Final Evaluation Report

Your Details	
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Project Title	Freshwater Biodiversity in Kabul River: Assessment of Fish Diversity, Distribution and Threats to Conservation of a Highly Threatened Group of Vertebrate in World
Application ID	27579-1
Grant Amount	£5000
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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
Study fish composition and abundance in Kabul River under Kabul city.				Total of 1,190 fishes were collected from the study area, 81.4% (n = 969) of which belongs to the Order Cypriniformes, 18.2% (n = 216) to Order Salmoniformes, and 0.4% (n = 5) to Order Cichliformes. This is in line with the research carried out by Saund *et al.* (2012) in Mahakali River, Nepal where they have reported Cypriniformes as the most dominant order. Studies conducted by Shendge (2007), Shinde *et al.* (2009), Vijaylaxmi *et al.* (2010), Aryani (2015), and Akhi *et al.* (2020) also reported the same. However, on the contrary, Verma (2019) found Siluriformes as dominant order in his study conducted in Uttar Pradesh, India. This difference in order dominance is mainly due to the difference in aquatic habitats. Cyprinids can live in cold waters, can tolerate very low oxygen level, and some feed on other fish species as well (Royce 1996). Hence, they are found to be more dominant in freshwater bodies. The most dominant Order Cypriniformes was represented by one family, six genera, and eight species followed by Order Salmoniformes with one family, two genera, and two species and Order Cichliformes with one family, one genus, and one species. Among families, Cyprinidae was found to be most dominant in the area, and Salmonidae was second most dominant. A study on freshwater fish fauna and water quality at Paintakli dam in Buldhana district, India also reported fish family dominated by Cyprinidae (Ubharhande and

				Sonawane 2012). Similarly, Dau and Parkash (2009), Cunico *et al.* (2011), Choubey and Qureshi (2013), Mohsin *et al.* (2013), Verma (2019), Hu *et al.* (2019), and Herawati *et al.* (2020) reported the dominance of the family Cyprinidae. In the upstream sites, *Schizothorax* sp. was highly abundant in the sites S2 (n = 76) and S3 (n = 117) followed by *Schizothorax esocinus*. In S1, *Oncorhynchus mykiss* (n = 44) was abundant species followed by *S. esocinus* (n = 31). Among three different sites (S4, S5, and S6) in the downstream, *Schizothorax* sp. was abundant species followed by *Oncorhynchus mykiss* in S5 and S6, and *Schizothorax esocinus* in S4.
Evaluate fish diversity and richness in the Kabul city along Kabul river				In terms of species richness, among sampling sites, the rank abundance plot illustrated high richness in S3 and S2. The high species richness in S3 and S2 were also indicated by Margalef's Diversity Index (DMg) (1.69 and 1.64 respectively), as their values were high comparing to other sampling sites. Sampling sites S2 and S3, S1 and S6, S4 and S6, and S5 and S6 indicated having similarity of 95%, 93%, 92% and 92% between them, respectively. Sorenson's Similarity Coefficient value between S3, S4 and S5 (CC = 0.71) was the lowest, which also shows 71% of similarity between them. Fish species diversity was evaluated using various diversity indices. The most diverse site among all was S3 with Shannon-Wiener diversity index (H') of 2.04 and Simpson's Diversity (D1) of 0.83. S4 (H' = 1.12, D1 = 0.57) was the site with less diversity. In the same way, species evenness was also high in S3 with Pielou Evenness Index (J') of 0.85 and less evenness score for S4 (J'=0.62).
Educating local on conservation importance of fish fauna				In Kabul city, solid waste, wastewater (both domestic and industrial), and open sewers are directly draining into the Kabul river (UNEP, 2003),

				exacerbated by population growth (Mack et al. 2009), modifying the aquatic habitat. Habitat environment plays a great role in the fish composition, diversity and distribution in any stream or river system (McClendon and Rabeni 1987; Agarwal *et al.* 2018). Use of agriculture pesticides, and overfishing (Saeed 2018) were other threats to the conservation of the freshwater ecosystem in the Kabul city. This study has documented 11 fish species from the area. Four species of them are listed under IUCN Red List of Threatened Species (Table 8). *Cyprinus carpio* is vulnerable (VU) species (Freyhof and Kottelat 2008) and *Hypophthalmichthys molitrix* is Near Threatened (NT) (Zhao 2011). *Salmo trutta* and *Coptodon zillii* are Least Concern (Freyhof 2011; Lalèyè 2020). To conserve these species and other associated species in the area, adoption of scientific fishing or sustainable fishing methods, timely monitoring of water quality, and proper management of solid waste and wastewater are highly recommended. Findings of the project were presented to different conservation organisations and universities. Locals were made aware of the conservation importance of fish. Cleaning campaign was conducted along Kabul river in Kabul city involving students, educators, government employees, and locals.

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

The project started well following prescribed timeline and agendas. However, before doing the last round of field data collection, the COVID-19 pandemic hit Afghanistan. This led to the delay of the project and created an unsafe environment for round 10 months. However, after that I have done the last round of fieldwork, education and advocacy programs, and completed the project the same methods prescribed before.

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

The following are most important outcomes of the project.

1. Documented fish fauna of Kabul river under Kabul city and identified those at the species level.
2. Analysed and described difference in fish diversity, abundance, and richness between upstream and downstream of the Kabul city and presented their conservation importance to various organisations and locals.
3. Organised education and advocacy programmes for locals and students, presented finding to different organisations, and started developing peer-reviewed research paper.

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

Local people were in the project during two phases of the project.

i. Fieldwork.
ii. Education and advocacy programme.

Fieldwork:
During fieldwork, local heads and local fishermen were actively involved. They have contributed much to collecting fish. They were paid subsistence daily allowance.

Education and advocacy programme:
Local people and students were the main target of the programme. More than 200 local and students participated in the programme.

5. Are there any plans to continue this work?

After this project, I have a plan to carry out similar studies in other provinces as well. Like in Kabul city, freshwater quality was degraded in the other provinces and no fish diversity were documented so far.

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

I have already started sharing the project results through presentation to organisations and students. Apart from that, I have a plan to publish peer-reviewed scientific paper in international journal. For that, I have started writing paper.

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

As mentioned before, COVID-19 had greatly altered the timescale of the project. It was planned to complete the project within 29 April 2019 – 28 April 2020, but it took more than that (29 April 2019 – 14 April 2020).

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
Field Equipment/Gears: i) Specimen Containers (200 nos.); ii) Gumboots (4 pairs); iii) Gloves (6 pairs); iv) Fishing waders (3nos.); v) Fishing nets [Cast nets (2 no.), gill nets (2 nos.), drag nets (2 nos.)]	577	577		
Preservation solution (i.e., 10% formaldehyde solution)	41	41		
Digital Camera (Canon EOS 750D with 18-135mm IS STM Lens)	567	567		
Multiparameter tester (Apera Instruments PC60 Premium 5- in-1 Waterproof pH/ Conductivity/ TDS/ Salinity/ Temp. Multi-Parameter Pocket Tester, Replaceable Probe)	95	95		
Lodging during fieldwork	587	587		
Food and snacks during fieldwork	792	792		
Salary for Local Fishermen	528	528		
GPS (Garmin GPSMAP 64st, TOPO U.S. 100K with High- Sensitivity GPS and GLONASS Receiver)	156	156		
Awareness and outreach programs	943	943		
Transportation	469	469		
Printings (posters, data sheets, etc…)	245	245		
Total	**5000**	**5000**		

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

This project produced new information on fish composition, diversity, and abundance in Afghanistan. Moreover, locals were educated on conservation importance of fish and other associated aquatic biodiversity. The next most important step is to compare fish compositions of Kabul city with other provinces and analyse why they are different or same and adopt best conservation practices that have been practising in another province. As Kabul river in Kabul city is polluted,

this study suggests integrated watershed management and monthly or biannually or annually publication of water quality of the area.

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?

Logo of the Rufford Foundation was used during presentation and during education and advocacy programs.

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

Mohammad Naeem Azimi: I have worked closely with Mohammad Naeem Azimi until the completion of the project. His vast field experience and knowledge helped the team whenever we face any problem in the field.

Parmanand Kumar: He helped the project team in the identification of specimens. He is conversant in statistical analysis; hence, we received guidance and support from during data analysis.

Abdul Jabar: He worked with the project as field assistants during field data collection. His field experience, management, and socialization skills were much helpful during fieldwork. Besides, he assisted me in organizing awareness and education program in different schools and communities.

Abdul Ghani Rahimi: He worked with the project as field assistants during field data collection. His field experience, management, and socialization skills were much helpful during fieldwork. Besides, he assisted me in organizing awareness and education program in different schools and communities.

Local Fisherman: During fieldwork local fishermen helped me collecting diverse fish.

12. Any other comments?