

Final Evaluation Report

Your Details	
Full Name	Isha Bopardikar
Project Title	Assessing the status of humpback dolphins and finless porpoises in a marine biodiversity hotspot off the west coast of India
Application ID	28395-2
Grant Amount	£ 6,000
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Date of this Report	

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 assess the spatiotemporal occurrence patterns of Indian Ocean humpback dolphins and Indo-Pacific finless porpoises along the Sindhudurg coast, India				To fully assess the spatio-temporal occurrence patterns of the two focal species, we require data for at least two more seasons. Our data collection from January-March 2020 included preliminary information for the hotspots used by the focal species. Current information provides us with some knowledge of habitat use patterns for the two species and how their populations are distributed throughout the study area. However, more data (two seasons) are needed to present a robust understanding of these patterns and potential changes in the same over time.
To estimate population densities of the two species using acoustic data from the line transect surveys				Surveys conducted in December 2019 served as a pilot for testing our methodology. Surveys conducted between January 2020-March 2020 resulted in 62 visual encounters of the focal species. Preliminary results from analysis of acoustic data show detections from the towed array were considerably more than visual alone for the finless porpoises. This trend was observed throughout the survey effort from January 2020 to March 2020. During the Jan-Feb2020 surveys, 29 groups of finless porpoises were sighted visually. However, acoustic survey data resulted in 51 group encounters.
To determine the degree of anthropogenic pressure on the focal species by mapping potential threats and their overlap with cetacean presence				We have preliminary data to map anthropogenic disturbances in relation to cetacean hotspots. To fully gauge the extent of overlap between chronic human-activity and presence of the two focal species we require more replicates in the survey area.

<p>Focal follows of humpback dolphin pods to record acoustic data with concurrent visual monitoring of behaviour to understand space use</p>				<p>We conducted focal follows for humpback dolphins from November - December 2019. This is in continuation with our previous study funded by The Rufford Foundation (2018-2019) to understand the behavioural context of humpback dolphin vocalisations. We will use the focal follow data to ground truth the acoustic cue rates for humpback dolphins. The cue rate data will be used in conjunction with the acoustic density estimates from the surveys. Focal follows resulted in acoustic data of approximately 19 hours, with 11 encounters of humpback dolphin pods.</p>
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2. Please explain any unforeseen difficulties that arose during the project and how these were tackled.

Project delays: The project started later than anticipated because of an unusually long monsoon season in 2019, we were not able to get on the water before early-November 2019.

Survey adjustments: During the first set of pilot surveys in December 2019, we realised that the section between Malvan and Tarkarli had to be excluded from the surveys due to the occurrence of extremely shallow and rocky areas. When we did our first attempt to survey the area, the downrigger got caught in rocks and the tow cable snagged. While we were able to recover the array, the downrigger and the depth sensor were lost. Even without the array in the water, it was not possible to stay on the survey lines because of these navigational hazards. In the end, the captain decided that it is unsafe to operate the vessel in this area.

COVID-19: The surveys in March 2020 could not be completed because of the pandemic. Only the blocks B1, B3, and B4 were surveyed during this month.

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

The most crucial conservation output of this study is the robust population density estimate for the humpback dolphin and finless porpoise populations in the study area. Furthermore, continuing our project will provide data on spatio-temporal occurrence patterns of these species along the Sindhudurg coast. Our initial analysis of the transect survey data from January 2020-March 2020 for Indo-Pacific finless porpoises (*N. phocaenoides*) indicates that these animals are frequently detected acoustically but not sighted visually.

Indo-Pacific finless porpoises are lacking a dorsal fin, are known to be elusive, and exhibit cryptic surfacing patterns. In addition, not all individuals within a larger group of finless porpoises surface regularly, making group size estimation tricky. These

factors are likely the reason for the low visual encounter rates especially during marginal weather conditions (>3 Bft). However, these animals very regularly vocalise to communicate, navigate, and detect prey.

During our surveys, we frequently sighted individual animals. The largest pods we observed visually consisted of just 4-6 animals. However, target motion analysis of individual vocalisations revealed group sizes of 8-9 animals.

Acoustics is therefore the superior method to monitor finless porpoises and provides the necessary information to enable data-driven conservation actions.

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

Our study has not directly benefitted the local community in the short time period that we have been on field. However, we do work with the local community and employ local fishermen as boat drivers. The fishermen in the study area are also part of a community based cetacean stranding and monitoring network. We maintain constant engagement with the fishermen to obtain data on stranded cetaceans, especially finless porpoises, and humpback dolphins. Eventually we aim to use stranding data and further community engagement to obtain trends in mortality events of the two species and link these with population estimates for the same.

5. Are there any plans to continue this work?

I will continue this study long-term and use the collected data: (a) to determine potential changes in space use, (b) to assess population trends, and (c) to study potential long-term impacts of anthropogenic activities on these two vulnerable odontocete species.

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

Our aim is to publish the data from our findings in peer-reviewed journals. We will also share our finding via popular articles to reach a wider non-scientific audience.

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

We had anticipated that our project would finish data collection and analysis for the first year of these surveys by October 2020. However, data collection was delayed by a month and was pushed forward from October 2019 to November 2019 due to extended monsoon along the west coast of India. We also suffered some survey vessel damages to our viewing deck during the 2019 Kyarr cyclone in the Arabian Sea.

We could not continue our data collection efforts till May 2020 due to the Covid-19 pandemic. Due to initiation of a country-wide lockdown in late March 2020, we had to halt all survey efforts.

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
Living expenses on field and rent for field base were combined as Salary for researcher	1700	1700		
Salary for boatmen	1900	1900		
Travel allowance	900	900		
Survey expenses	1500	1200	-300	Due to covid-19 restrictions vessel surveys could not be conducted till May 2020. We would like to use the leftover funds to cover hardware related expenses (batteries, hard drives for data, replacement of handheld GPS)
Total	6000	5700	-300	We would like to use the leftover funds to purchase a handheld GPS. Our existing GPS has been malfunctioning, hampering the accuracy of data.

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

We are still in the data collection phase of this project. We have successfully conducted 14 visual-acoustic surveys along the Sindhudurg coast, India and will continue to collect data in the study area across all seasons over the next few years. We are now focusing on a comprehensive analysis of the collected data to determine population density estimates for both species. The preliminary data analysis is being conducted in collaboration with Dr Danielle Harris (Centre for Research into Ecological and Environmental Modelling, University of St. Andrews). We are also working with Dr Tina Yack (EcoSound Bioacoustics, USA). Dr Yack has extensive experience using acoustic monitoring for studying marine mammal populations.

These data analysis effort will help us to optimise the visual-acoustic survey design and make sure that we are collecting the best possible data for density estimation moving forward. In the future we look forward to implementing this methodology across a wider area along the Indian coast.

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?

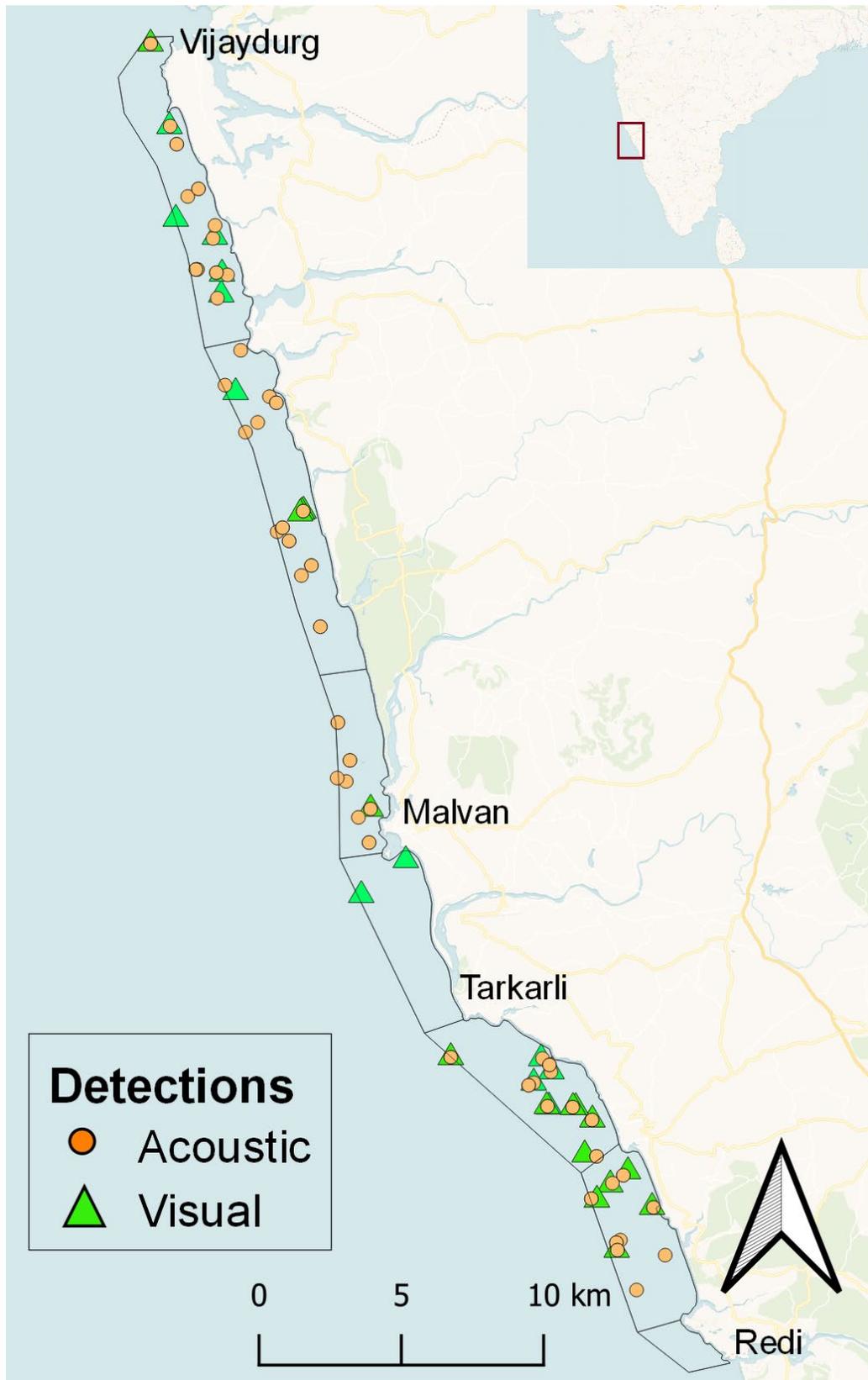
I conducted some online talks regarding marine ecology and the use of passive acoustic monitoring to study marine mammals for the undergraduate students at IISER Tirupati, Ashoka University, Delhi. I have used the Rufford Foundation logo in my presentation. The Rufford Foundation was also acknowledged as funders.

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

Isha Bopardikar (PI): I conducted the fieldwork, data collection and data analysis for this study. I will continue this study long-term for my PhD thesis and will conduct surveys for atleast 2-3 years in the study area. I also plan to extend the survey area and explore locations on the east coast to study cetacean populations using acoustic methods.

Dr VV Robin (Co-PI) is Isha Bopardikar's PhD advisor at IISER, Tirupati. He plays a supervisory role on this project. IISER, Tirupati is the affiliated institution for the study. Dr Danielle Harris (University of St Andrews, Scotland) is supervising and advising on the methodology used for density estimation using passive acoustic monitoring. Dr Harris is supervising analysis of the data collected during the field season.

12. Any other comments?



Map showing a comparison between number of visual sightings and acoustic detections for Indo-Pacific finless porpoises in the study area. Data above are combined events from January-February 2020 surveys.



Left: Observers on survey. Right (Top to Bottom): Indo-Pacific finless porpoise and Indian Ocean humpback dolphins.



Left: Isha Bopardikar deploying the array. Right: Captains, Mahesh Tandel and Rohidas Lone deploying the array