Final Project 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.

Complete the form in English and be as concise as you can. Note that the information may be edited before posting on our website.

Please email this report to jane@rufford.org.

Your Details	
Full Name	V V Binoy
Project Title	Sahyadri's underground fishes: developing conservation action plans for the subterranean fishes of Western Ghats
Application ID	17135-1
Grant Amount	10th September 2015 to 30th August 2017
Email Address	vvbinoy@gmail.com
Date of this Report	1 October 2017

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
Understanding diversity and distribution of the subterranean fishes in Kerala State, India and developing a diversity and distribution map			■	Subterranean fishes being the inhabitants of cryptic habitat such as dugout wells, both people living in the study area and scientific community had very little knowledge about these rare but ecologically significant organisms. Our team was able to identify locations distributed over various districts of the Kerala state where subterranean fishes are available. Additionally, two hotspots for subterranean fishes, one in Thrissur and other in Kannur district of Kerala state were also identified during the study. The subterranean eel *Monopterus* sp. was abundant in the wells of Mattanur, Anjarakkandi, Madayippara areas of Kannur district, while catfish *Kryptogalnis shajii* was present at Perambra area of Thrissur District. However, *Horaglanis* another genus of subterranean catfish reported from Kerala, was present only in the southern and central districts of the state. We were able to find an epigean population of the subterranean piscine species (*Kryptoglanis shajii*) also. A diversity and distribution map of the subterranean fishes reported from the Kerala was also developed.
Survey and interview of the local people to understand knowledge, perception and attitude towards subterranean fishes			■	Dugout wells located in the lands owned by private parties are the only habitat from which the hypogean fishes of Kerala are reported till date. Hence a questionnaire based survey and interviews were conducted to know the nature of knowledge kept by local people and their attitude

				towards the subterranean fishes. It was very difficult for most of the local people to believe that these organisms, occasionally appearing in their wells are fishes. They describe subterranean fishes as "dark, slender swimming snakes, which will die if it is taken out of the water". Many believed that the presence of these animals in the wells would cause contamination of the drinking water. The general attitude was to remove and kill "the snake!" as soon as it is noticed in the well and adding bleaching powder. Some others were boiling water before using it to "neutralise the toxin" produced by these animals! This baseless fear and disgust of local people was found to be the major threats for the subterranean fishes of Kerala. Furthermore in this state wells used for collecting drinking water are chlorinated by the owners or the institutions of local governance to avoid waterborne diseases. This process wipes out all living things including the cryptic subterranean fishes inhabiting such wells. Along with these anthropogenic pressures drying up of the wells in the early phase of summer itself, may be caused by the over exploitation of the ground water and climate change, which is becoming a common phenomenon in the areas from which the subterranean fishes are reported also could be contributing significantly to the silent extermination of these cryptic species.
Studying behaviour and ecology of the subterranean fishes				Summer is the time at which populations of subterranean fishes face maximum damage from anthropogenic activities, since the owners dry up or disinfect the wells. If workers come across any subterranean fishes while cleaning the well they kill it. Hence, the only way to

				save the population of subterranean fishes from the fury of the summer is rescuing them and keep alive and healthy in the captive conditions till the beginning of the monsoon. When the wells are refilled with the monsoon shower these rare animals could be released back to their natural habitats. However, very little information on the basic requirements such as food items to be given, ecological conditions to be provided etc. for maintaining these species *ex situ* are available in the literature. Various behaviour patterns such as microhabitat preference, foraging and food items consumed, exploratory and social behaviour of *Monopterus* sp. and *Kryptoglanis shajii* has been recorded. *K. shajii* prefers egg white, live prey items such as mosquito larvae, *Chiromonous* larvae etc., while *Monopterus* could be maintained by providing tubifex or dried blood worms. However, both species do not eat commercially available artificial pellets but prefers the minced earthworm. Both *K. shajii* and *Monopterus* likes dark environmental conditions; the former never comes out of the shade even if the food materials are present outside the hide, but the latter does not care feeding in the lighted environment also. Interestingly, no aggressive displays have been observed in the tanks where these species were kept in monospecific groups. The current project is one of the pioneering work on the behaviour and ecology of subterranean fishes of Western Ghats region. More research would have to be conducted on this topic to elucidate various dimensions of ecology and behaviour of these cryptic species.
Building a network of institutions to conserve				Subterranean fishes being the inhabitants of the drinking water

the subterranean fishes				resource, conservation of these organisms is not possible until and unless local people believes that the subterranean fishes are harmless and ecologically important organisms. In order to make people familiar with these organisms and eliminating baseless fear and disgust, interaction programmes were conducted by a team of resource persons including researchers, academicians, conservation activists and social workers, students etc. from National Institute of Advanced Studies (NIAS) Bangalore, Department of Zoology, Nirmalagiri College, Kannur, Institute of Development and Education (IDE) Kasargode etc. During these workshop biology, relationship between subterranean fishes and local fishes, ecological importance of the subterranean fishes and the need for conserving them etc., were introduced to the participants. People from different sections of the society, labourers, housewives, snake rescuers, school children and the workers involved in making and cleaning wells etc., participated in the workshop and shared their knowledge and concerns about the subterranean fishes and cleared their doubts about these fishes. An association was made with Malabar Rescue and Awareness Centre (MARC) Wayanad an organisation actively involved in rescuing snakes in the study area. Members of this organisation are often contacted by the people to remove subterranean fishes appearing in their wells. The rescuers found time to make the house owners who contact them aware of the harmless nature of the subterranean fishes and the need for conserving them. Additionally, volunteers from the Institute of Development and Education,

				Kasargode visited individual houses in the study area, conducted discussion with the housewives, who often comes in contact with these fishes while fetching the water, to eliminate the misconceptions about the subterranean fishes. Additionally, the team shared the information about the subterranean fishes via the social media also with the people. The newspapers and local television networks also supported us in spreading the scientific information about these fishes and eliminating fear towards them. Along with conducting programmes to make people aware of the subterranean fishes living in their wells establishment of facilities for keeping these precious animals rescued from the wells alive and healthy are also important. With the support of Department of Zoology, Nirmalagiri College, Kannur and Kerala University of Fisheries and Ocean Studies facilities were developed to keep the rescued fishes. Currently, whenever people from the study area notice the presence of the subterranean fish in their wells they get in touch with the faculties of these institution or the National institute of Advanced Studies (NIAS) Bangalore. The project team discuss with owners of the well and tries to eliminate the baseless fear. In many contexts volunteers who are familiar with the subterranean fishes visit the site and talk to the house owner. However, if the owners are not interested in keeping the fish in their well these fishes are translocated to the rescue facilities. Although in the initial phase of the project people were reluctant to keep the subterranean fishes in their wells, the trend is changing slowly and many people put the fishes collected while cleaning the well back.

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

The major difficulty faced during the initial phase of the project was convincing people from the study area that the subterranean fishes are not poisonous. Due to the baseless fear/ disgust people often killed these animals when they notice it in their wells and were very reluctant to inform the research team about the presence of these organisms in their wells or to discuss about it. However, involvement of educational institutions, local non-governmental organisations and snake rescuers in our activities helped in initiating and maintaining interaction between project team and general public.

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

a). For the first time, our team was able to come up with the comprehensive document of the diversity and distribution of subterranean fishes in Kerala state, India and identified two hotspots for these rare, biologically significant and data deficient organisms.

b). Standardised protocols for maintaining two subterranean piscine species *Monopterus* sp. and *Kryptoglanis shajii* in captivity, an important step in the development of *ex situ* conservation strategies, and begun research on behaviour and ecology of these cryptic fishes.

c). Our team was able to spread a vital information 'subterranean fishes are neither poisonous nor contaminate water'. We were able to establish a network of institutions by bridging research institutes, educational institutions, nongovernmental organisations and general public for the rescue and conservation of the subterranean fishes.

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

The current project worked as a platform to bring various stakeholders from the local communities such as local educational institutions, NGOs and the youth club, house wives, labourers etc. under one umbrella, promoting dialogue between them and the researchers and to initiate joint action plans to conserve the subterranean fishes. The residents of the study area got the opportunity to learn facts about this 'scary fishes' and became 'courageous' to use water from their wells in which the subterranean fish was sighted.

5. Are there any plans to continue this work?

Although the project completed its tenure our team is in constant contact with people and various institutions supported us for conducting awareness and rescue programmes. People contact us when they notice the presence of subterranean fish in their wells to get more information about these organisms. We are continuing our

research on the behaviour of *Monopteus* rescued from various regions. Our team is planning to continue this work in future also since we know that elimination of the fear towards this fish resembling snake in appearance and surviving in the drinking water resources may take a long period and co-living with this rare and precious fishes and the conservation of it will not be possible until we reach that target.

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

We are constantly in touch with the various institutions and people from the study area who are interested in the conservation of the subterranean fishes and update our findings with them. Our observations on the diversity and distribution of the subterranean fishes had been presented in the international conference on the biogeography held at Indian Institute of Science Bangalore (26th-28th September 2017). Three papers are under preparation and would be submitted to some high impact journals soon. Our team is planning to conduct a series of lectures for school children in the study area during summer months when these fishes starts to appear in the wells.

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

10th September 2015 to 30th August 2017: The project took more time than the team anticipated due to the nature of the habitat of the focal species and misconceptions about it present amongst the natives of the study area.

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
Survey of dugout wells and springs	401	416	+15	
Survey and interview to know the attitude of natives	422	430	+8	
Travel, accommodation and food in the field	1100	1072	-28	
Field assistant	201	209	+8	
Awareness programmes	672	665	-7	
Water and sediment testing	303	284	-19	
Development of Information Communication Education (ICE) materials	155	135	-25	
Development of distribution map	106	113	+7	

Development of facilities to rescue and shelter fishes collected during summer	657	638	-19	
Training volunteers	252	240	-12	
Communication, Stationary Accounting and other documentations	643	728	0	
Total	**4997**	**4925**	**-72**	

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

The current project was instrumental in generating awareness about the subterranean fishes in focal area. At the time of the beginning of the project these animals had been reported from a few locations only. However, our team was able to record the presence of the subterranean fishes from nearby districts of the focal area also. Hence the momentum generated by the current project will have to be maintained and its activities has to be extended to the other areas of the state. In this context, it should be noted that conservation of an animal which is mistakenly perceived as a poisonous snake and living in the drinking water resource, by bringing behaviour change amongst the general public is a long term process.

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?

The logo of Rufford Foundation was used in public interaction meetings conducted by the project team. Additionally, write ups on subterranean fishes published in print and social media also recognised the assistance obtained from the Rufford Foundation.

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

Dr. V V Binoy Assistant Professor, National Institute of Advanced Studies, Bangalore: Dr. Binoy studied the behaviour of the subterranean fish, knowledge and attitude of the people towards them and coordinated the awareness programmes.

Dr. Rajani M. Assistant Professor, National Institute of Advanced Studies, Bangalore: Dr. Rajani lead the study on the geographical distribution of the subterranean fishes and the development of the distribution map

Dr. Anvar Ali Assistant Professor, Kerala University of Fisheries and Ocean Studies KUFOS, Kochi: Dr. Anvar conducted studies on the taxonomy and diversity of the focal species

12. Any other comments?

No

Monopterus

Kryptoglanis shajii **(top)**

Monopterus **(bottom)**