

## Final Evaluation Report

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Your Details	
<b>Full Name</b>	Rahul Muralidharan
<b>Project Title</b>	Conservation on a contested coast: Indo-Pacific humpback dolphins and fisheries interactions in Tamil Nadu, India
<b>Application ID</b>	18975-1
<b>Grant Amount</b>	£4709
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<b>Date of this Report</b>	15 January 2019

**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 estimate population density, habitat use and seasonal occurrence of humpback dolphins				10 survey days covering eight transects between Rameswaram and Adam's bridge area in Palk Bay were completed. However, I had to forego dolphin surveys in Gulf of Mannar due to international security restrictions. In total I spent 15 survey days at sea.
To assess seasonal trends in fish diversity, catch density and the socio-economics of artisanal fisheries				Two villages, one each in the Palk Bay and Gulf of Mannar overlapping with dolphin conflict, were selected for an in-depth study.
To explore the extent and nature of humpback dolphin-fisheries overlap in order to evolve conservation and management strategies in the study area				

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

The proposed objective of carrying out a boat-based survey at sea to estimate dolphin population density could not be achieved as there were several security restrictions for researchers to operate in the study area. This was due to Palk Bay and Gulf of Mannar's close proximity to the international border separating India and Sri Lanka. Notably, there was a ban on the use of fibre boats and engines that were more than 10 HP, slowing down transect times greatly. Another unforeseen difficulty was the extreme weather conditions that prevailed in the region, reducing the window available for good boat-based survey conditions to a few hours in the morning. Covering transects within a short weather window considering the restrictions on boat and engines use proved to be a challenge. This region was also prone to trafficking of narcotics, wildlife and other contraband, and being at sea posed several security threats to the researchers. Hence, boat-based surveys were abandoned due to deteriorating security conditions.

Sampling of fish catch in the Palk Bay and Gulf of Mannar was a challenge due to extensive migration undertaken by fishers during the south-west and north-east

monsoon season in the Gulf of Mannar and the Palk Bay, respectively. When the weather turned rough, fishing effort drastically reduced where fishers migrated to other regions along the coast in search of calm fishing waters or operated from a mechanised harbour. To address this, I concentrated efforts in each location according to the fishing seasons. I assessed fish catch in Palk Bay between April and September and switched to Gulf of Mannar during the remaining 6 months.

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

First, through this project I was able to collect data on presence and movement patterns of humpback dolphins in the Palk Bay and the Gulf of Mannar. Previous studies carried out in the region had relied on stranding-based information to predict presence of humpback dolphins. This research combined interviews with boat and fishing vessel-based surveys to study presence, movement and interactions between humpback dolphins and artisanal fisheries. Findings indicated that humpback dolphins were present all year long, occupying pockets of bays and estuaries in near-shore waters of the Palk Bay and Gulf of Mannar. The humpback dolphins in the region frequently engaged in depredation of artisanal fishing gear and some groups of dolphins entirely depended on fish caught in fishing gear to fulfil their foraging requirements. Humpback dolphins remained in near-shore areas when the waters were calm and clear. When monsoon winds picked up the near-shore waters became rough and the humpback dolphins moved to deeper waters.

Second, this project enabled the estimation of the diversity of fish species targeted by artisanal fishers and its overlap with humpback dolphin's preferred prey. Fish catch sampling studies showed that the humpback dolphins of the region particularly targeted small to medium mesh gill nets that captured fish including, but not limited to, mackerel, sand whiting, seer fish, barracuda, mullets and snappers. Incidentally, these species were priced higher in the local fish market compared to the fish that were either avoided or not depredated by dolphins. Catch sampling showed that the artisanal fishers averagely caught 3 to 4 kg of fish on a daily basis. It has emerged with reasonable clarity that dolphin depredation causes socio-economic impact not just due to loss of day to day fish catch but the damaged fishing gear had to be discarded and replaced with new gear, putting local artisanal fishers at a disadvantage.

Third, through this project, an insight into the extent and nature of humpback dolphin's interactions with artisanal fisheries was obtained. This was linked to the history of technological changes in near-shore fisheries and the behavioural adaptations of humpback dolphins. Fishers point out that in the last 10 years they had been observing a spurt in dolphin depredation incidents which was directly linked to the depletion of near-shore fisheries. While there were existing conservation policies for the regulation and management of fisheries, there was a serious lack of on the ground implementation. Mechanised bottom trawling and the intensification of pair trawling activities in coastal areas of Palk Bay and the Gulf of Mannar needs to be regulated to ensure artisanal livelihoods as well as the presence of humpback dolphins.

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

Youth from local fishing communities in two villages were engaged in assisting with fish catch sampling activity. With few months of training, the fisher youths were able to sample catch independently. Given their knowledge of local fisheries, catch sampling was cohesive and complete. This work also provided them temporary monetary benefits as they were paid for the hours put in.

Given the insights obtained from the research, communities have taken the researchers help in locally formulating a dolphin-fisheries conflict mitigation plan that is being presented to the state administration for implementation.

Informal trainings and discussions about coastal laws and fisher rights were also imparted, leading to increased participation in local coastal planning. For instance, fishers from the research site participated in several public hearings held by the government.

**5. Are there any plans to continue this work?**

Yes, there are plans to continue this work on a long-term basis particularly focusing on dolphin depredation of fishing nets and identifying locally formulated, pragmatic solutions for the issue. The encounters between dolphins and near-shore artisanal fisheries, and depredation incidents are likely to increase in the near future considering the depletion of fish resources, and further intensification of fishing effort. While depredation incidents involving humpback dolphins are reported less in other parts along Tamil Nadu coast, the peculiar features of Palk Bay and the Gulf of Mannar, including high abundance and diversity of near-shore fish species, seasonally sheltered calm waters and various types of fishing practices that are carried out in here, makes it an ideal region to conduct long-term studies on depredation and fisheries.

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

First, we aim to engage with the Tamil Nadu Forest Department by conveying the findings of the research and be involved in the preparation of a near-shore fisheries management plan. This has been initiated by means of a presentation at the annual wildlife seminar and frequent meetings that are carried out with the Forest Department officials.

Second, by writing both popular and research articles. In February 2018, I published an article in *Seminar* titled '*Entangled lives of dolphins and fishers*'. This article was also translated in the local language – Tamil, and distributed to fishing communities. I am currently writing a research paper on humpback dolphins and artisanal fisheries of the Palk Bay and the Gulf of Mannar.

Third, producing a short educational outreach video that describes the nature of dolphin-fisheries conflict through the eyes of artisanal fishers. This video aims to bring to the fore the ethical and emotional encounters of dolphin-fisheries conflict not only

to push for further research but also conveys the challenges faced by the local population to the general public. The video will be shared with the funders once nearing completion.

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

The grant was used over a 2-year period. Initial budget was planned for a period of 1 year, however, fieldwork circumstances posed challenges and the grant period was extended.

**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
Boat hire for line transect surveys	2400	1016	-1384	
Field assistant salary	768	770	+2	
DSLR Camera	290	373	+84	Purchased a metal body camera instead of plastic body to accommodate the heat, moisture and tough conditions of survey environment
Telephoto zoom lens	380	479	+ 99	Purchased a 300 mm telephoto zoom lens with an image stabilizer which is suitable for taking photos from fishing boats in choppy waters
Binoculars with compass and range finder	130		-130	I used a friend's binocular instead of purchasing a new one
Hand-held GPS device	186	176	10	
Depth finder device	155	140	15	
Travel, stay and food expenses for the researcher and team members during fieldwork	400	780	+380	Due to the extension of the project, the researcher and the team had to make multiple visits to the field sites
Organisational overheads		320	+ 320	Calculated at 10% of the grant money

Educational outreach video production	0	655	+655	Includes travel/food expenses, equipment hire during shooting period and remuneration charges for two technicians for six days of filming
<b>Total</b>	4709	4709	51	*Currency conversion rate 1 GBP – 93.8 INR

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

First, outcomes of this research have indicated that this region is an ideal location to conduct long-term behavioural studies on humpback dolphins. Interviews conducted with fishers since 2013 has indicated that the decline of near-shore fisheries over the years coincides with the range contraction of humpback dolphins along the coast. This means that humpback dolphin groups are restricted to certain areas, and causing local conflict situations with artisanal fisheries. More importantly, the effects of monofilament ingestion by dolphins and their behavioural adaptations around this fishing gear needs to be investigated. This has never been done before in India. Insight on this detail will help facilitate further research of policy relevancy by forming local networks with fishing communities, researchers and governing officials.

Second, there is a need to prepare a road map for management of near-shore fisheries, particularly to ensure the persistence of artisanal fisheries. Interviews with fishers and catch sampling conducted during this research indicated that near-shore fishing is declining and is becoming unprofitable. If the same situation continues there be loss of fishing livelihoods and employment opportunities. Both humpback dolphins and artisanal fishers target the same resources. By ensuring the proper management of near-shore fisheries, dolphins as well as fishers could benefit.

**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?**

I have acknowledged the funding support of the Rufford Foundation on my institutional webpage. Due credits to Rufford is given in all presentations in my institution as well as at the First Annual Wildlife Seminar conducted by the Tamil Nadu Forest Department in October 2017. Rufford Foundation's logo will be used in the educational video to indicate funding support.

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

**Nitin D. Rai** helped in preparing topic guided interviews and in designing socio-economic surveys of fishing villages

**Dipani Sutaria** assisted in both designing boat surveys and on field with photo-identification of individual dolphins in the Gulf of Mannar

**Mihir Sule** and **Isha Bopardikar** of the Konkan Cetacean Research Team (KCRT) provided assistance during preliminary surveys of humpback dolphins by bringing their experience of working in the west coast of India

**Arul Rooban** and **Anthony Sandhiya** of Olaikuda Village in the Palk Bay and Shankar and Namburajan of Kilamundhal Village in the Gulf of Mannar were primary data collectors in assessing fish catch and effort.

## 12. Any other comments?

I thank the Rufford Foundation for providing the funds to carry out this important research and supporting throughout the study period. It has been incredible corresponding with the Rufford team, for their understanding the local fieldwork challenges and allowing me to alter my project, subsequently. Right from the application process to submission of this report, there has been no moment of apprehension in contacting the Rufford team for assistance. My special thanks to Jane Raymond and everyone else at Rufford for making this project a fulfilling and a productive research experience.

