

Project title:

**Human Wildlife Conflict, Species Conservation and Community Livelihoods in Biological Corridors
Connecting Two National Parks and a Wildlife Sanctuary in Bhutan**

Introduction

Connectivity is the ability of a landscape to support plants and animals' movement, their gene flow, seasonal migration and shift of a species geographic range particularly in response to climate change. Biological corridors (BCs) are expected to support such functions in landscapes connecting various ecosystems. Bhutan has established more than nine percent of the total protected areas as biological corridors. However, it is not clearly known whether establishment of biological corridors has been functional in terms of gene flows across the ecosystems from one protected areas to the other.

The objective(s) of this study are to: (a) identify and map biodiversity hotspot areas of wildlife species, (b) identify problem species and evaluate conflicts between the people and wildlife through quantification of property damaged by wildlife, (c) evaluate indirect impacts of HWC to farmers' well-being, (d) assess the participation of local people in conservation activities and to (e) recommend sustainable management strategy on how long term conservation goals can be achieved. This study is expected to help understand the underlying Human Wildlife Conflict (HWC) in biological corridors thereby provide basis to design long term conservation strategies.

Materials and Methods

Study site

The study was carried out in biological corridor III (Figure 1: Green areas) linking Jigme Singye Wangchuck National Park, Phibsoo Wildlife Sanctuary and Royal Manas National Park in southern Bhutan (Figure 1; Figure 2). This study covered Lhamoyzingkha, Senge, Chunzom and Jigmecholing geog all located under the administrative jurisdiction of Sarpang Dzongkhag in southern Bhutan. In addition to the geogs in Sarpang Dzongkhag, Dunglagang geog in Tsirang Dzongkhag was also included in this study.

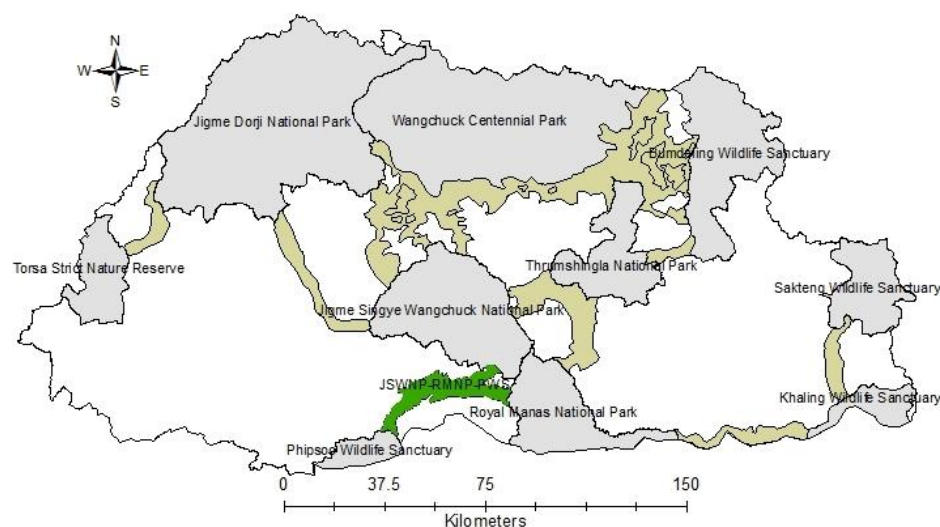


Figure 1. Protected areas of Bhutan (Light grey = National parks and Sanctuaries; brown = biological corridor)

Data collection

Data collection used pre-tested structured questionnaire for household survey. The questions were mainly asked regarding types and quantity of crops damaged, the type and number of wild animals encountered by farmers and the farmers' knowledge on hotspot habitat for problem animals.

Results

Hotspot areas of wildlife species

The hotspot areas identified are based on the farmers' knowledge and perceptions. The hotspot identification was also based on the incidences of wildlife encountered during the field surveys. The biological corridor (BC III) is divided into four zones; Zone I; Zone II; Zone III and Zone IV (Figure 3).

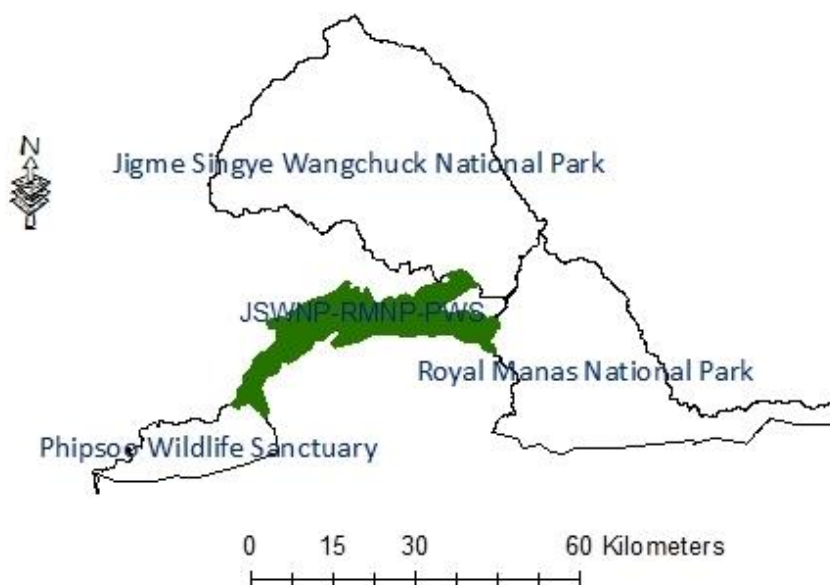


Figure 2. Biological corridor (JSWNP-RMNP-PWS) linking national parks and wildlife sanctuary.

The habitat zones identified were based on the problem animals that are in conflict with farmers mainly in terms of crop and property damages. Habitat based on the wildlife species such as golden langur, Hornbill and Hare and others are beyond the scope of this research, therefore, habitat hotspot is identified based on the wildlife species that are in conflict with human livelihoods (Table 1).

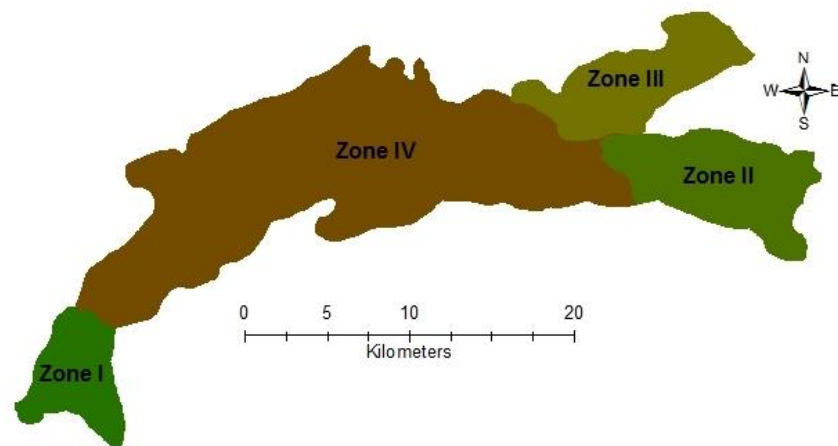


Figure 4. Wildlife habitat hotspot (Zones) in Biological corridor III.



Figure 5. Golden Langur spotted during field survey



Figure 6. Spotted deer spotted by Mr. Kuenley Gyeltshen nearby Phibsoo Wildlife Sanctuary.



Figure 7. An Elephant with a calf outside a barbed wire fence adjacent to agricultural field.

Human Wildlife Conflicts and Impact to farmers' livelihoods

Results indicate that villagers perceive Human Wildlife Conflict to be a major problem. Respondent's estimates the seasonal loss ranging from 15% to 50% of total production which also depends on one season to other. Although reliable figure on actual crop loss could not be obtained but farmers' perception to wildlife species conservation is found to be strongly associated either to the crop loss or property losses. About 50% of the farmers held negative attitudes towards farmers and this is because those farmers having negative attitude had either destroyed their crops or damages property or killed livestock in previous interactions.

Table 1. Habitat (Zones) in biological corridor III

Wildlife Habitat Hotspot (Zones)				
Wildlife Species	I	II	III	IV
	Spotted deer, Asian elephants, Bengal tiger, Gaur	Asian elephant, Bengal tiger, Black bear, Leopard, Gaur	Wildpig, Wilddog, Black bear, tiger, Leopard	Monkeys, Wilddog, Wildpig, Barking deer, Black bear, Leopard

Location farmers household and Human Wildlife Conflicts (HWCs)

Research revealed that HWCs are associated to location of households of farmers, for instance, farmers whose households located to close to forested areas linking other ecosystems are found to experience more conflicts (Figure 8). Theories predict that conflicts occur when one organism needs are encroached by the other like food, habitat etc however in case of Bhutan habitat destruction does not appear to be the significant variable. From this research two hypothesis can be formulated. Major HWCs emerge due to the existence of edge species like deer, wild pig and monkeys and HWCs associated to other species such as tiger and elephant emerge due to overlap of migrating corridor and location of agricultural farms adjacent to the migration corridor.

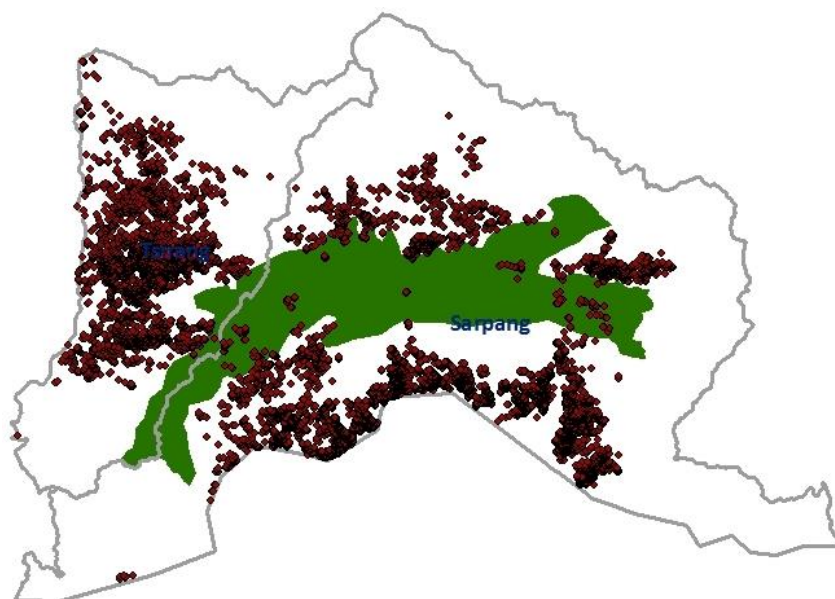


Figure 8. Settlements (red dots) in and around biological corridor III, (grey lines: district boundary).

Farmers' stated that conflicts varies from season to season. For instance, wild pig destroy tapioca in lower elevation areas (Figure 9) and Maize While elephants most appear during the harvest time of paddy.



Figure 9. Uprooting of Tapioca by Elephant.

Protection measures implemented by farmers

More than 80% farmers stated that they mostly keep scarecrows in the field to scare away the wild animals however farmers added that this is mostly effective during day time only (Figure 10). Therefore, during night guarding huts are constructed at elevated areas or on tree branches whereby farmers spend night awake throughout the night and scare the animals by making noise either by beating drums/tins or by shouting from time to time (Figure 11).



Figure 10. Crop protection measures implemented by farmers.



Figure 11. Crop protection measures implemented by Farmers.

Participation of farmers in conservation activities

More than 50% of the farmers also expressed that wildlife species conservation is only affecting their livelihoods as compensation for crop loss is mostly not adequate or even not paid due to lack of funds. Farmers' living in the rural areas as expressed by farmers (Figure 12) are found to be relatively poor which most of the time forms critical barriers to farmers' participation.



Figure 12. Household questionnaire survey in rural village of Jigmechoeling geog.

Recommendation for species conservation

Based on the results, the research recommends that the welfare of the rural communities could be improved by employing three step strategies: (a) Establishing baseline information on timing and locations of conflicts including the behavior of the involved wildlife species, (b) Identifying shared objectives between wildlife conservation and human welfare, and (c) monitoring the success of the management plan in terms of implementation, threat reduction and outcomes for targets. While considering the rural welfare, two important points appears to be critical:

- Long terms sustainability of interventions on human wildlife conflict needs to be assessed based on economic feasibility.
- Incentives that may encourage farmers to change livestock husbandry practices or crop cultivation need to be understood clearly.

By

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