

Final Evaluation Report

Your Details	
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Project Title	Exploration and Conservation of Newly Reported Endangered Assam Macaque Population in Far-Western Nepal
Application ID	29201-2
Grant Amount	£6,000
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Date of this Report	2022-03-05

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
Population survey				Surveys were successfully conducted among all planned river basins in western Nepal.
Potential distribution modelling				Ecological niche modelling of the Assam macaques was able to identify potential distribution area of the species in western Nepal. It was further projected for future potential distribution under different greenhouse emission scenarios.
Threats assessment by participatory risk mapping				Major threats to the conservation of Assam macaques were identified by questionnaire survey and field observation.
Awareness campaigns				Awareness campaigns were conducted at four different villages from where Assam macaques were recorded. Such campaigns were conducted following the COVID-19 protocol of the Government of Nepal.

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

During the course of this project, the entire world suffered from the COVID-19 pandemic. As an intervention against the COVID-19, the Government of Nepal imposed nationwide lockdown restricting the movement and gathering of people. Therefore, actual schedule of the project had to be re-scheduled postponing it for about nine months.

Following the COVID-19 protocol of the Government of Nepal, awareness campaigns could be conducted with limited number of people which could not accommodate all the interested locals. We could conduct every awareness campaign involving maximum 15 participants only.

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

- 1. Inventory of new troops of Assam macaques from new localities**

A total of 10 troops of Assam macaques, three from Surkhet District of Karnali Province and eight from Achham, Bajura, Baitadi and Darchula districts of Sudur Paschim Province were recorded (Figures 4-6). A total of 159 individuals counted from the 10 troops accounted average troop size of 15.9 individuals. Among the total, 45 were adult males, 73 were adult females and 41 were juveniles. The adult male to female sex ratio was calculated as 1:1.6223 and juveniles to female sex ratio was 0.56:1.

Among 10 troops, eight (except two troops from Api Nampa Conservation Area in Darchula District; Figure 4) were recorded from the area outside the protected area system of Nepal. This emphasises the need for urgent species-oriented conservation actions in far-western Nepal.

II. **Identification of potential distribution areas and prediction of the future distribution under anthropogenic climate change**

Current potential distribution: This recently described westernmost subpopulation of Assam macaques might be important for evolutionary and conservation perspectives. Therefore, knowing the potential distribution areas for the species is important. The species distribution model by Maximum Entropy (MaxEnt) algorithm estimated 25,114 km² area of the western Nepal as suitable habitat to Assam macaques (Figure 1). Among the bioclimatic variables, annual mean temperature, isothermality and annual precipitation were the major contributing variables to the model. Current suitable habitat of the species ranged between 158 and 3899 m above sea level (Figure 2). Suitable habitats of the species are mostly distributed along the river basins much far from the protected areas of Nepal. It makes the species more vulnerable and justifies need of conservation interventions.

Future potential distribution: Current niche of Assamese macaques was projected for 2050 and 2070 AD under three representative concentration pathways of greenhouse gases (RCP2.6, RCP4.5 and RCP6.0). The projected models revealed that a majority of current suitable habitat will be lost in the future under all the studied RCPs (Figure 3). The suitable habitat will be shifted towards higher elevation with respect to increase in concentration of greenhouse gases.

III. **Knowing the level of human-macaque conflicts and empowering locals in conservation through awareness campaigns:**

Our understandings on level of human-macaque conflicts and conservation status of the Assamese macaque in far-western Nepal has been expanded by the knowledge gained through questionnaire surveys and participatory risk mapping.

Crop raiding was the major cause of human-macaque conflict. Maize and potato were among the most raided crops. Unlike the Rhesus macaques, crop raiding by Assam macaques was localised in the farms close to the forest border. However, farmers perceived a significant amount of crop loss due to macaques.

Misidentification of the species as Rhesus macaque was another important conservation threat. Local people were not able to discriminate Assam macaques from the Rhesus macaques. Despite being protected by the National Parks and Wildlife Conservation Act 1973 of Nepal, Assam macaques could not get conservation priorities from the local government agencies and people. Awareness campaigns during this project taught the locals about the difference in taxonomy and conservation legislation of the macaque species.

Attacks by the domestic/stray dogs was the threat to the monkeys ([Figure 6](#)). Almost every household nearby the forest had domestic dogs which could attack and kill/injure the macaques, especially the infants and old ones. Three such cases of attacks by domestic dogs were recorded during this study. Therefore, we speculate that attacks by domestic dogs could be an important threat to this shy and less vigilant species. Retaliatory killings have been reported at some places, however, people did not express their views and experiences about it openly after knowing the legislative protection status of the Assam macaques.

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

Community awareness campaigns were carried out during the project. Four such campaigns were conducted in four different areas of western Nepal from where troops of Assam macaques were recorded. One such campaign in the Pokhara of Surkhet district involved 15 local people from the village nearby the observation of a troop of Assam macaques. Second campaign was conducted in Ramaroshan area of Ramaroshan Rural Municipality, Achham district involving 12 local people and two officials of the Ramaroshan Tourism Management Committee. Other two campaigns, one from Ghusa of Darchula district and the next from Kotpetra of Baitadi districts involved 13 local people each.

Along each river basin, field assistants were hired from the local communities who helped in the survey as well as during the participatory risk mapping, focal group discussions, and questionnaire surveys.

Involvement of local people in the campaign helped them in understanding the diversity of macaques; their conservation and legislative status; causes, effects and prevention techniques of human-macaque conflicts; importance of biodiversity conservation for human welfare, etc.

5. Are there any plans to continue this work?

Yes, further exploration along Karnali River basin, especially on the eastern side of the river. Khanal et al. (2019) for the first time reported three troops from the far-western Nepal. The species was believed to have disjunct distribution, not reported from the Bheri River basin in the mid-western Nepal. This project was able to record a troop from the Bheri River basin too. Therefore, further exploration along the tributaries of the Bheri River is important for the inventory of the species.

The seven new troops recorded during this project and new troops which might be explored in the future require the genetic assessment to know if they bear some genetic uniqueness of conservation and hold evolutionary importance. Therefore, further study is essential.

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

The results of this project will be published in peer reviewed journals. Two manuscripts, one focusing on present and future distribution of Assam macaques under the climate changes; and the next on human-macaque conflicts and co-existence in the western Nepal are under the preparation.

Additionally, follow up programs will be conducted in the areas where awareness campaigns were conducted. Findings of the study in analysed form will be shared among the local people during those programmes.

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

The project duration had to be extended because of the nationwide lockdown imposed by the Government of Nepal that restricted the movement and gathering of people. The project was supposed to be completed by October 2020 but was extended for additional 9 months.

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
PI daily allowance	480	480		45 days in the field
RA daily allowances	1920	2160	+240	3 RAs used instead of two originally planned
Travel	450	380	-70	RAs used public vehicles for the travel
Accommodation and food	1280	1325	+45	Additional days surveyed in the field
Local travel	300	300		
Awareness campaigns	900	1160	-260	4 areas instead of three
Field gears	520	260	-260	GPS were borrowed from the Central Department of Zoology, Tribhuvan University

Report manuscript preparation	and	150	50	-100	Manuscript under preparation
Total		6000	6115	+115	Covered from PI's institution

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

This study has been able to correct erroneous understanding that Assam macaques are not distributed west of the Kaligandaki River in central Nepal (Boonratana et al. 2020). Apart from some troops previously reported (Khanal et al. 2019) in Karnali and Mahakali River basins, this study reported a troop from the Bheri River basin too. It raised the question whether the species has a disjunct distribution as previously thought or has a continuous distribution along the entire mid-hills of Nepal. This warrants for further exploration of the species along the tributaries of the Bheri River and assess the conservation status.

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?

Yes, the logo of The Rufford Foundation was used in the posters, t-shirts distributed among the participants of the awareness campaigns, banners used in the campaigns. Use of the logo in those materials and events has obviously gained the publicity to The Rufford Foundation. Funding of the project will be acknowledged in future publications and the logo of the foundation will be displayed if permitted by the journals.

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

Dr. Laxman Khanal: As the Principal Investigator of this project, Dr Khanal performed the field surveys, conducted awareness campaigns and involved in Participatory Risk Mapping process for the identification of the level of human-macaque conflicts. Additionally, he performed collection, processing and analysis of data, and preparation of reports and manuscripts.

Naresh Pandey: Mr Naresh graduated from the Tribhuvan University in the year 2019 specializing in the Ecology and Environment group. He worked actively in this project supporting in the entire process of it from field surveys, awareness campaigns to data analysis.

Laxmi Prasad Upadhaya: Mr Laxmi is the post-graduate student of the Central Department of Zoology. He completed his MSc thesis research entitled "**Population status and distribution of the Assamese macaque (*Macaca assamensis* McClelland 1839) in western Nepal**" under the financial support from this project.

Melina Karki: Ms. Melina is the post-graduate student of the Central Department of Zoology. She worked in this project as the field assistant and supported during the field survey and community awareness campaigns.

Local field assistants: At every site of community awareness campaigns and field surveys this project involved local people as field assistants. Total of 12 people were involved from the local villages for the field works in the forest and to run the community awareness campaigns smoothly.

12. Any other comments?

We would like to thank The Rufford Foundation, UK for the project grant. We express our sincere thanks to the local field assistants who provided invaluable support in field surveys and awareness campaigns. Thanks are due to local people who participated actively in the questionnaire surveys and awareness campaigns.

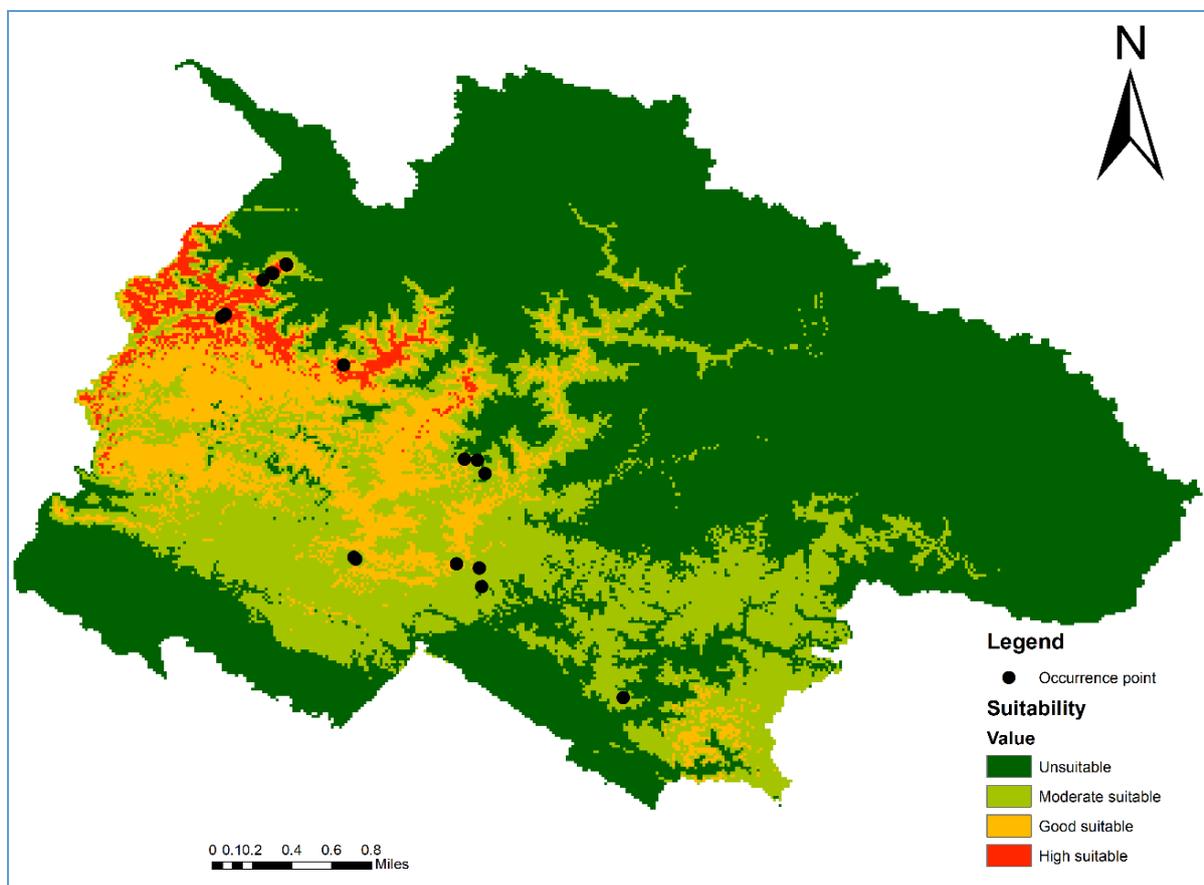


Figure 1. Map showing current potential distribution area of Assam macaques in western Nepal

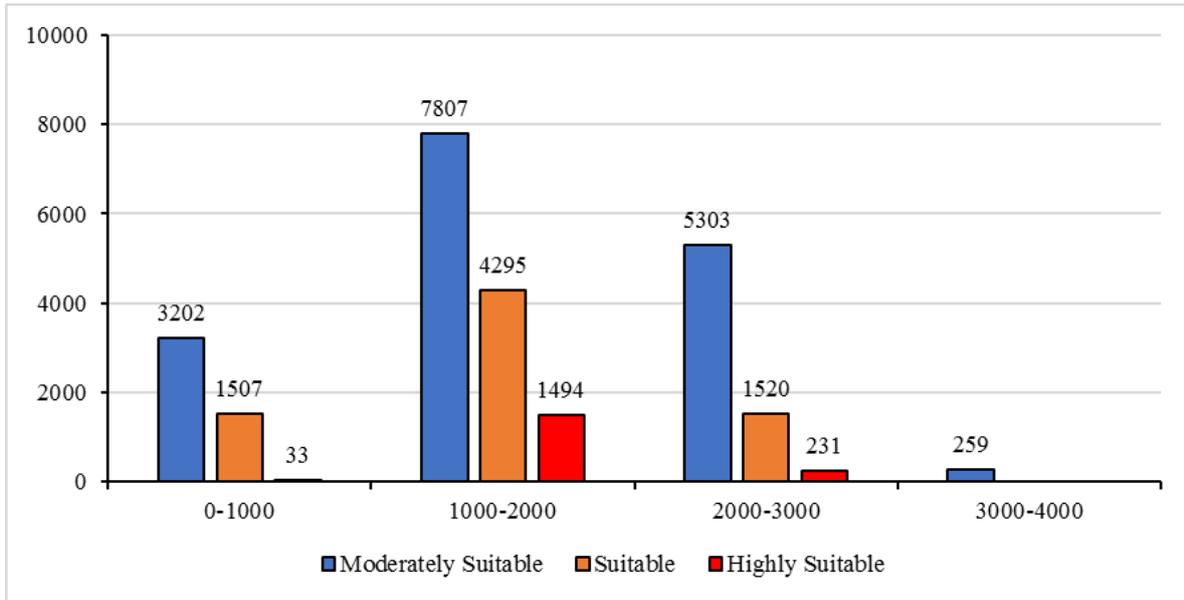


Figure 2. Current potential distribution areas for Assam macaques at different elevational range of western Nepal

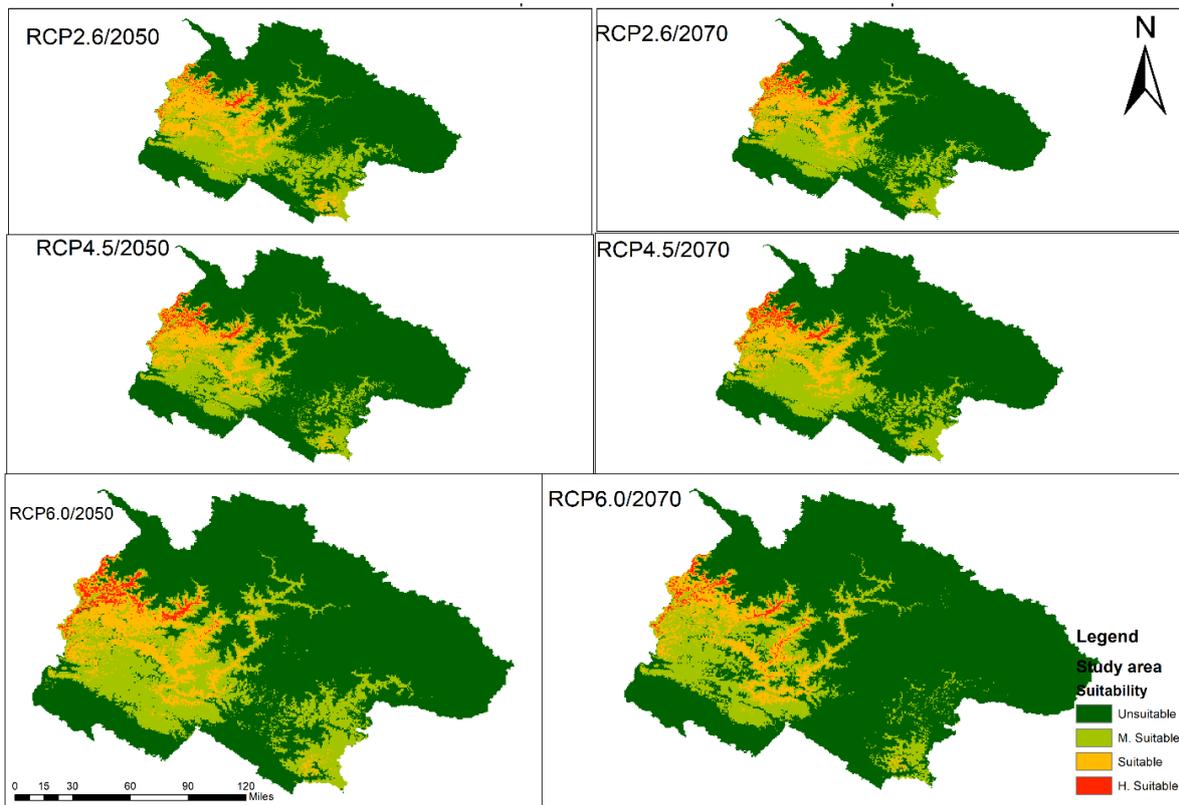


Figure 3. Future potential geographical distribution of Assam macaques in western Nepal by 2050 and 2070 at different greenhouse emission scenarios RCP 2.6, RCP 4.5 and RCP 6.0.



Figure 4. The westernmost troop of Assam macaques recorded from the Ghusa area of Darchula District in western Nepal (Observed on March 07, 2021).



Figure 5. Assam macaques observed from the Ramaroshan Area of Achham District in Sudur Paschim Province, western Nepal (Observed on November 23, 2021).



Figure 6. An adult female Assam macaque from Saini area of Achham District seriously injured by the attack of domestic dogs (Observed on March 24, 2021).

References

Boonratana, R., Chalise, M., Htun, S. and Timmins, R. J. 2020. *Macaca assamensis*. The IUCN Red List of Threatened Species 2020: e.T12549A17950189. <https://doi.org/10.2305/IUCN.UK.2020-2.RLTS.T12549A17950189.en>.

Khanal, L., Chalise, M. K. and Jiang, X. L. 2019. Distribution of the threatened Assamese Macaque *Macaca assamensis* (Mammalia: Primates: Cercopithecidae) population in Nepal. *Journal of Threatened Taxa* 11(1):13047–13057. <https://doi.org/10.11609/jott.4623.11.1.13047-13057>.