

## The Rufford Small Grants 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](mailto:jane@rufford.org).

Thank you for your help.

**Josh Cole, Grants Director**

#### Grant Recipient Details

Your name:	Sunita Pradhan
Project title:	Develop first draft of Conservation strategy for red panda in Darjeeling Himalayas
RSG reference:	Dr. Bibhav Talukdar, Dr. Prahlad Yonzon
Reporting period:	six years
Amount of grant:	£5,000
Your email address:	sunita.pradhan@atree.org
Date of this report:	28.6.2012

**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
1. collection of information on the species distribution pattern, status,			Achieved	We were able to assess and the current distribution pattern of red panda in Neora.
2. identify threats			Achieved	We were able to identify threats and status of red panda in Neora.
3. Get a picture of red panda status from the Darjeeling Himalayas.		Partially achieved	i. We were not able to hold meeting with the stakeholders. However, we shared the report with the forest Department, Wildlife Division, Government of West Bengal.	We were able to gather and get a picture of the red panda status in Darjeeling Himalayas after the study in Neora.
			ii. The draft conservation strategy was based on the current findings of field work, past work on red panda in Singhalila National Park and observations.	A paper on the present work, for a peer reviewed journal is being prepared for publication in due course of time.

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

Yes, we did come across a number of difficulties during and after the completion of the project. However, we would like to enlist for present information, and learn lessons for future strategies, while taking up further studies.

**2.1 Poor Infrastructure and inaccessible forest:**

The first trip to the National Park was made in June 2006, during which the entire National Park was visited as a reconnaissance survey. Apart from information on red panda, assessment on the availability of the existing logistics in the areas was also made. We found that the area where we needed to work was Upper Neora Valley National Park and the core area, where the study was to be conducted was 14 - 30 kms from the small town of Lava.

We found that the logistics of accommodation, communication and supply of provisions was a problem. We selected three study sites for intensive study. These three areas had one campsite each

for the forest personnel (Plates 2.1, 2.2, 2.3), apart from which there was nothing. Taking provisions to these areas during the survey was a major logistic problem.

Apart from this, the study area had highly retained wilderness, with high tree density and dense bamboo thickets, making it difficult to get into the forest for survey, vegetation study.



Plate 2.1 Campsite at Chaudphere, Neora Valley National Park. Plate 2.2 Provisions being loaded on a pony at Upper Neora Valley during the Red Panda study.



Plate 2.3 Campsite at Rechilla in Upper Neora Valley

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

The present study is one of the few and pioneering efforts made to study the red panda in the Darjeeling Himalayas. Even a basic baseline information on the distribution pattern, abundance, threats to the species was non-existent from the Neora Valley National Park (Figure 3.1) ( $80^{\circ} 45' - 88^{\circ} 50' E$ ,  $26^{\circ} 52' 27^{\circ} 7' N$ ; altitude: 138 – 3155 msl), a gap, something which the present study tried to fill. Completion of this study provided a near complete picture of red panda status in Darjeeling Himalayas, with a study on red panda in the Singhalila National Park, Darjeeling having been completed (Pradhan *et al.* 2001).

The three important outcomes of the project were:

### 3.1 First study on Red panda in Neora Valley National Park came up with information on distribution of the species in the National Park

Information on distribution and abundance is a basic requirement in ecological studies (Elton 1927, Krebs 1985) and an important necessity for formulation of effective management and conservation strategies for the wild species (Caughley and Sinclair 1994). Work on preliminary survey of red panda started in Neora Valley National Park from 5.06.2006 following Pradhan *et al.* (2001). Extensive survey of the National Park was conducted primarily followed by intensive survey of red panda in Neora Valley. These surveys confirmed the presence and distribution of red panda in Upper Neora Valley (UNV). UNV ranged from an altitude of 2300 to 3100 m totalling an area of 48 km<sup>2</sup> and constituting 55% of the total area of the Neora Valley National Park.

UNV consisted of two broad vegetation types namely the Lower temperate evergreen forest (>2200 – 2800 m) and the Upper temperate Broad-leafed deciduous forest (>2800 – 3100 m), with a patch of Rhododendron Forest at around an altitude of 2800 m. A cursory quantitative vegetation analysis was done looking into the frequency of occurrence of tree species in these vegetation zones, along with their occurrence in different size classes based on the gbh recorded in the sampling quadrats. Trees were categorised into three size classes (Size class 1 = gbh  $\geq$ 31-70 cm, Size class 2 =  $\geq$ 70-150 cm and Size class =  $\geq$ 150 cm).



Figure 3.1 Location of Neora Valley National Park, Darjeeling, India

#### 3.1.1 Lower Temperate Forest in UNV

The lower temperate forest in UNV was composed of oak species like *Quercus lineata*, *Q. lamellose*, and *Q. pachyphylla* which formed the upper canopy with *Q. pachyphylla* being the most widely distributed along the altitudinal range with a frequency of 60%. Oak in the habitat was found in all size classes, with the highest density being between size class >31 – 105 cm dbh. 10% of the total

density of oak was in size class above 105 cm dbh, indicating the presence of mature and old trees. Dominant under-storey species in the habitat are *Litsea elongate*, *Rhododendron* sp. (local name: *Chemal*), with these species present within size classes 1 and 2. Other tree species within these size classes were *Symplocos* sp. (Local name: Kholmey), *Schefflera impressa* (Local name: Bhalu Chinday), *Magnolia campbelli*, *Michellia* spp. and *Pinus* sp. Although the density of *Pinus* sp. was 156/ ha. frequency was as low as 8%, indicating a small patch of plantation which fell within the Oak forest in the habitat.

### 3.1.2 Upper Temperate Forest in Upper Neora Valley

The Upper temperate forest consisted of upper canopy species such as *Sorbus cuspidata*, with a frequency of 56%, followed by *Acer* sp., *Vitex* sp. and *Rhododendron* spp. *S. cuspidata* was the most dominant tree species in this altitude zone distributed in all size classes. *Acer* was also distributed in all size classes. *Vitex* sp. was another prominent tree in this habitat zone with large mature trees though with frequency of only 15%. *R. faconeri*, *Betula* sp. and *Rhododendron* spp. were other tree species with a frequency of 71%, 41% and 37% respectively. *Betula* sp. had a distribution frequency of 41 % with maximum density proportion in size class 2, thus forming both the upper as well as the lower canopy, along with *Rhododendron* species. *Schefflera impressa* (Local name: Bhalu Chinday) formed an important lower canopy species with as much as 15 % frequency.

*Rhododendron falconeri* was the most widely distributed species, though found in only lower size classes of 1 and 2, indicating small girth trees, not much used by the red panda.

### 3.1.3 Rhododendron Forest

In Neora, the Rhododendron Forest, unlike other places of Eastern Himalayan the Rhododendron Forest of the National Park don't exactly correspond to any of the Champion's climatic climax type and form pockets of pure patches, on the exposed hill tops, found above 2743 m. (Plate 3.2). Common species are *Rhododendron arboreum*, *R. barbatum*, *R.falconeri*, and *R.dalhousiae*. This community is perhaps a bio-edaphic climax peculiar to this area (Management Plan of Neora Valley National Park 2005 -2010).



Plate 3.1 Rhododendron Forest at 2800 m in Upper Neora Valley

### 3.1.4 Study Sites

The study was conducted in three sites (Figure 3.2) namely Chaudphere area (Site 1), Alubari Area (Site 2) and Jorepokhari-Rechilla Area (Site 3). Six transects were laid in these areas ranging from 1.9 km to 3.2 kms. The present study covered all the seasons (except the monsoon when the national Park was closed) to acquire a near complete and reliable spatial and temporal information on the animal in the National Park (Plate 3.2). Monsoon was used to survey fringe settlements.



Plate 3.2 Team member working in the Upper Neora Valley during winter. Figure 3.2 Location of study sites in the Upper Neora Valley

### 3.1.5 Presence of Red panda in UNV

The presence and distribution of red panda in UNV was based on direct and indirect evidences, more specifically pellet groups of the species (Plate 3.3). Presence of red panda in UNV and adjoining areas started from an altitude of 2230 m and extended till an altitude of 3100 m. In UNV, areas such as Ake Mile (outside the protected area), Chaudphere area (near Goth), Chaudphere (Plantation area), Upper Chaudphere, Alubari (on way to Mulkhara), Alubari (near Jorepokhari), Rechilla (on way to Rechilla), and Rechilla main, Path leading to Mulkharga, Hathi danda, and on way to Tiger camp, were strewn with red panda evidences. No evidence of red panda was however found in the PHE source area, Jari buti, and areas below Alubari.

### 3.1.6 Distribution and abundance

Encounter rate of pellet group was highest in Site 3 with  $62 \pm 78.3$  pellet groups /100 hours. This site included areas around Hathi danda, Jorepokhari and Rachilla, roughly included in compartments 5, 9, 6, 10 and 4b of Rhenok, and Compartments 14 and 13 of Rechilla. This was followed by Site 1 which covered areas in and around Chaudphere which had evidences of red panda population and was assigned with medium to high abundance had an encounter rate of  $39 \pm 43.3$  and a low to medium abundance of red panda was in the areas in and above (ridge forest of Alubri) of Alubari of the Upper Neora Valley National Park, which was covered by Site 2 and had a low encounter rate of  $18.07 \pm 23.4$ .

The lowest altitude where red panda evidence was found was 2200 m and extended till an altitude of 3100 m (the ultimate elevation covered by the National Park). Infact, 40 % of the red panda evidences was found at the lowest vegetation zone of 2200 – 2600 m (covering Site 1). There was a significant dip to 13% of evidence found in the vegetation zone 2600 – 2800 m (covering Site 2), while evidences of red panda was highest with 47% in the altitude zone above 2800 m (covering site 3).

### 3.1.7 Direct Sightings

Sightings of red panda were extremely infrequent. During the 234.35 hours of work (excluding the extensive survey and visits of sites for reported red panda sightings), spending an average of 33 hours per transect (6 transects) in the study area, there were two direct sightings of the red panda

during the intensive study period. Both the sightings were of single animal. As there is no apparent sexual dimorphism in red panda, sex identification of the animal when sighted is difficult. Observations of the animals were done as long as it was in sight.

The first sighting was on 6<sup>th</sup> September 2006 at Chaudphere. It was about 350 mt. north from the camp-set of Chaudphere at an altitude of 2350 m. It was on an Oak (*Quercus pachyphylla*) tree, feeding on bamboo leaves.

The second sighting of the red panda (Plate 3.3) in Neora Valley National Park by the study team was done on 18. 5.2007 in the afternoon at 3. 30 pm on an oak (*Quercus pachyphylla*) tree in the Hathidanda area at an altitude of 2785 m. The activities of the panda were observed for 1 hour 20 minutes. The red panda spent 88% of the time sitting in the tree branch; while 8 % of the entire observed time to walk briefly and stretch. The animal also defected which took about 3 minutes (4% of the observed time). All the activities observed were performed on the tree, indicating a strong arboreal characteristic of the animal.

Apart from these two direct sightings of the red panda by the study team in the Neora Valley National Park, Darjeeling, and secondary information of sightings made by people and staff from 2005 onwards in the Park was documented.

The only two sightings of red panda by the study team accounts for a very poor encounter rate of the red panda. However, the secondary sighting information of red panda and the detection of indirect evidences of the species by the study team confirm the presence of a sizeable population of red panda. The poor sightings of the species could be accounted for poor detectability due to the dense vegetation of the study area and also the shorter tenure of the study.



Plate 3.4 Red panda pellet group on a *Rhododendron* tree (First time photographed in Neora). Plate 3.5 Red panda sighted in UNV on 18.05. 2007 (First time photographed in Neora Valley National Park)



Plate 3.6 View of Red panda habitat in Upper Neora Valley National Park

### 3.1.8 Distribution Map

It has to be mentioned here that red panda is an extremely difficult animal to study especially for its population status. Therefore, the schematic presentation of their abundance and distribution as shown in figure 3.1 is an important baseline map and important for a suggestion of their present population distribution and for future reference.

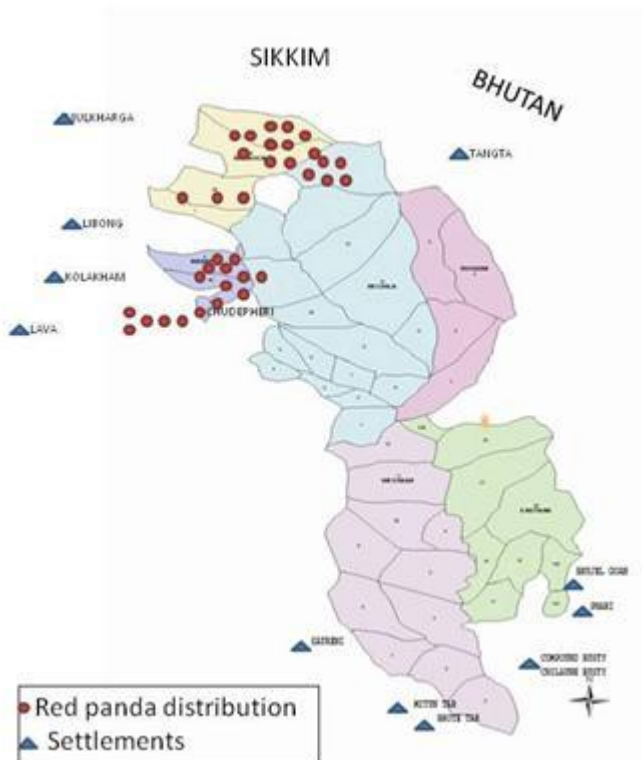


Figure 3.3 Distribution of red panda in Upper Neora Valley National Park



### 3.1.9 Occupancy analysis and Models

USGS (2005) states that wildlife species are rarely detected with perfect accuracy, regardless of the technique employed. New classes of models, called occupancy models were developed to solve the problems of imperfect detectability (MacKenzie et al 2002, 2003, 2004). These models use information from repeated observations (something which we have for red panda from our red panda studies in the two national parks) at each site to estimate detectability.

However, we did not attempt to use the detection/non-detection data of red panda collected every month, from the three sites and six transects of Upper Neora Valley for the present report. We would like to look into it, while we write our papers.

### 3.1.10 Use of various substrates by red panda

The different substrates used by red panda were trees, ground or the forest floor, fallen logs, and stumps. Trees were the most preferred site for defecation with 85% of evidences on trees ( $\chi^2 = 183.93$  DF = 4 p <.05), amongst other substrates such as forest floor, fallen logs and stumps. Use of forest floor was higher in the post monsoon and winter.

As many as 12 tree species prominently featured and used by red panda in red panda habitat. Out of these, *Quercus pachyphylla* featured as the most important tree species used by a red panda in the UNV followed by *Sorbus cuspidata* and *Rhododendron* species. It was simultaneously found that presence of tree hollows in these tree species followed the same order with 63% *Q. pachyphylla* had tree hollows, while 16% were in *S. cuspidata* and 10.5% in *Rhododendron* spp. and rest in other species. Tree hollows are very important component of red panda habitat where birth of young ones is given to (Pradhan 2005). Some of the other important trees used were *Acer* spp., *Vitex heterophylla* and trees supporting the saprophytic tree locally known as Lahare tenga.

### 3.2 Threat Assessment and conservation issues of red panda in Neora Valley National Park

Assessment of disturbance to the Park was done by quantifying the current grazing and lopping pressures, past disturbances of grazing and lopping, presence of cattle paths, damage done by presence of roads, paths, and settlements in the park vicinity, fire, landslips and erosions. All these factors of disturbance were estimated subjectively on ordinal scales of 0= absent, 1= low, 2= medium and 3=high. The number of cut stumps were counted within the 10 x 10 m quadrat and density calculated per hectare.

Assessment of interaction between the social and natural system was also done by assessing the socio-economic conditions of the fringe settlements with the premise that there ties are close between poverty and environmental situation.

#### 3.2.1 Estimate of disturbance to Park and red panda habitat

The results from the present quantified estimate of anthropogenic pressures to the red panda habitat within the Upper Neora Valley National Park were very low and insignificant.

Between 1992 – 1994, when the area was declared a Protected Area, land use such as agriculture and animal husbandry practiced within the National Park as in Alubari and Dole was removed from the Park. Till 2005, more than 15 “Goths” (cattle stations) in the Sikkim forest bordering the National Park existed. Each Goth had 50-60 cattle heads which approximately amounted to a minimum of 750 – 900 cattle heads grazing in the National Park forest bordering the State of Sikkim. These *Goths*

were however removed in 2005. These policies of complete removal of land-use practices such as agriculture and animal husbandry from some of these core areas, significantly reduced pressure on the National Park forest and red panda habitat.

### 3.2.2 Socio-economic profile of fringe settlements and conservation issues in UNV

Protected areas provide important ecosystem services at the global, national and local scale. However, there is concern that the costs are mostly incurred by the local people who rely on forest resources for their livelihoods and place restrictions on the use of resources within large areas of forest that had been freely available to local and indigenous communities (Coad *et al.* 2008). At the same time, it is also generally accepted there are close ties between poverty and the environmental situation (Visser 2006). In practice, poverty can be the cause, as well as the effect of environmental problems (Visser 2006). Poverty is assumed to be a major underlying cause of biodiversity loss (Adams *et al.* 2004, Bawa 2006).

Hence in order to assess the interactions between social and natural systems in and around Neora valley National Park, an ethnographic study of the fringe settlements were done in order to understand the human ecology framework *vis a vis* red panda protection and conservation.

#### 3.2.2.1 Poverty and human well-being of the fringe settlements

‘Poverty’ in its broadest sense, is seen as the pronounced deprivation of well-being related to a lack of material income or consumption (the conventional measures of poverty), low levels of education and health, poor nutrition and low food security, high levels of vulnerability and exposure to risk, and a profound lack of opportunity to be heard (Chambers 1988, World Bank 2000, Sunderlin *et al.* 2004).

Following this definition, socioeconomic condition of the four settlements (Mulkharga, Lebong, Kolakham and Tangta) around Neora Valley National Park was assessed. We would regard this study an important outcome of this project and a brief summary of the study is outlined here.

All these four settlements had farming as the primary source of livelihood. However, the four settlements had different levels of dependence on their agro-husbandry sector for their livelihood strategies with Mulkharga and Kolakham depending almost 50 - 60% on animal husbandry, while Tangta and Libong was 90% into agriculture with cardamom being the cash crop in Tangta, which made them better economically than the others (Table 3.1).

The settlements also had different levels of formal education and vocational skills which would in future help them to diversify their livelihoods and minimise their exposure to risks, changes and vulnerability. Tangta had the highest literacy while Mulkharga had the lowest making Mulkharga less adept to livelihood changes and more vulnerable to probable risks.

Mulkharga also had only two main crops (Maize and Potato) growing, while Tanga had as many as five crops growing (Table 3.2). This made Mulkharga and Kolakham dependent on animal husbandry. Despite this Mulkharga had only 4.2 livestock/household as compared to the 7.7 livestock/household in Tangta (Table 3.3).

Table 3.1 Livelihood strategies in settlements around Upper Neora Valley

Village	Main Occupation	Agriculture % income	Husbandry % income
Mulkharga	Farming	48	52
Kolakham	Farming	41	59
Lebong	Farming	92	8
Tangta	Farming	99	1

Table 3.2 Crops grown in the four settlements around Upper Neora Valley

Village	Maize	Cardamom	Ginger	Potato	Millet
Mulkharga	√ *			√	
Kolakham	√ *	√	√		
Lebong	√ *	√	√	√	√ *
Tangta	√ *	√	√	√	√ *

\*=grown for subsistence

Table 3.3 Average livestock per household

Village	Avg. Livestock/household
Mulkharga	4.2
Kolakham	6.9
Lebong	3.9
Tangta	7.7

Civic amenities like metalled road, primary schools, primary health care centres and safe drinking water was absent in Mulkharga and Libong, while Tanga and Kolakham had primary schools.

Upper Mulkharga was the only settlement directly harvesting fodder fuel and timber and other forest products from the National Park. All the other settlements were buffered from the core National Park Forest by a corporation forest.

The crux of this socio-economic assessment and their linkages with natural resource use and impact on red panda habitat and red panda conservation was:

1. the local communities of all the four fringe settlements were dependent on natural resources of the adjoining National Park and the Reserve forest for firewood, timber, fodder and cattle grazing, irrespective of their socioeconomic status.
2. Mulkharga was socio-economically the weakest, while Tanga was the strongest.
3. Surprisingly, local communities in these settlements fringing Upper Neora Valley had very low awareness of red panda and not many had directly sighted a red panda (Table 3.3). No direct threats (like poaching, keeping them as pets or a history of red panda trade) to the red panda was noticed nor detected in the Upper Neora Valley.
4. Conservation problems such as insufficient infrastructure, inadequately trained staff, lack of research, monitoring database system, and transboundary problems were pointed out by the Management Plan of the National Park (Singhal and Mukophaday 1998).
5. As far as transboundary problems were concerned, Mulkharga and Tangata come into picture.
6. Mulkharga shared a border with the adjoining state of Sikkim and Tangata shared a border with the neighbouring country, Bhutan. Transboundary poaching and trade was reported (Singhal and Mukophaday 1998).

7. Hence for conservation point of view and attention, Mulkharga and Tanga ranks important.

Table 3.3 Tabulated history of red panda sighting by local people in the four villages

Settlement	Red panda sighting reported	Location where seen	Year Sighted
Mulkharga	6 persons out of 57	National Park	Within 1987 -2006
Kolakham	1 person out of 92	National Park	2005
Lebong	2 persons out of 79	National Park	1987, 1992
Tangta	1 person out of 220 persons	National Park	1996

### 3.3 Conservation Strategy

A species Conservation Strategy is a blueprint for saving a species or a group of species across all the areas of the species range (IUCN, SSC 2008). The present draft conservation strategy loosely follows the framework outlined by the Species Survival Commission (SSC) which has four components to formulate a conservation strategy. This again is a baseline draft which can be built upon. The four components are:

- i. Status review of the species (incorporating a threat analysis)
- ii. Vision and Goal
- iii. Objectives
- iv. Action

It has further been pointed out that a species conservation strategy is required when there is need for coordinated conservation attention (IUCN, SSC 2008). The need for coordination may arise because the range of the species straddles political boundaries or when the level of threat is endangering the viability of the species population and all these require different entities such as policy makers, the government, scientists, managers and local communities to act in concert (IUCN SSC 2008). Therefore, participatory process in the development of the Species Conservation Strategy is emphasised upon.

However, various problems constrained us from holding participatory stakeholders' meetings during the present study. Hence, we used our current findings from the field study in Neora Valley and past findings from Singhalila National Park along with observations to develop a strategy loosely following the four components outlined by SSC.

#### 3.3.1 Red panda Conservation Strategy for Darjeeling Himalayas

##### 3.3.1.1. Status of red panda in Darjeeling Himalayas

Two Parks (Figure 3.3) in Darjeeling Himalayas hold red panda population and with the present study we were able to conceive a picture of red panda status in Darjeeling Himalayas.

In Singhalila National Park, red panda was threatened due to non contiguous habitat, movement of the animal between protected and unprotected habitat (in Nepal side of the border) (Figure 3.4). Red panda was also threatened due to high anthropogenic pressure and other transboundary problems (Pradhan 1998, 2001, 2005, 2007). Direct threats (like poaching, keeping them as pets, predation by local dogs or a history of red panda trade) to the red panda was found in the Singhalila National Park (Pradhan 2007, Williams 2008).

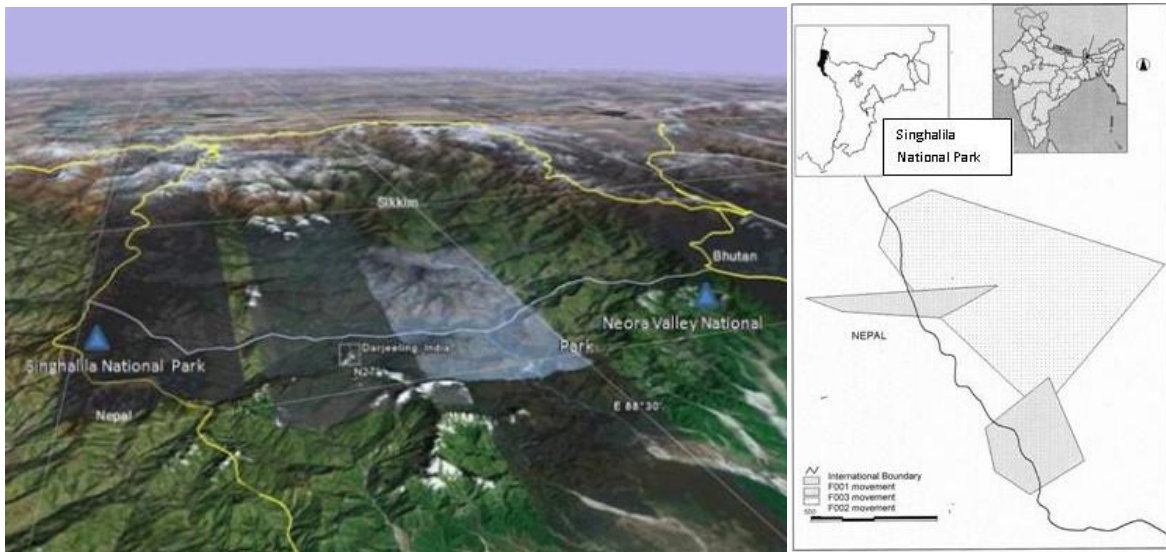


Figure 3.3 Map showing two protected areas with red panda distribution in Darjeeling Himalayas. Figure 3.4 Map showing transboundary movement of radio collared red pandas from Singhalila National Park to Nepal area.

However, no such threats due to the non-contiguous habitat were detected for the red pandas in the Neora Valley, nor were there any type of heavy anthropogenic pressures from the adjoining settlements. Direct threats (like poaching, keeping them as pets, predation by local dogs or a history of red panda trade) to the red panda was not found in the Neora.

The only problem observed was the remoteness and inaccessibility of UNV. The remote stretches along the northern border of the National Park shared border with the State of Sikkim and Bhutan.

Although forest camps existed in strategic points along these stretches, transboundary offences such as poaching of wild animals, illicit removal of timbers and NTFP, trade of orchid, could not be ruled out due to the remoteness of the area (Singh and Mukophadya 1998). However, interviews of the surrounding villages and settlements such as Mulkharga, Libong, Kolakham, Tode and Tangta to assess people's perceptions about red panda surprisingly revealed that people were not much aware of the red panda as compared to that of the Singhalila National Park (Pradhan 1998, 2001). Singhalila had a huge red panda trade nexus till the late 1970s.

Tourism was a burgeoning threat to red panda in Singhalila National Park with a rise of almost 250% in the last 10 years, while, it was also found that tourism to Upper Neora Valley areas was minimal with an average visitation of the Park with just 84 visitors / month (2006 records). This was mainly due to the poor infrastructure and accessibility compared to Singhalila National Park, where tourism is more organised with better infrastructure.

In Singhalila National Park, there are many sectoral agencies such as police, paramilitary force, tourism, Public Welfare department, Darjeeling improvement fund department, forest department operating in the Park. However, a lack of coordination has been noticed between these sectors, amounting to more damages than good. This can be treated as a pertinent threat to the National Park and red panda habitat.

Evidences of breeding populations of red panda was found in the Singhalila National Park and was used to assess the status of the red panda in the Park (Pradhan 1998, 2005). Evidences of breeding

population were not found in the Neora Valley. This could be because of the shorter tenure of the study which was one year as compared to the four years plus spent in the Singhalila to understand the red panda distribution and abundance. The study area in (UNV) also had a highly retained wilderness, with very intact wildlife habitat with high density of trees and dense bamboo thickets which posed massive problems when the team members had difficulties in getting into the forest for survey. This also accounted for the poor detection of red panda and red panda evidences. Despite the lack of tangible evidences of breeding such as sightings of cubs, sub adults and cub pellets, it would be incorrect to say that the Neora Valley didn't have a breeding population, considering the evidences of adult animals found in the National Park.

From these conjectures, especially the intact habitat, low anthropogenic pressure, it can be said that red panda status is better in the Neora Valley than in the Singhalila National Park.

#### 3.3.1.2 Vision and Goals

Red panda is a charismatic and a flagship species very coveted in Darjeeling and Sikkim Himalayas where Red panda is also the State animal. It is therefore envisioned that the Red panda should exist in the wilderness of this region in multiple viable populations for the generations to see, cherish and respect the species.

And have goals to motivating effective actions in the regions so that red panda is not lost from any of the sites in which they occur now.

#### 3.3.1.3

In order to achieve the vision and the goal, some of the mid-term objectives (5-10 years) would be:-

- a. To further understand the impacts of identified threats especially tourism to the species and its habitat.
- b. Understand the ecological and economic (sustainable livelihood of communities) impact of tourism in the landscape
- c. Work on inter-sectoral coordination and orientation for protection, conservation and sustainable development of the landscape.
- d. Assess the population structure of one red panda population in one site to start with
- e. Have a mid-term monitoring program in place to understand trends of the species population, habitat loss/gain, along with dynamics of the human communities using community participation.
- f. Investigate transboundary issues and find ways and means to mitigate the problems arising from this.

#### 3.3.1.4 Action

From the assessment in the above text, it can be seen that the two protected areas holding red panda needs different specific treatment. While Neora needs a more regulated and watchful vigilance and intervention for the preservation of its present state of intactness and conservation, Singhalila needs a more aggressive protection and conservation strategy, which would range from top down urgent transboundary conservation strategies and policy implementation, to bottom up community involvement and management, along with coordination amongst the different sectoral agencies operating in the National Park.

Some of the immediate action needed to be taken up is:

- a. Assess tourism, its impact and take action accordingly to regulate, make it ecologically friendly, and a sustainable livelihood for the local communities in the Singhalila National Park (by 2014).
- b. Have a monitoring program in place, with local involvement and participation (2016).
- c. Arrange for series of awareness and coordination programs with all the sectors of agencies operating in the Singhalila National Park. Departments like Tourism, Public welfare, Police, Darjeeling Improvement Fund, SSB (a para-military force of India) which work and function in isolation and it is important for these sectors to co-operate and chalk all their programs out, in conformity with the park's objectives of protecting and conserving the Eastern Himalayas Broadleaf and the Conifer (Subalpine) forest. Red panda is a flagship species of these forest and needs attention from all sectors (initiated by 2013 and keep it as an ongoing program).
- d. Work towards Transboundary cooperation between Darjeeling – Sikkim, Nepal and Bhutan for better management and conservation of the forest ecosystem straddling across the borders of these places (Does not have a timeline but we propose to actively participate in the transboundary policy level initiatives taken by ICIMOD (international centre initiatives in mountain development) for these region. Advocate the case and need for transboundary policy level intervention, through our case studies in Neora Valley and Singhalila National Park.

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

Involvement of local communities included training of the local forest field staffs. They accompanied the team in all the field work (social as well as ecological) (Plate 4.1). They greatly benefited by the

survey exercise and also by the report which we prepared and shared with the forest department. The results of our report especially the map of distribution of red panda in Upper Neora Valley has been seen to be presented in various occasions. The map has served as a baseline for the department, much to the fulfilment of our mission and objective.



Plate 4.1 Team members and forest staffs (indicated by arrow) at Mulkharga, Upper Neora Valley National Park

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

Yes, there definitely is. We are planning for a monitoring program to be put in place for red panda in the region now that we have the baseline data and information.

This time we would also use Occupancy Models and Habitat suitability models along with GIS mapping.

Tourism as mentioned is an over arching threat to red panda habitat in the Singhalila National Park and the bordering Nepal. A study of tourism – its impact on red panda habitat and its potential as livelihood option in these areas is too assessed.

We plan to incorporate social and ecological components in our monitoring program, to have a holistic idea of the landscape and its elements, of which red panda is a part of.

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

We have already shared the results, specifically to the forest department, Wildlife Division and they have been using the results to the best of their benefit. This has been a very fulfilling experience.

Not much has been published in the form of articles and papers for greater public access, and that would be done soon.

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

The RSG was used in stipulated time, though we took time to analyse the socio-economic data exceedingly almost nine months to 12 months of the time budgeted. However, we are very late in reporting due to problems stated above.

**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
Field Equipment	1100	1301.38	-201.38	Three LED lamps extra and warm blankets and rain gears for two staffs
Honorarium	1500	1500		Honarium split to pay local field assistants who helped in socio-economic surveys. Hired a student to tabulate the socio-economic survey data and do a cursory analysis.
Food	1200	1000.0	200	
Travel	675	715.56	-40	i. Includes using porter, hiring ponies, transporting supplies from Lava. ii. Also includes travelling to the fringe settlements several times.



				iii. To validate the information received during the questionnaire survey.
				iv. Team members and local guides stayed in the villages for several days for observation.
Communication	150	150		Email, internet and phone expenses
Workshop, Meetings and Information sharing	325	85.36	239.64	Meetings as stated in the budget and proposal not held but team members travelled to the Wildlife Div. headquarters to submit reports, discuss and get feed backs.
<b>TOTAL</b>	5000	4830.26	-169.74	

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

1. The next important step would be to publish the results of the study in peer reviewed journals as well as popular articles.

2. As a follow up of the present study, we have detected that the next logical step would be to develop a mid-term/long-term monitoring program for red panda and its ecosystem with the social and human component included. These projects are intended not to keep it a single species conservation program but to have red panda a focal species to having a broader impact in the conservation of the Eastern Himalaya Broadleaf and Conifer Forest eco-region of the Eastern Himalayas.

3. However, before developing this monitoring program, there are a couple of things that needs to be looked into.

In Singhlaila National Park, threats to red panda and red panda habitat were identified more than 10 years ago and recommended for further assessment studies. Burgeoning tourism to the area was one of them. However, no such assessments ever took place.

4. Hence, the next important step would be to understand threats better especially the impact of transboundary tourism in the area. A baseline study is urgently required to understand and assess the socio and ecological impact of tourism in the area for it to be a part of the mid-term/long-term monitoring program in the area.

5. Apart from trends, magnitude of change and effectiveness of management information from the monitoring program, we also plan to look into population structure of red panda in the area for better understanding of their status.

6. ATREE considers strengthening of civil society as one of the key pillars to sustainability. While implementing the project, mechanisms would be built in which would ensure sustainability of the overall endeavour?

7. We intend to work in Sikkim too, in future. Our present Regional Office is in Sikkim and therefore getting logistic support would be easier.

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

Yes, in our report.

**11. Any other comments?**

i. Firstly we apologise for submitting the report late, but this would not happen again, now that one of our team members Suita has resigned from her previous job to continue working on conservation issues in the region.

ii. We would continue working towards understanding better the conservation problems of red panda and its ecosystem with the social components included.

iii. We thank RSG profoundly. Without RSG, this work would not have been possible.