

❖ **STANDARD 7: SELECT TERRESTRIAL, FRESHWATER AND MARINE CONSERVATION BIODIVERSITY ELEMENTS (A.K.A CONSERVATION TARGETS) ACROSS MULTIPLE BIOLOGICAL SCALES TO COMPREHENSIVELY REPRESENT THE BIODIVERSITY OF THE ECOREGION.**

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## **Case Study: Conserving Ecological Processes in the Eastern Himalayas**

*From: WWF (2002) Ecoregion Conservation: Securing Living Landscapes through science-based planning and action. A users guide for Ecoregion Conservation through examples from the field. Washington, DC*

### **Purpose and region of analysis**

The Eastern Himalayas have distinctive ecological processes that need to be maintained to sustain biodiversity and a healthy ecosystem. These include:

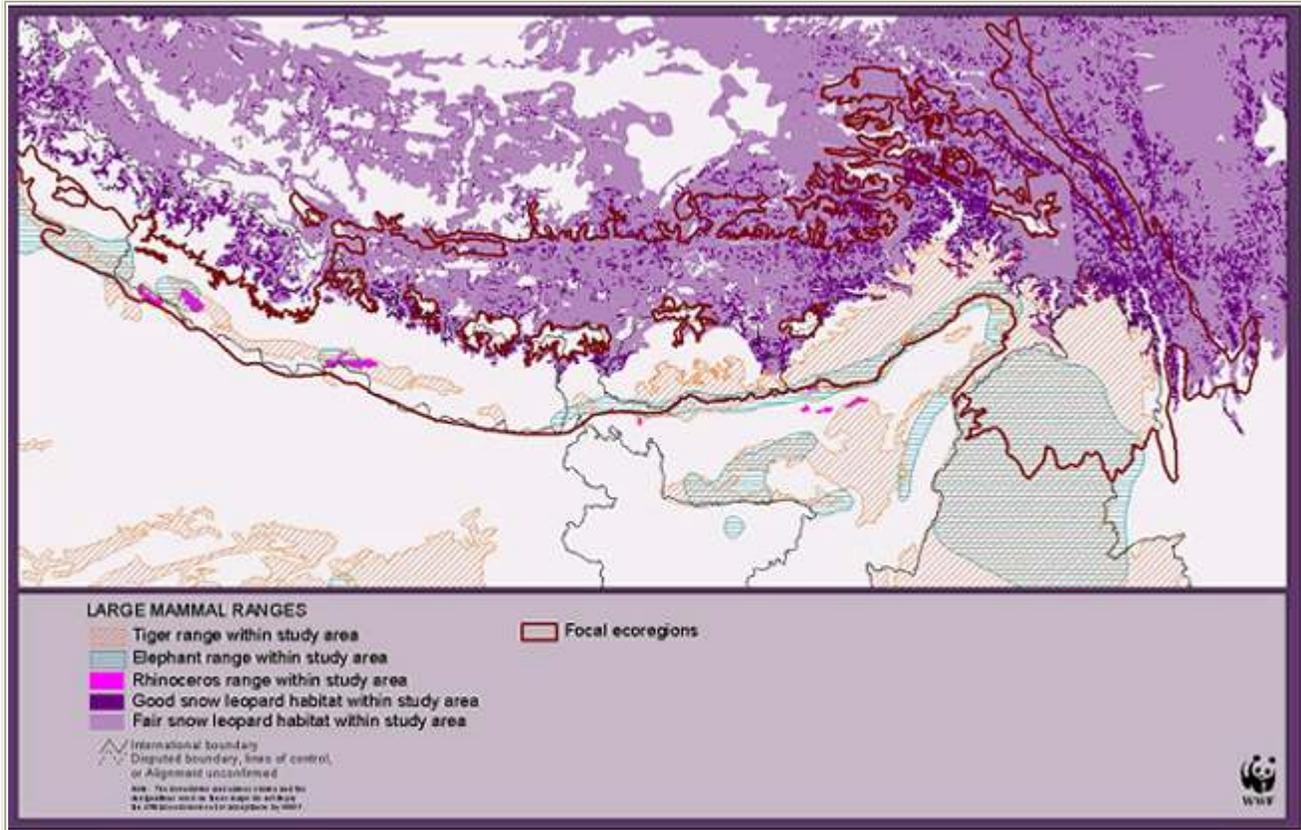
- large predator-prey relationships with a focus on the two endangered large carnivores (the tiger in the lower elevation habitats and the snow leopard in the upper elevation habitats);
- altitudinal and other regional migrations (especially for the birds and some focal mammals); and
- storage and gradual release of water (particularly during the monsoon) from intact watersheds and the maintenance of hillside topsoil and clean rivers and streams that support migratory fish.

### **Criteria/Methods**

#### *Large predator-prey relationships*

The range distributions of the snow leopard and its primary prey species the blue sheep, and, to a lesser extent, the Himalayan Thar (*Hemitragus jemlahicus*) are included in several priority areas. The range distributions of the tiger and its primary prey species (sambar, chital, muntjak, gaur, wild pig) are included within several CPAs and protected areas (map below).

## Current and potential ranges of larger mammals in the Eastern Himalaya



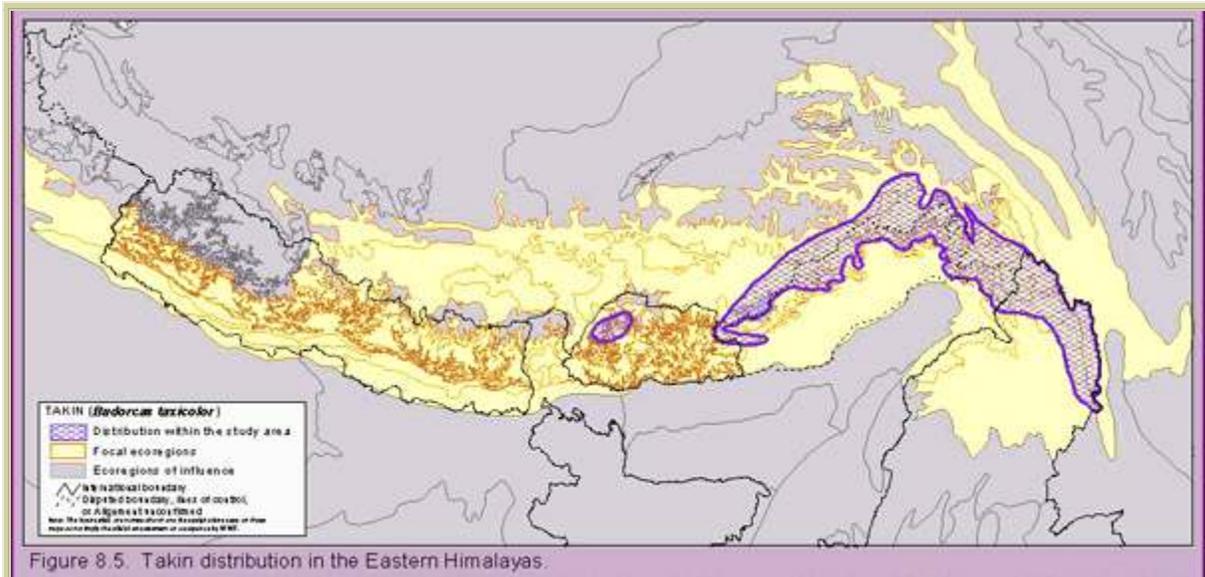
### *Altitudinal migrations*

Many of the animal species, especially the birds, that live in the eastern Himalaya move up and down the mountain slopes over the course of the year to exploit different habitats and other resources during different seasons. Seasonal altitudinal migration patterns have been identified among various bird families - including thrushes, titmice, and flycatchers (Carol and Tim Inskipp, pers comm., Chris Carpenter, unpublished data) - and among mammals, such as takin and to a lesser extent in blue sheep (Schaller 1977). Seasonal migration in blue sheep is usually limited to areas that receive heavy snowfall and with a paucity of south or west-facing slopes (R. Jackson, pers comm). Conservation of these species requires the altitudinal connections that provide migration routes. Altitudinal habitat connectivity and continuity of habitat types is critically important in the Himalaya to allow for seasonal bird migrations and dispersal of other species in taxonomic groups ranging from mammals and birds to butterflies (Inskipp 1989, Basnet et al. 2000).

### Altitudinal migrations - mammals

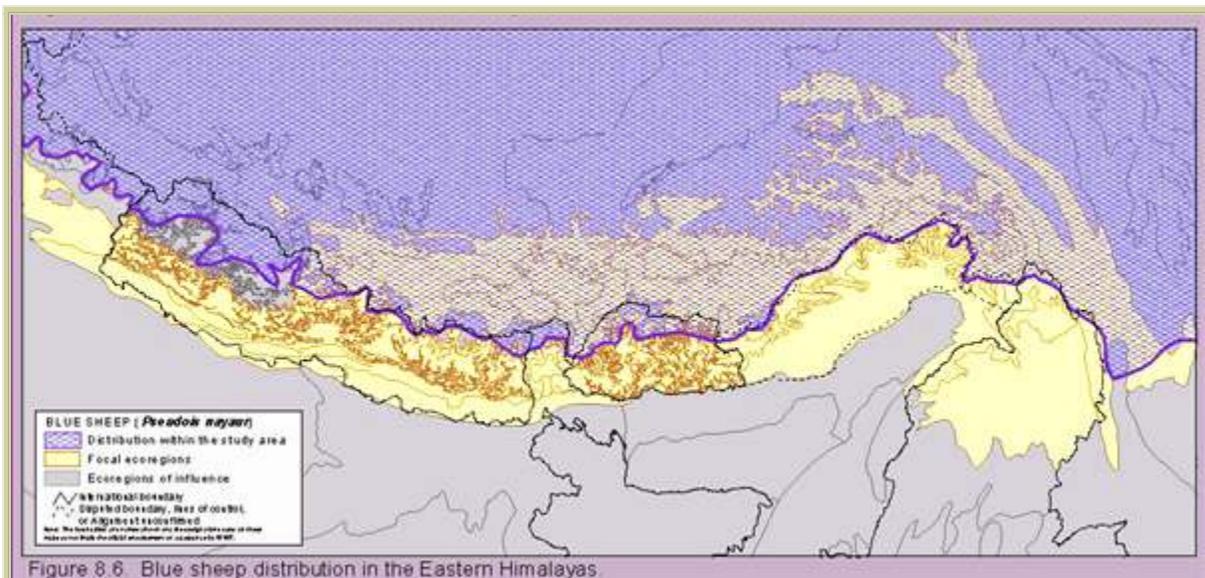
The takin population in northern Bhutan is included within the Jigme Dorji-Manas-Bumdaling conservation landscape. This population migrates from the alpine scrub to the subalpine broadleaf forests in the summer. The winter and summer ranges of this population is included within the conservation landscape. Further east, the larger

takin populations are included within several conservation landscapes, namely the Lohka-Mili Landscape, the Namcha Barwa-Dibang Walong Landscape and the Namdapha-Hkakabarazi Landscape.



**Takin (*Budorcas taxicolor*) distribution in the Eastern Himalayas**

Blue sheep: A total of seven large protected areas (Shey Phoksundo, Annapurna Conservation Area, Kanchendzonga NP, Jigme Dorji NP, Bumdeling NP) and biologically important CPAs (Quomolangma complex, Namchabarwa complex) overlap substantially with the distribution range of blue sheep (*Pseudois nayeur*), and include their summer alpine meadow and the winter alpine scrub habitats.



**Blue Sheep (*Pseudois nayeur*) distribution in the Eastern Himalayas**

Himalayan Thar: A third high elevation ungulate, the Himalayan Thar, may undertake seasonal migrations from the broadleaf forests—where they spend the winters—to the summer alpine habitats (Schaller 1977). The range of the Himalayan Thar extends from western Nepal into Sikkim. In the Eastern Himalaya, the distribution range of this species overlaps with three ecoregions, the Eastern Himalayan broadleaf forests, Eastern Himalayan subalpine conifer forests, and the Eastern Himalayan alpine shrub and meadow. Very little of the broadleaf forest habitat is included within the high priority CPAs, which are essentially narrow habitat linkages between protected areas. The two Level I priority areas that provide winter habitat for the Himalaya thar, are the northern extreme of the Parsa-Makwan-Chandragarh-Shivpuri-Langtang Link and the Kanchanjanga-Makalu Barun-Sagarmatha Link. Two protected areas, Makalu Barun and Kanchendzonga also include some broadleaf forests that represent winter habitat for this endemic ungulate.

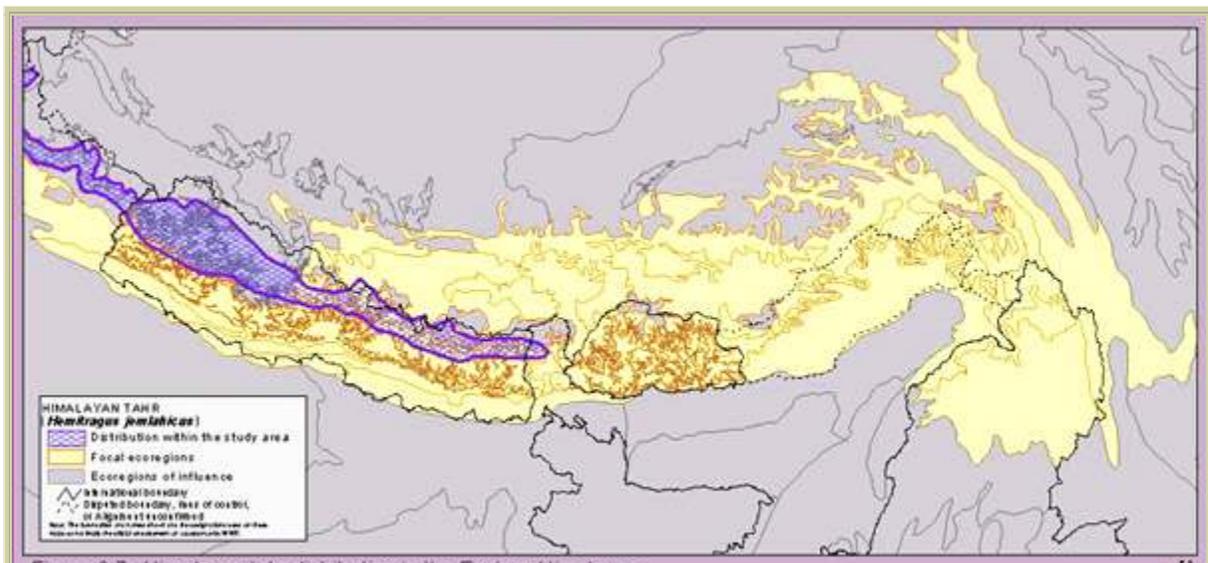


Figure 8.7. Himalayan thar distribution in the Eastern Himalayas.

### **Himalayan Thar (*Hemitragus jemlahicus*) distribution in the Eastern Himalayas**

#### Altitudinal migrations - birds

Almost 500 species of birds undertake seasonal altitudinal migrations in the Eastern Himalaya. Most of these species are in the subtropical and temperate broadleaf forests. The priority areas that link the protected areas in Nepal are narrow riparian linkages, but there is better, wider linkage representation in Bhutan. Expanding the narrow priority areas in Nepal into broader landscapes consisting of a mosaic of natural habitat fragments and other land-uses that can be used as “stepping-stones” for migratory birds will be more effective.

#### Regional migrations

The winter habitats of the globally threatened Black-necked crane (*Grus nigricollis*) in Bhutan. The summer areas of Black-necked Cranes in China are included within the

Lhasa Valley-Yarling Tsangpo priority areas. The Asian elephant populations in the lowlands range widely within the grassland and moist deciduous forest ecoregions along the Himalayan foothills. Thus conservation of elephants in the Eastern Himalaya should ensure adequate spatial areas and conservation of the seasonal migration pathways.

### *Hydrology*

The middle elevation forests of the Himalaya protect the steep watersheds that serve millions of people locally as well as thousands of kilometers away. The loss of forest and ground cover in these habitats has dramatic downstream effects. Riparian habitats are also vitally important for species dispersal, riverbank stabilization and flood control.

### **Products/Outcomes**

Selecting and understanding distinct ecological processes that help define and ecoregion and the biodiversity within will enhance a biodiversity vision. The design of priority areas can reflect the importance of these ecological processes. For example, priority areas in the Eastern Himalayas designed for altitudinal connectivity to facilitate seasonal migrations include:

- the linkages between the Chitwan-Parsa-Valmiki protected areas complex in the Terai and the Annapurna-Langtang-Manaslu complex in the alpine regions;
- the Parsa-Makwan-Chandragarh-Shivapuri-Lantang link; and
- the Jigmi Dorji-Black Mountains-Manas linkages in Bhutan.

Several other CPAs contain contiguous habitat across an elevation gradient, but over more localized spatial scales, where they encompass deep, steep river valleys. In these CPAs, Namchabarwa-Dibang-Walong and Yardong-Torsa, the habitat ranges from subtropical broadleaf forests to sub-alpine and alpine habitats as they ascend the steep slopes.

### **References**

Basnet, K., P. Shrestha, K. Shah, and P. Ghimere. 2000. Biodiversity assessment of corridors linking Annapurna Conservation Area and Chitwan National Park-Parsa Wildlife Reserve. In: Chitwan-Annapurna Linkage. Biodiversity Assessment and Conservation Planning. WWF Nepal Program, Kathmandu, Nepal.

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