35. USE OF GEO-SPATIAL TOOLS IN THE MANAGEMENT OF POTENTIAL HABITATS OUTSIDE THE PROTECTED AREAS IN THE TRANSBOUNDARY BRAHMAPUTRA-SALWEEN LANDSCAPE

Bandana Shakya*, Kabir Uddin, Nakul Chettri, Birendra Bajracharya and Eklabya Sharma

International Centre for Integrated Mountain Development (ICIMOD), GPO Box 3226, Kathmandu, Nepal; bshakya@icimod.org

Keywords: conservation landscape, habitat restoration, protected areas, habitat corridors, habitat suitability modelling

INTRODUCTION

The Brahamaputra-Salween Landscape (BSL) is an exceptionally biodiversity rich area of the eastern Himalayas shared by China, India, and Myanmar. Formal boundary delineation for the landscape will take place through further consultation among the three countries; the provisional extent of the BSL is shown in Figure 1 and includes a number of adjoining protected areas (PAs) in the three countries and some adjoining areas outside. The landscape includes several well-known protected areas such as the Namdapha National Park (NNP) and Tiger Reserve in Arunachal Pradesh (India), Hkakaborazi National Park (HNP) in Kachin State (Myanmar), and Gaoligongshan National Nature Reserve (GNNR) in Yunnan Province, China. These protected areas have a common ecosystem shared by many species of global importance, such as tiger, clouded leopard, snow leopard, common leopard, hollock gibbon, and Namdapha flying squirrel, as well as many endemic flowering plant species. These protected areas have not only conserved the rich biodiversity of the landscape but have also supported the livelihoods and cultural dependencies of the diverse ethnic communities living in and around them. Given the several conservation and development challenges, including climate change vulnerability, it is crucial to have an effective protected area system with long-term monitoring of biodiversity and socioeconomic systems to sustain the ecosystem services and enhance the livelihood opportunities for local people. Several studies have stressed the need for complementing the PAs with supportive mechanisms for restoration of rapidly degrading habitats outside the Pas, and for providing communities with conservation-linked alternative economic incentives (Stotz et al. 2003; Aung 2007; Chatterjee et al. 2006). Already, there are several habitats with unique ecological situations outside the PAs identified as priority conservation sites. In order to strengthen the argument for restoration of habitats outside the PAs, a geo-spatial analysis based on a habitat suitability model was used in the BSL as part of the broader pre-feasibility studies conducted by the three countries in the landscape.

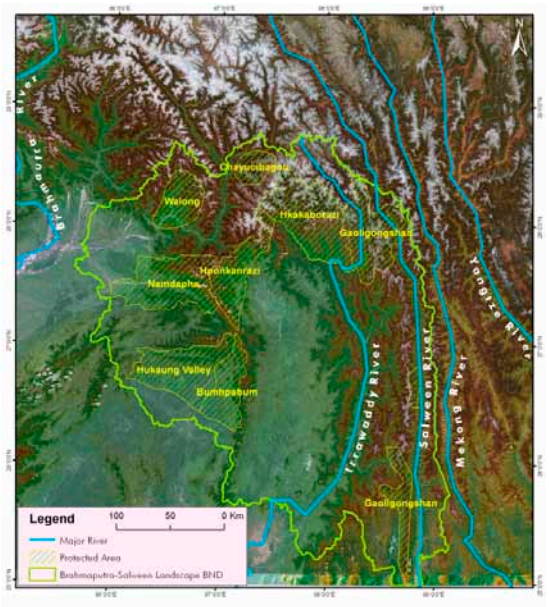

FIGURE 1: Tentative extent of Brahmaputra-Salween Landscape based on the watershed boundary covering the protected areas (source of protected area boundaries: World Database on Protected Areas)

HABITAT SUITABILITY MODEL

ICIMOD carried out a preliminary corridor identification analysis for the BSL based on habitat suitability models for two species: leaf deer and takin. The Corridor Designer toolbox(http://corridordesign.org/designing_corridors/habitat_modeling/) was used in an ArcGIS 9.3 platform to design wildlife linkages/corridors to determine the best available habitat for individual wildlife species between the protected areas. Several parameters such as habitat patches, movement resistance, and suitability with relation to the raster-based thematic layers such as land use/land cover,

elevation, topographic position, and human disturbance (e.g., distance from roads, trails, and settlements) were used for corridor design. Land cover is often the most important factor in habitat models for many species because it relates to food habitat, hiding cover, thermal cover, and human disturbance. The information on land cover was derived using the eCognition Developer with Object-Based Image Analysis (OBIA) technique. Additional thematic layers were collected from secondary sources and reclassified as input to the habitat suitability model. According to the relative importance of the thematic layers, certain weights were assigned to combine multiple habitat factors into one aggregate habitat suitability model. Weighting parameters were determined using species distribution information from the relevant literature. Once all the layers were weighted, the corridor design tool was used to generate the habitat suitability for the species. Next, the potential habitat patches were identified by specifying the threshold habitat quality for breeding and the minimum suitable area necessary to sustain a breeding pair or population.. Finally, a tentative area for a corridor between the protected areas was delineated using a corridor model input of habitat suitability and habitat patches, which was further evaluated by considering the corridor profile.

IDENTIFYING POTENTIAL HABITATS OUTSIDE THE PAS

The geo-spatial assessment showed that the two species have a contiguous habitat across the two protected areas NNP of India and HNP of Myanmar (Figure 2) and there is a high potential for connecting these areas through a wildlife corridor. Two patches between the HNP and NNP were found to be appropriate for the proposed corridor, one for leaf deer 165 km long and 2817 km^2, and one for takin 98 km long and 2403 km^2. The comparative altitudinal and horizontal coverage of the two species clearly indicated their habitat preference; takin showed higher altitudinal sub-alpine and alpine coverage and leaf deer a preference for temperate forested areas. Interestingly, while trying to identify corridors for both species, a broader connectivity coverage extending from alpine to temperate forested areas was found to be most suitable. This preliminary study has provided important insight into the significance of habitat connectivity between the protected areas and those lying outside them, and the prospects of developing wildlife corridors to support the idea of widening the extent of PAs by the three countries.

PRIORITY ACTIONS FOR REGIONAL BIODIVERSITY MANAGEMENT

Geo-spatial analyses of the type described here provide a valuable basis for putting areas or 'pockets' of unique flora and fauna outside PAs that are too small to be considered as regular protected areas into some form of protection arrangement, and for facilitating regional level efforts to maintain transborder vegetation contiguity, as well as for protecting landscape elements in the entire landscape. Strengthening the conservation of existing parks and other priority sites outside the PAs by maximising the synergies between biodiversity conservation and community development initiatives across the three countries will be a high priority in the landscape.

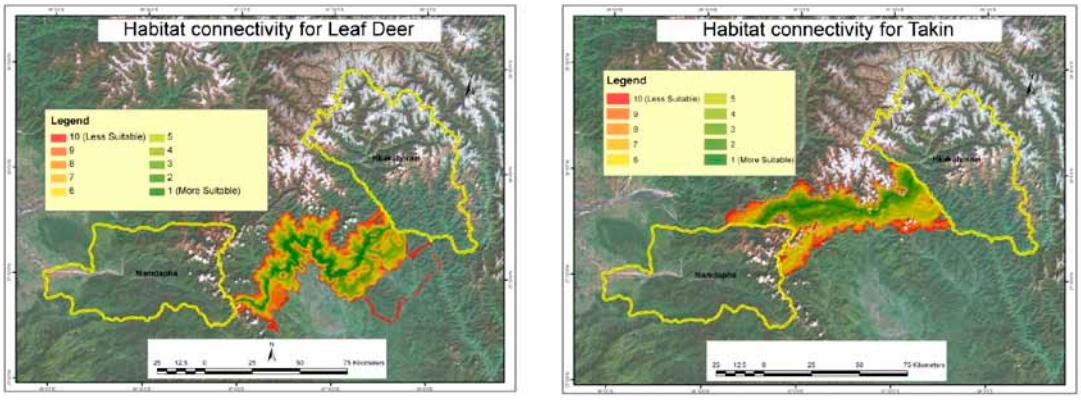

FIGURE 2. Suitable corridors between Namdapha National Park (NNP) and Hkakaborazi National Park (HNP) in the Brahmaputra-Salween Landscape, based on the habitat suitability model for leaf deer and takin.

References

Aung, U.M. (2007). "Policy and practice in Myanmar's protected area system," *Journal of Environmental Management* 84: 188-203.

Chatterjee, S., Saikia, A., Dutta, P., Ghosh, D., Pangging, G., Goswami, A. K. (2006). *Background paper on biodiversity significance of North East India, for the study on natural resources, water and environment nexus for development and growth in North Eastern India*. WWF-India, New Delhi, India.

Stotz, D. F., Harris, F., Moskovits, E. J., Hao, K., Yi, S., Adlemann, G.W. (eds). (2003). *Rapid biological inventories report No. 4*. The Field Museum, Chicago, USA.