

## Final Evaluation Report

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Your Details	
<b>Full Name</b>	Sujan Khanal
<b>Project Title</b>	Fine-scale drivers of the status and distribution of Dhole ( <i>Cuon alpinus</i> ) in Parsa National Park (PNP), Nepal.
<b>Application ID</b>	35950-1
<b>Date of this Report</b>	2/7/2023

**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
Baseline data describing the distribution and status of Dhole in PNP and identification of factors affecting habitat requirements of Dhole.				Distribution of the dhole in an around the PNP was recorded through the occupancy survey and distribution was produced based on the sightings. A presence/absence model was run and factors affecting its habitat were figured out.
Distribution maps identifying sensitive zones within PNP which are critical for Dhole conservation.				Based on the distribution, a sensitivity map was prepared using Kernel Density Mapping. As the occupancy was difficult in Churiya region of PNP, some of the sites and grids were omitted
Community conservation awareness programs and outreach material.				Community awareness campaigns were also organised. The informational posters were used as major awareness equipment. Citizen scientists, local community forest leaders and local wildlife guides were given wildlife monitoring training to motivate and strengthen their capacity for long term monitoring and conservation of the species as citizen scientists. These activities were conducted where dhole-human conflict was sighted.
Publish scientific paper				The manuscript titled 'Factors affecting the Distribution of Dhole in Parsa- Chitwan Complex was prepared and is currently under review with the Journal of Plos One.

**2. Describe the three most important outcomes of your project.**

- a).** Distribution of dhole map was prepared, and habitat zonation was prepared.
- b).** Human-dhole conflict was spotted, and people were made aware of the importance of the dhole.

c). A National Dhole Working Group is organised and discussion were made to prepare the action plan.

d). Factors affecting its habitat were analysed.

Occupancy survey and models are important tools for dhole (Asian wild dog) conservation because they allow for estimation of species presence and abundance, even in the presence of imperfect detection. This information is crucial for monitoring population trends and determining the distribution and habitat use of dholes. By using presence-absence data, occupancy models can account for the probability of detecting the species in an area, allowing for more accurate estimates of occupancy and improved decision-making for conservation efforts. Furthermore, result from the occupancy models can also be used to identify key habitat features and potential limiting factors, providing insights into the ecological requirements of the species and informing conservation strategies. Major achievements are:

### I. Occupancy Model

The single species single season occupancy model has been used available in PRESENCE Software. The naive occupancy estimate was 0.1720 with estimated probability of habitat use and detection,  $0.5712 \pm 0.2508$  and  $0.0691 \pm 0.0323$  respectively. We had followed the two-step modelling method. At first, keeping occupancy constant, detection probability has been examined incorporating individual covariates and their combinations. Subsequently, top ranked detection probability model had been kept constant and habitat use was examined incorporating individual covariates and their combinations. The site covariates were used as a function of detection and habitat use probability. The covariates were Prey (P), Settlement (S), Disturbance (D), Elevation (E) and Water(W).

Top 5 best models to explain detection probability of dhole has been summarized below:

Model	Delta AIC	AIC Wgt	Model Likelihood	no. Par.	-2*Loglike
psi(.),p(S+D+W)	0	0.2219	1	5	245.34
psi(.),p(S+D)	1.64	0.09777	0.4404	4	248.98
psi(.),p(P+S+D+W)	1.96	0.0833	0.3716	6	245.3
psi(.),p(S+D+E+W)	1.98	0.0825	0.3468	6	245.32
psi(.),p(D)	2.12	0.0769	0.3247	3	251.46

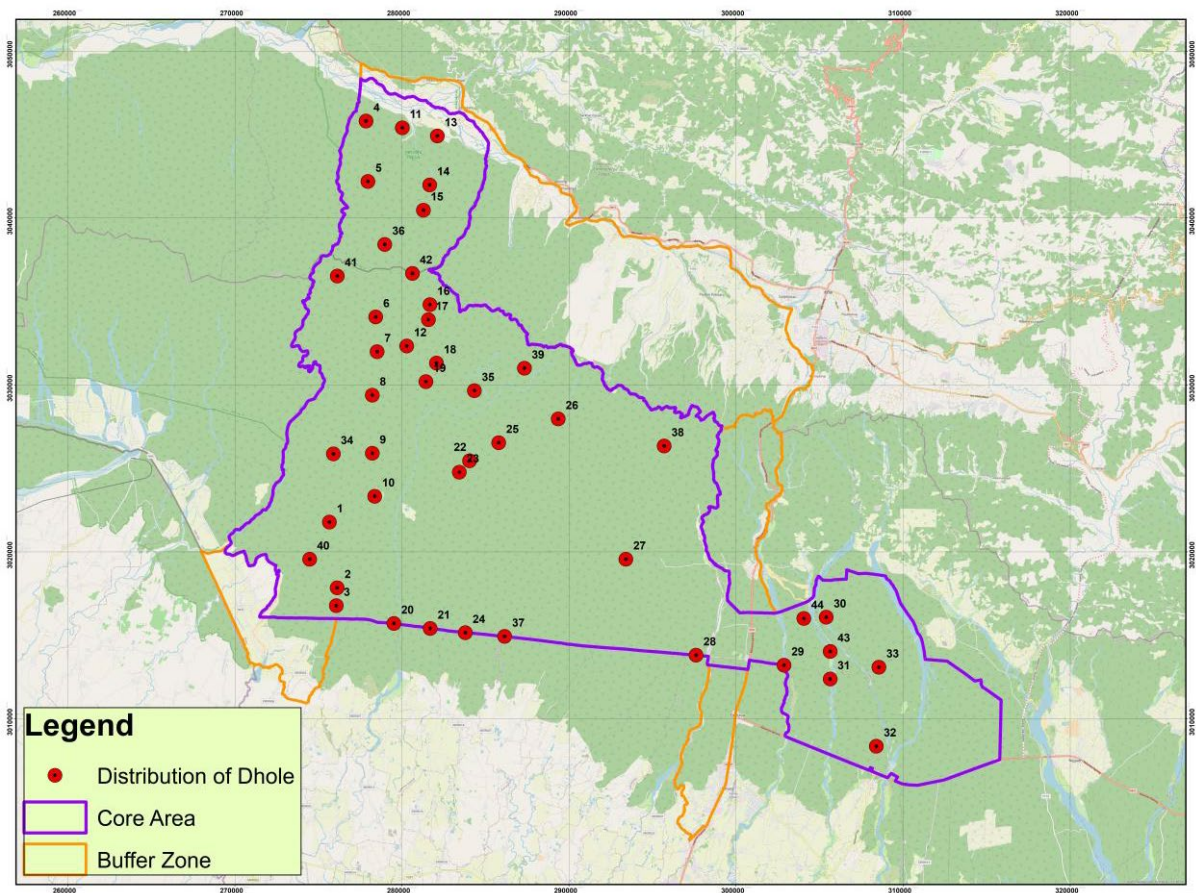
Top 5 best models to explain probability of habitat-use by dhole has been summarized below:

Model	Delta AIC	AIC Wgt	Model Likelihood	no. Par.	-2*Loglike
psi(P),p(S+D+W)	0	0.2544	1	6	228.63
psi(P+S),p(S+D+W)	2	0.0936	0.3679	7	228.63

psi(P+D),p(S+D+W)	2	0.0936	-0.2642	7	228.63
psi(P+E),p(S+D+W)	2	0.0936	-0.8963	7	228.63
psi(P+W),p(S+D+W)	2	0.0936	-1.5284	7	228.63

Prey and Water has strong positive influence on habitat-use by dhole while Settlement and Elevation has slightly negative effect to use habitat.

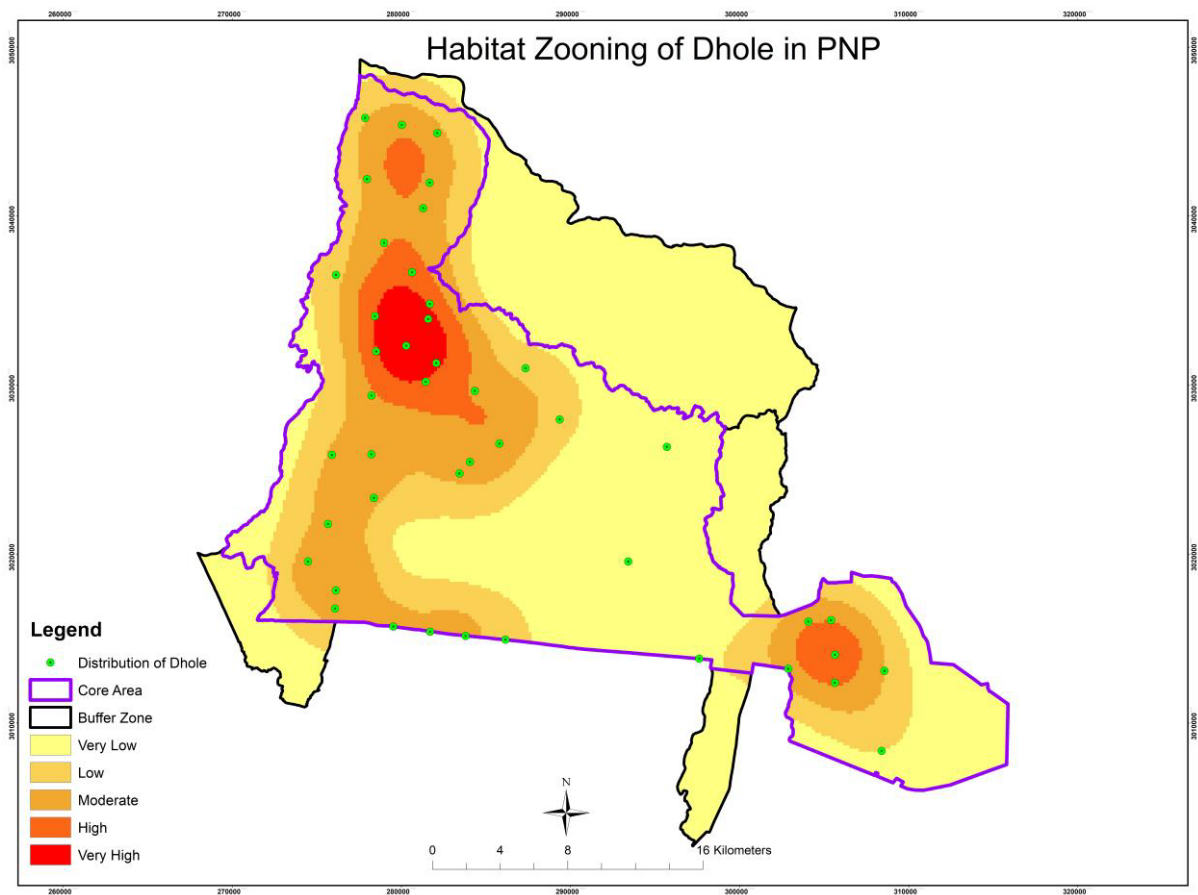
## II. Distribution of Dhole in PNP



Most of the dhole were distributed in a core area. Dholes, also known as Asiatic wild dogs, are native to South and Southeast Asia, including parts of Nepal. In PNP, they are found in the lowland Terai region, which is characterised by flat, tropical grasslands and forests near the border with India.

The Terai region provides ideal habitat for dholes due to its abundance of prey, such as deer, wild pigs, and hares, as well as sufficient cover and water sources. The region is also relatively undisturbed, with large stretches of wilderness that allow dholes to roam and hunt.

### III. Zoning of habitat



Habitat Zoning of Dhole in PNP. Dholes are highly social and territorial carnivores. In terms of habitat suitability, dholes require large areas of intact forests with adequate prey availability to support their pack-living lifestyle. These forests typically contain a mix of grasslands, riverine habitats, and dense vegetation, providing the cover and resources necessary for the dholes to hunt and survive.

Zoning of areas for dhole is important for their conservation and management, as it helps to protect crucial habitats and minimise human-wildlife conflict.

However, the continued loss and fragmentation of forests, as well as increased human activities such as agriculture and livestock grazing, poses significant threats to the survival of dholes in the lowland terrains of Nepal. It is crucial that adequate measures are taken to address these threats and conserve the remaining habitats of this important species. This may include enforcing protective laws, promoting sustainable land-use practices, and implementing community-based conservation programmes.

**3. Explain any unforeseen difficulties that arose during the project and how these were tackled.**

During the implementation of the project, COVID 19 pandemic hit Nepal and the government has announced strict law national wide and partial lock down from the mid-January to April. As the project was near the border of India. However, mapping related to GIS and Remote sensing was carried out and outreach materials were prepared and few focus group discussion was conducted. Additionally, desk review and secondary data was collected. As the lock down was dissolved, crew member was deployed in the field for occupancy survey.

**4. Describe the involvement of local communities and how they have benefitted from the project.**

Parsa National Park in Nepal has implemented a dhole conservation project which involves local communities. The park recognises the importance of involving local communities in the conservation of dholes and other wildlife, as they play a crucial role in preserving the park's biodiversity.

The park has set up a Community-Based Anti-Poaching Unit (CBAPU) to help protect dholes and other wildlife. The CBAPU is made up of local people who are trained and equipped to monitor and report any illegal activities such as poaching and hunting within the park. Thus, the programme also provides education and training on the importance of wildlife conservation, helping to raise awareness among local communities. The dhole conservation project has brought numerous benefits to local communities. The park's education and training programmes have also helped to raise awareness about the importance of wildlife conservation, improving the relationship between local communities and the park.

The park's CBAPU programs have also helped to improve the security of the park, reducing the incidence of poaching and hunting. This, in turn, has helped to conserve the park's biodiversity, including the dhole, and has contributed to the preservation of the park's unique ecosystem.

In conclusion, the dhole conservation project in Parsa National Park has successfully involved local communities in the preservation of the park's biodiversity. The park's success serves as an example of how involving local communities in conservation projects can lead to positive outcomes for both wildlife and local communities.

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

Although a community-based conservation initiative has been launched, much more work must be done to encourage community people to become active conservationists. I will apply for the next proposal to work on reducing the human-dhole conflict and corridor mapping of Chitwan National Park and Parsa National Park similarly a national dhole conference will be conducted on 1st June to 7th June 2023 with the coordination of the IUCN Canid Specialist Group. So, I will work on preparing the Action Plan for Dhole in Nepal.

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

If the results are not shared, they are useless. Publication in peer-reviewed journals is among the best ways to disseminate the findings. For various audiences, including the scientific community, policy makers, and public audiences, we have planned various content output. As a basis for their plans, we intended to give a final report to The Rufford Foundation, IUCN Canid specialist Group, local, national, and non-governmental organisations, scientific research groups, conservation organisations, educational institutions, and development practitioners. I had shared initial project results with the community we worked with in later visits after the project work. Local governments and park officials were informed of the study's early findings. One draft manuscript has been prepared and it will be submitted to Plus One Journal.

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

This is the first stage of Dhole conservation. BZCFUGs also are key willing to take part in the conservation programme. Preparation of National Dhole Action Plan is the most crucial in the next phase and stage. Similarly, I have planned to work in human-dhole conflict in an around the Parsa National Park. Similar others are:

- Our efforts to conserve carnivores in the KCA must be sustainable and integrated. Building up capacity for documentation, monitoring, and efficient administration is a crucial next step.
- In recent days, human-dhole conflict (specially with domestic dogs and livestock) has intensified in nearby settlements. Expanding dhole conservation efforts (awareness-raising, conflict documenting, in dhole-bearing communities (BZCFUGs) nearby is a crucial next step.

**8. 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?**

On our flex, posters, and oral presentations, yes, we have utilised the Rufford logo. Additionally, we will give The Rufford Foundation credit for their help and financial support in our upcoming publications and conference appearances. While creating radio jingles for the protection of Dhole, the name of the foundation was included despite the use of the organisation's emblem.

**9. Provide a full list of all the members of your team and their role in the project.**

**Sujan Khanal:** Sujan Khanal is the Principal Investigator and team leader of the project. He did his master in Natural resource management and Rural Development in 2020 and Crash course in Landscape Restoration. He was responsible for organizing all the project's components and leading the team through its implementation and conclusion. He is also responsible for running models and mapping.

**Ram Kuwar:** Ram Kuwar is the Ranger of DNPWC. He was responsible for collection the occupancy data from PNP and questionaries survey. He has been doing various field-based activities and database management.

**Manoj Chaudhary & Ram Krishna Bhattarai:** Both of them are expert wildlife biologist. They were responsible for camera trapping and collection the data from the ground. Moreover, they were also responsible for conduction the conservation and awareness program and providing training to citizen scientist.

#### **10. Any other comments?**

The team wishes to thank The Rufford Foundation for their flexibility and understanding in allowing the project to be completed despite the Covid-19 pandemic problem. The fact that this initiative is the first research-based effort to examine dhole in Nepal's lowland terai has created opportunities for further study of the species. Similar investigations must be carried out right away in the other potential dhole habitats around the landscape to provide a baseline of knowledge regarding the distributional ecology and habitat ecology. A national workshop is going to conduct in June with the expert IUCN Canid Specialist Group in Nepal to draft the action Plan, and this was only possible through the support of The Rufford Foundation.