in this study. Thus, further studies are recommended to implement practical based in-situ conservation of threatened <i>Labeobarbus</i> species
Explore the biological traits of the migratory <i>Labeobarbus</i> species				Some of the biological aspects of <i>Labeobarbus</i> species such as length weight, fecundity, gonad index, sex ratio and maturity size were explored. Thus, protect the potential spawning grounds in below and above irrigation dam is necessary for future conservation of the threatened species.
Identify the pollution status of upstream tributaries of the Megech River, which is the main spawning ground of migratory <i>Labeobarbus</i> species.				Some of the upstream tributary rivers of Megech River which are flowing through Gondar City are highly polluted due to the presence of poor urban and industrial waste management.
Detect the spatiotemporal dynamics of land use land cover change in Megech River watershed				For the last three decades, the land use land cover change analysis in Megech river catchment indicated the presence of high environmental degradation which needs sustainable land use management.
Assess the impact of the newly constructed irrigation dam on fish migration				Consequently, the migratory fish will face high water turbidity and removal of important spawning grounds.
Awareness creation for local fishermen, non-governmental organization workers and local officials about the importance of conservation and potential threats of the threatened <i>Labeobarbus</i> species.				We have confirmed that there is low awareness and attitude of the surrounding communities and governmental officials or environment protection authority on the threatened fish species. Thus, it urges further research effort and conservation action to enhance

				public understanding in the area.
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2. Describe the three most important outcomes of your project.

a). A total of 2035 specimens from three families and 15 species were recorded, comprising 13 *Labeobarbus* species, *Oreochromis niloticus* (Cichliidae) and *Clarias gariepinus* (Clariidae). The study confirmed that the abundance, diversity and distribution of the *Labeobarbus* species are influenced by potential environmental factors and anthropogenic pressures such as urbanisation, sand mining, irrigation dam construction, intensive agriculture, river shoreline degradation and poor waste management. The total abundance and diversity of species declined as compared to the previous studies conducted in the Lake Tana sub-basin. The dominant species were *Labeobarbus nedgia*, *Labeobarbus beso* and *Labeobarbus intermedius* at all sampling sites. Some of the rare species sampled from sites were *Labeobarbus brevicephalus*, *Labeobarbus tsanensis*, *Labeobarbus platydorsus*, *Labeobarbus crassibarbus*, *Labeobarbus degeni*, *Labeobarbus megastoma*, *Labeobarbus trutiformis*, *Labeobarbus surksis*, and *Labeobarbus gorgorensis*. We found one unidentified new *Labeobarbus* species. Based on the morphometric and meristic characterisation of this specimen, it could potentially be a new species and have a lower probability of being a hybridisation between other *Labeobarbus* species.

b). We explored that water pollution is one of the severe threats to riverine and migratory fish species in Megech River drainage basin. River water pollution was examined by measuring potential water quality parameters such as dissolved oxygen, temperature, pH, conductivity, total dissolved solids, turbidity, nutrients (nitrate, phosphate, sulphate and ammonia), and heavy metals (Pb, Cr, Fe, Cu, Cd, and Zn). The result indicated that some of the upstream tributary rivers of the Megech River that are flowing through Gondar City are highly polluted due to poor urban and industrial waste management.

c). We have identified the impact of constructing an irrigation dam on the diversity, distribution and spawning grounds of migratory *Labeobarbus* species. The natural river course of the Megech River is highly degraded by sand and gravel excavation below and above irrigation dams. However, important spawning routes for migratory *Labeobarbus* species were identified in the upstream and downstream sampling sites of the Megech River. In addition, the spatiotemporal change in land use land cover of Megech River indicated that the existence of environmental degradation in the drainage basin. It could have a direct or indirect role in the loss of migratory and riverine fish species. Generally, we have collected sufficient information regarding the existing situation of threatened *Labeobarbus* species and the magnitude of anthropogenic impacts on the spawning grounds in Megech and its tributary rivers. These data represent a component of the PhD dissertation work, and the result is now ready to be used to create various publications that will be published in indexed journals.

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

While there was a war in northern part of the country, we encountered no unanticipated difficulties and completed the job without delay. Due to this conflict, the government occasionally shut down the internet and the power, which was caused to delay the submission of an update and the final report.

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

Local fisherman, sand miners, daily labourers, and local administrative representative officials participated in the data collection procedure at all sample locations during fish sampling and water quality monitoring. Thus, throughout data collection, local communities were well informed about the threats to spawning migratory species in the Megech River through observation. By protecting illegal fishing during the spawning season, preventing the degradation of spawning grounds, and restocking the newly built reservoir to increase fish production, we raised awareness for local fishermen, who are the primary beneficiaries in the local communities. This reduces the negative fishing pressure on spawning migratory species.

5. Are there any plans to continue this work?

This first round of Rufford Foundation funds helps to determine basic information on the current status of *Labeobarbus* species and the location of potential spawning grounds. We have identified the main threats to the migratory *Labeobarbus* species and possible mitigation measures. Thus, we will have a plan to continue this work on protecting the upstream and downstream spawning routes, stocking the newly constructed irrigation reservoir, simulating new artificial spawning grounds, or assimilating the degraded spawning routes. Moreover, awareness creation workshops are needed for local communities, including primary and secondary school students, policymakers, and different private and governmental organisations, to help establish community-based conservation management for the threatened *Labeobarbus* species in the future. We have planned to hold awareness creation workshop with riverine fishermen, local administrative representative, fisheries experts and research at University of Gondar, by September 2023. We prefer this month to show the practical fish migration and the peak time of the spawning season of the threatened *Labeobarbus* species in the Megech and its tributary rivers. The main finding of this project will be presented in this workshop.

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

This project is part of my PhD thesis work. Two papers are now preparing to be submitted for publication. Therefore, publication is one means of sharing the result with the scientific community. The study papers will also be presented at national and international scientific conferences. For instance, these research articles will be presented at the annual conferences of the American Fisheries Society (AFS), International Society of Limnology (SIL), and Ethiopian Fisheries and Aquatic Science Association (EFASA). I belong to these professional associations.

The following three manuscripts are prepared and will be submitted to indexed journals for publication and the contribution of Rufford is acknowledged.

- Morphometric and meristic characterization of a potentially new *Labeobarbus* species from the Megech and Gumero rivers, Lake Tana Sub-basin, Ethiopia. Gizachew Teshome^{1'2*}, Abebe Getahun², Glenn Wilson^{3'4}, Seyoum Mengistou², Minwyelet Mingist⁴,
- Spatiotemporal patterns in the diversity and abundance of *Labeobarbus* fishes in the Megech and Gumaro rivers, Lake Tana sub-basin, Ethiopia. Gizachew Teshome^{1'2*}, A. Getahun², G. Wilson^{3'4}, S. Mengistou², M. Mingist⁴
- Variation in macroinvertebrate assemblages and water quality as a test for different levels of ecological impairment across Megech River, Lake Tana sub-basin, Ethiopia. Gizachew Teshome^{1'2*}, Abebe Getahun, G. Glenn Wilson^{3'4}, Seyoum Mengistou², Minwyelet Mingist⁴,

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

The most important next step is to give great attention to further study and establish sustainable conservation strategies for the threatened *Labeobarbus* species of Lake Tana. Advanced fish tracking techniques (radio telemetry) have to be implemented for a detailed study of the spatio-temporal migration of *Labeobarbus* species. Another important future plan is to create awareness among the local community and policymakers to enhance public understanding of the significance of conservation of threatened species and protect their natural habitats.

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 logo of The Rufford Foundation is included in the project activities including the progress report as a part of the PhD thesis work and promotion materials. It is also promoted and used in the research office of the University of Gondar during the research exchange programme. Besides using the logo, the prepared manuscripts that will be submitted to publications acknowledge the foundation as a supporter of the fund.

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

Gizachew Teshome Ayele: Project team leader and principal investigator.

Professor Abebe Getahun: Participate in problem identification and main supervisor.

Professor Glenn Wilson: Team member and co-supervisor.

Professor Seyoum Mengistu: Team member and co-supervisor.

Dr Minwelet Mingist: Team member and co-supervisor.

10. Any other comments?

We would like to thank The Rufford Foundation for supporting this essential research project work, without your support we couldn't achieve the given objectives. We confirmed that this research project output has great importance in the conservation of the threatened endemic fishes of Lake Tana. We have certainly believed that we will continue in-situ conservation activities in the future that can be save these species in sustainable conditions.



New hybrid Labeobarbus species.