The Rufford Foundation

Final Report

Congratulations on the completion of your project that was supported by The Rufford Foundation.
We ask all grant recipients to complete a Final Report Form that helps us to gauge the success of our grant giving. The Final Report must be sent in **word format** and not PDF format or any other 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. Please be as honest as you can in answering the questions – remember that negative experiences are just as valuable as positive ones if they help others to learn from them.

Please complete the form in English and be as clear and concise as you can. Please note that the information may be edited for clarity. We will ask for further information if required. If you have any other materials produced by the project, particularly a few relevant photographs, please send these to us separately.

Please submit your final report to jane@rufford.org.

Thank you for your help.

Josh Cole, Grants Director

Grant Recipient Details	
Your name	Shambhu Paudel
Project title	Understanding populations of most endangered Ganges River dolphins (*Platanista gangetica gangetica*) in Nepal and initiating local efforts to conserve remaining population
RSG reference	14428-1
Reporting period	End of project (July)
Amount of grant	£6000
Your email address	oasis.excurrent@gmail.com
Date of this report	2014/8/03

1. Please 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
Population estimation along major river system			✓	
Characteristics of available habitats (suitable habitats estimation) during low water season			✓	
Identification of prime habitats that are urgently needed to preserve			✓	
Factors responsible for the presence and abundance of dolphins in river systems			✓	
Fisherman survey			✓	

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

N/A

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

River geometry analysis:
Mean depth and width of the river sections measured at 300m intervals were significantly different between river systems (width: ANOVA test, F=81.834, df=2, p=0.000, Karnali: 187.16±78.55, 95% CI177.76-196.58, Sapta Koshi: 258.04±132.59, 95% CI252.13-263.95, Narayani: 197.11±56.36, 95% CI235.43-244.60; depth: ANOVA test, F=712.209, df=2, p=0.000, Karnali : 5.55±4.13, 95% CI 5.06-6.05, Sapta Koshi:1.40±1.10, 95% CI 1.35-1.45, Narayani: 2.65±1.56, 95% CI2.51-2.79). Mean depth varied significantly between all pairs of river systems (Post Hoc test, p=0.000 for all pairs) but mean width between Narayani and Karnali was not significantly different (Post Hoc test, p=0.267). Mean depth and width based on habitat types was significantly different (ANOVA test: Width-F: 10.38, df: 3, p=0.000; Depth- F: 463.18, df: 3, p: 0.000). Mean width (DP: 231.88±99.52, 95% CI 222.89-240.88; SC: 220.50±99.42, 95% CI212.38-228.63; CF: 266.41±142.04, 95% CI 245.86-286.96; M: 247.06±131.11, 95% CI 240.31-253.81) and depth (DP: 4.60±2.92, 95% CI4.34-4.87; SC: 1.59±0.98, 95% CI 1.51-1.67; CF: 2.94±3.26, 95% CI 2.46-3.41; M: 1.27±1.06, 95% CI 1.21-1.32) was observed in river systems. Mean depth between all pairs of habitat types differed significantly (p=0.000 for all pairs) but not for width between DP and SC (p=0.128). There was a statistically significant interaction between the effects of river systems and season on the depth of river systems (Univariate test, F=77.37, df=2, p=0.000) but not for width of river by the same interaction effects (F=1.472, df=2, p=0.230).

Population abundance and occupancy:
The Karnali and Sapta Koshi Rivers as river systems had higher occurrence probabilities than the Narayani River. Higher occurrence probabilities suggest that these two rivers are much more critical to river dolphin conservation in Nepal than the Narayani. We detected 12 dolphins (maximum direct count) in the southern sections and estimated there were likely 16 individuals (adjusted bias estimate) in the entire river section of Karnali in Nepal side. The maximum observed count (minimum known alive) in our surveys of Koshi was 14 individuals with detection bias-adjusted estimates ranging from 19-27 individuals (95% CI). Although our results reveal a severely limited

river dolphin population with low abundance and fragmented sub-populations, our global estimate for all of Nepal (95% CI = 28-52 individuals) is higher than the estimated population of 20 individuals in 2011 (Jnawali *et al.*, 2011). The occupancy models also revealed a strong relationship between dolphin habitat use and deep pools in those segments. Our results suggested that dolphin occurrence was more probable in river segments with deep pools. Depth and width recorded was below the lowest threshold required for dolphin survival during post monsoon period (Smith *et al.*, 2008; Akbar *et al.*, 2004), and as a consequence abundance was reduced compared to the pre-monsoon season.

Socio-economic status of fisher communities in Nepal:
Fishing is a leading activity on which most fishermen spent much of their time for their daily livelihoods. Mean days of fishing per week are 4.82 (SE 0.16), two fishing strategies are notified since almost 70% fish more than 4 days per week and about 20% fish only one or two days per week. The preferred mean time to fish was 14.83 AM (SE 0.27) for almost 90% of the respondents and the best season was the one with low water level for 65% of them. The net used to fish varies in length, width and mesh. Average length of the net was 64.42m (SE 6.67m), where almost 60% of interviewed fishermen used nets less than 10 m long but, some of them used intermediated lengths and 30% used long nets of more than 100 m. Mesh size of the net was changed by about 25% of fishermen in last year's but no reduction tendency was detected, typical form overexploited fisheries. Respondents usually fish in areas close to their villages. Significant fisherman (70%) travel 5.4 km (SE 0.29) average distance to fish each day and almost all no more than 7-8 km. Specifically, fisherman travels a mean of 2.85 km (SE 0.13) upstream and 2.54 km (SE 0.19) downstream for the fishing activity. Monthly income is less than 100 US dollars (mean 63.28, SE 2.49) for 95%, and for around half of these (45%) it is actually less than 50 US dollars. Among the fishermen who responded to if they saw dolphins often, 98% answered that currently only saw dolphins rarely but not in the past, when more than 70% sure they see dolphins often and at least 15% more said see them occasionally. Most fishermen replied they see more dolphins a particular time of year before and usually, groups of up to eight dolphins. Around 30% thought that the decrease in the number of dolphins was due to the widening of the river and presence of less water than before. Mean age (50.65 ± 1.77), years of fishing (43 ± 1.98) and age engaged with fishing activity (11.42 ± 0.49) of the fisherman of Narayani River is significantly different with SaptaKoshi and Karnali but not in between SaptaKoshi and Karnali segment. Pressure on such overlapped area between dolphins and fisher communities need to erase soon by providing preferred alternatives like involving youth on ecotourism (nature guide training) and micro enterprise development programme using plant species as water hyacinth (*Eichhornia crassipes*) or pater (*Typha angustifolia* L.).

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

N/A

5. Are there any plans to continue this work?

With the knowledge and experience from this project, I am planning to propose next phase project for this small population in Nepal (see below specific recommended actions). We need to investigate detail information on dolphin abundance and presence in relation to ecological and river geometry (cross sections) of river systems. Additionally, there is lacking information on dolphin surfacing and dive time in relation to environmental factors. Therefore, I believe that science is the base for the

meaningful conservation initiatives, methods and approaches. Dolphin conservation in Nepal is limited by the lack of science. Purposed research should be initiated as soon as possible.

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

By means of peer reviewed journal publications (paper will be submitted to the Rufford, after acceptance. The Rufford Foundation will be highly acknowledged).

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

Project was run (August 2013 to July, 2014) for the period of one year. Project was completed within anticipated period.

8. Budget: Please 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.

Item	Budgeted Amount (£)	Actual Amount (£)	Difference	Comments
Boat based survey: Three replication for each season (pre and post)	1425	1425		Exchange rate1 £=NRs 163
Equipment (GPS and range finder)	500	500		
River geometry analysis	1750	1750		
Dolphin watch group formation (one in Karnali and two in Sapta koshi)	1605	1605		
Data preparation and analysis	150	150		
Workshop/Result sharing	200	200		
Miscellaneous (Communication/printings/local travels)	370	370		
Total	6000	**6000**		

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

Without complete knowledge of conservation issues of this small remaining population, maintenance of viable population is impossible. At the same time, this species ignored by concerned authorities (invested for large mega species) and most studies concentrated only on traditional study like status, distribution and conservation threats without having regular monitoring and detail investigation of its ecological factors. Therefore, it is urgent to monitor up to 3-4 years regularly in relation to different ecological factors to assess their population trend and risk of extinction from Nepal. Therefore, following conservation activities is strongly recommended as soon as possible:

- Seasonal monitoring of dolphin up to 3-4 years to assess population status and to see the effect of ecological factors on its presence and abundance.

- Integration of recent survey techniques (Photo ID based and acoustic survey) over traditional boat-based survey to assess robust population estimation of this small endangered species.
- Assessment of dolphin surfacing and dive in relation to ecological components.

Following are specific recommendation at different level:

1. **<u>At policy level:</u>**

    - Government should review the conservation status of this small remaining population as soon as possible. Conservation status of this species was identified during 1970s. Therefore, IUCN cetacean experts should urge Government for this task.
    - While developing or planned or purposed large development structures, Government should pay attention to large freshwater mammals and its survival. Specifically, their movement and survival during minimum water level (winter season) must be assessed before their development.
    - Regional workshop on "Review of conservation status of freshwater dolphins in Nepal" should be organised with the assistance from international conservation donors. Regional and international experts should be invited for this purpose.
    - Though number and range of this population is declined sharply, it has received less attention from concerned authorities in Nepal. Therefore, immediate "Dolphin Recovery Action Plan" should be prepared as soon as possible.

2. **<u>Population survey and monitoring:</u>**

    - Upstream Ganges river dolphin is most endangered, sparsely sighted and highly threatened by barrage and river geometry in Nepal. Therefore, its regular monitoring during different seasons using advanced technology (e.g. acoustic and Photo ID based) is recommended for its population size and movement.
    - Dolphin movement via barrage gate should be reviewed critically during monsoon season.
    - Use of acoustic device is more suitable in the river system like Nepal where external noise source is limited. Therefore, its application will be great opportunity in combination with traditional boat-based survey in Nepal.

3. **<u>Conservation Intervention:</u>**

    - Dolphins were already migrated or moved below the barrage area in Sapta Koshi. Therefore, if possible, translocation of dolphins from below the barrage area of Saptakoshi to Koshi Tappu Wildlife Reserve area (lower extend area) is highly recommended where habitat is more suitable for the dolphins. Technical and financial assistance from international donor agencies is imperative.
    - Barrage area in Sapta Koshi should be developed as aquarium for the dolphins by the government agencies in Nepal for the ecotourism.
    - Artificial tributaries near to triveni area (1 km above) should be constructed in Narayani River to safeguard the dolphins during monsoon season.

4. **<u>Community education, capacity building and livelihoods:</u>**

- Dolphin watch Group should be promoted and trained (skilled based training should be provided for their livelihoods opportunity like nature guide training, use of invasive species for enterprise development, etc.).
- River dependents should be organised into small groups with supporting small seed money for their micro enterprise. In *peer pressure principle*, enterprise should be promoted.

5. **<u>Future scientific research:</u>**

- Systematic collection of long-term data (at least 5 years) is urgent to assess the population trend and risk of extinction of dolphins from Nepal
- Assessment of population abundance and presence in relation to ecological components (i.e. river geometry) is highly recommended as soon as possible.
- Understanding dolphin surfacing and dive time in relation to environmental parameters is very important to conserve dolphin important sites.
- Population is very small and sparsely sighted. Therefore, assessment of population abundance using Photo ID based survey with traditional boat based and acoustic survey is highly recommended to estimate reliable data required for meaningful conservation efforts.
- Monitoring of dolphins using acoustic device could enhance knowledge on spatial and temporal movement and feeding behaviour of dolphins. This may be opportunity and more fitted for Nepalese river systems, where external noise is very limited. This should be applied in conjunction with Photo ID and traditional boat-based survey to assess the efficacy.

10. Did you use The Rufford Foundation logo in any materials produced in relation to this project? Did the RSGF receive any publicity during the course of your work?

Yes. I have used logo on each social activity and will highly acknowledge on journal publication too.

11. Any other comments?

Author aims to continue the above mention urgent conservation issues as project and contribute for the Dolphin Recovery Action Plan in Nepal. Government is planning to formulate action plan for highly endangered individual wild species. Therefore, recommended actions with continue support from The Rufford Foundation will be critical and expected.