Final Evaluation Report

Your Details	
Full Name	Dr Thomas Kalama Mkare
Project Title	A first look at species richness and spatial distribution trends of seahorses at selected sites along the Kenyan coast
Application ID	Project ID: 24357-1
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
To determine the number of species of seahorses occurring in the Kenyan waters			✓	Before the inception of this project, a total of four seahorse species were known for Kenya, through a questionnaire survey. They included the thorny seahorse, *Hippocampus histrix* (IUCN Redlist: Vulnerable), the great seahorse, *H. kelloggi* (Vulnerable), the giraffe seahorse, *H. cameloprdalis* (Data Deficient) and the spotted seahorse, *H. kuda* (Vulnerable). Our Rufford project, which utilised complementary approaches, including questionnaire surveys, ecological surveys (i.e. SCUBA diving & snorkelling), citizen scientists' involvement and museum visits, was able to provide an updated list of the species including the *Hippocampus histrix*, *H. kelloggi*, *H. kuda* and *H. jayakari* (Least concern).
To determine present and future spatial distribution patterns of the seahorse species using species distribution models (SDMs)			✓	Generation of species distribution models was possible for only *Hippocampus histrix* and *H. kelloggi* because they had comparably more occurrence records, unlike *H. kuda* (n= 3) and *H. jayakari* (n = 1) which had very few records. Through the SDMs, we were able to provide insights into their current and future distribution ranges.
To identify and map out potential biodiversity "hotspots" for protection especially when they occur outside existing Marine Protected Areas (MPAs).			✓	We generated species distribution maps showing areas of species overlaps and also whether they occurred within MPAs. These results have been consolidated in a manuscript for publication in an internationally recognised journal.

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

We detected some dishonest responses from a few local fishermen and aquarium divers, especially during the early days of the project when we were conducting questionnaire surveys. A few respondents from these groups were unwilling to tell the truth in fear of being arrested or losing their fishing grounds should there be a need in the future to establish a protected area in the area. Fishermen would tell you, "yes, we know and have seen them, but in other places and far away from these fishing grounds". Surprisingly, respondents from the areas that were mentioned by other people as having seahorses would deny and instead mention the areas where others had denied seeing them. Others would openly tell us that they are not willing to lose their fishing grounds because of seahorses. Others (only at one fish landing site) would tell us, pay us handsomely so that we could give you the information! However, through our citizen science trainings that targeted some of the representatives of these groups, we were able to change the negative thinking and embrace collaborations in the seahorse project.

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

A decline of illegal seahorse harvesting: The project has created awareness of seahorse protection in the country through training that was targeted at fishermen, divers, aquarium traders and conservation officials from the government and private institutions. This is evident because more people joined the citizen science team and have been reported seahorse sightings in the country. Additionally, aquarium firms that were buying seahorses from divers for export no longer participate in this illegal business or at least have reduced the rate of their involvement. Majority of the stakeholders are aware that seahorse harvesting is illegal and is only permitted to people with permits from CITES.

Knowledge of the geographic distribution of seahorses in the country. Our project has provided insights into the spatial distribution of the species and whether their occurrence falls within MPAs or open fishing areas. These results are included in the manuscript that will be available to the wider international community once it comes out of the press.

Allocation of survey and monitoring efforts: The species distribution models provided insights for areas where the seahorses occur. This is important because rather than conducting ecological surveys randomly along the coast, specific areas could be targeted for surveys and monitoring thus saving on money and time.

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

Right from the outset the project we have been working with local communities very closely. Briefly, the project recruited and trained citizen scientists from the local communities including fishermen, divers and government and private conservation officials. These people were trained on seahorse taxonomy and were issued with identification guides. Through our WhatsApp group, we created important linkages

and friendships especially between fishermen/divers and conservation enforcement officers. During the training, it was important to hear that some of the divers had once been arrested by conservation officials who were also part of the meeting. It was encouraging to seeing these conservation officials explaining to divers and fishermen the importance of protecting species and that any laws are not made to hurt anybody but for the wellbeing of the species and ours as well.

5. Are there any plans to continue this work?

We have a small area in Shimoni where we have been sighting most of our seahorses through citizen science, and it would be great if we could start ecological surveys to estimate population sizes and also to characterise its habitat (vegetation types). Two species including *Hippocampus histrix* and *H. kuda* have occured in this area. Lamu, which is on the northern part of the Kenyan coast, has not been surveyed, despite the area having seahorses. Starting surveys in this area is important because the *Hippocampus jakayari* (first record in the country) was caught by fishermen when we had gone for fisheries surveys. Several species of seahorses could be existing, and it would be great having a data from the area.

Malindi-Ungwana Bay, which is the only area where bottom prawn trawling occurs forms the only area where *H. kelloggi* have been found. The area has no protected areas and it would be a good thing to do if more records could be collected. This would allow for rigorous distribution models to provide insights on the distribution extent and abundance in the bay. Given that the species has only been reported in that area, stringent conservation measures may need to be formulated in the future including gear restrictions and demarcation of the trawling area. However, this can only be done in the presence of adequate data. Environmental DNA (eDNA) as a biodiversity assessment tool may need to be tested in the area to complement ecological surveys.

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

Reports and the publication will be submitted to the Kenya Wildlife Service (KWS) to contribute towards establishment of applicable management measures for the species. The results have also been shared at a regional meeting organised by the Tropical Biology Association, in Nairobi during 2019.

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

The project started in June 2018 when the sampling permit was issued and completed in December 2019.

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
Activity 1	**426**	**426**		
Sampling permit	88	88		This is the cost of obtaining permit for one-year duration from the Kenya Wildlife Service (KWS)
Museum visits	206	206		Cost to support museum visits in Nairobi (3 nights DSA)
Questionnaire trial	74	74		Cost for two research personnel
Stationaries	58	58		Cost for printing and photocopying of field materials
Activity 2	**1052**	**1052**		
Questionnaire surveys	1052	1052		Instead of two officers as stated in the proposal, we used three officers to administer the questionnaires
Activity 3	**3154**	**3191**	**+37**	
Ecological surveys	2713	2750	+37	Cost for carrying ecological surveys (SCUBA & snorkelling). The excess was the cost to access a locally managed marine area and we were not aware of the charges when the proposal was being written.
Genetics work	441	441		Cost for DNA work
Activity 4	**368**	**368**		
Citizen science trainings & visits	368	368		Cost for citizen science
Total budget	**5000**	**5037**	**+37**	**Total budget of the project**

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

The next step going forward is to secure funds to continue with the action activities as indicated under section 5. This will involve approaching The Rufford Foundation for to facilitate the continuation of the project

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?

During the citizen science trainings and Tropical Biology Association meeting where the results of the project were presented, the logo was made public for publicity and acknowledged adequately.

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

Dixon Odongo: Fish taxonomist. He participated in questionnaire surveys

Valarie Silali: My research associate (BSc in Fish Biology) who participated in questionnaire surveys.

Nimrod Ishmael: My research associate (BSc in Marine Resource Management) at KMFRI who participated in the questionnaire surveys

Juma Masudi: A diver from KMFRI who participated in ecological surveys (dividing and snorkelling)

Josphine Mutiso: An officer from Kenya Wildlife Service (KWS). She participated in the ecological surveys.

Sammy Mramba: An aquarium diver who participated in the ecological surveys
Mgeni Wamwachai: My intern and diver at KMFRI (BSc Marine Resource management). She participated in the ecological surveys

12. Any other comments?

I sincerely thank the Rufford Foundation small grants for the award. It really kick-started my conservation career in my home country, and possibly also for many more countries' involvements in the near future. I am indebted to your kind and generous support. Thank you.

K.M.F.R.I

Center for Aquatic Genomics, Forensics & Bioinformatics