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is secured. And, last but not least, a feasibility study for collecting and recording traditional farmers' knowledge in the Alpine region has begun.

Knowledge about farming with the use of products from traditional agrobiodiversity can be lost very quickly as older generations die out and younger generations are more interested in modern cultures. There are many attempts made to save the actual genetic material through gene and seed banks or other forms of ex situ conservation. However, there is very little emphasis placed on gathering and storing the knowledge that goes together with each plant variety and each animal breed. Without this knowledge, any conservation efforts are doomed to long-term failure. Domesticated animals and plants are inseparably bound to humans for their survival; likewise, the cultural heritage of rural areas is bound to the plants and animals that are part of the traditional agricultural system.

Reference

Final Report of the Alpine Delphi: www.save-foundation.net/pdf/ALM_Final_Report.pdf

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Project Snow Leopard: Participatory Conservation Model for the Indian Himalaya

Pranav Trivedi

The high altitude region of the Indian Himalaya (including the Trans-Himalaya) is home to the snow leopard *Uncia uncia* - the elusive and magnificent big cat that symbolises the desolate, mountain landscapes. This globally threatened predator shares its rugged, climatically challenging and remote home with a unique wildlife assemblage of global importance that includes populations of many other threatened species such as the Black-necked Crane *Grus nigricollis*, two species of bears *Ursus spp.*, Red Panda *Ailurus fulgens*, mountain ungulates such as the Wild Yak *Bos grunniens*, Chiru or Tibetan Antelope *Pantholops hodgsoni*, Gowa or Tibetan Gazelle *Procapra picticaudata*, Tibetan Argali *Ovis ammon*, Ladakh Urial *Ovis vignei*, Himalayan Musk Deer *Moschus chrysogaster*, three species of the goat-antelope *Goral Nemorhaedus spp.*, Serow *N. sumatraensis* and Takin *Budorcas taxicolor*, to name a few. The traditional agro-pastoral communities and their domestic livestock also share this home of threatened and unique high

altitude wildlife. Like every other human society that has been transformed through the twin agents of technology and markets, these once isolated, remote and near-subsistence societies are also in a socio-economic transition from their earlier rather benign existence.

The snow leopard, in the meanwhile has continued attracting attention for its feline beauty and grace on the one hand, while on the other it lives as a ghost haunting these communities as it preys on their livestock. It also draws those involved in the illegal international trade in its body parts, especially bones and skin or fur. Many other species of wildlife are also involved in some kind of conflict or issue, be it depredation on livestock, crop/forage losses, trans-boundary issues between neighbouring countries or poaching.

While a substantial proportion of India's population, including policy makers, are aware of the precarious conservation status of species such as the Tiger *Panthera tigris* and Asian Elephant *Elephas maximus* and of the efforts to conserve them (such as the Project Tiger), few are aware of even the existence of species such as the snow leopard. Besides low awareness, the snow leopard faces threats from inadequate measures for its conservation within the existing high altitude Protected Areas (PAs) in India. Acute lack of resources, manpower, training, absence of boundary demarcation, lack of proper management plans and low conservation attention are some of the problems plaguing the PAs in the region. Given the widespread occurrence of wildlife on common land, continued traditional land use within PAs and difficulties involved in creating and maintaining large, inviolate National Parks in this region, it becomes imperative that wildlife conservation efforts are participatory - both within and outside PAs. Such an approach could be facilitated by the relatively intact and functional traditional administrative bodies such as the village councils in most of the high altitude landscapes. A community-based livestock insurance scheme to compensate the damage caused by wild carnivores to livestock, coupled with setting up of village level grazing-free reserves and better herding initiated by at Nature Conservation Foundation (NCF) and the Snow Leopard Trust (SLT) in Spiti and Ladakh are among the few such models of success in participatory conservation. These point at



Snow leopard cub. Photo: Steve Tracy.

the desirability and feasibility of such models of wildlife conservation in the Indian high altitudes. The Project Snow Leopard initiatives were largely based on more than a decade-long scientific work that involved field research on human-snow leopard conflict, ecology of high altitude ungulate prey species and studies on the agro-pastoral communities in the Spiti Valley and Ladakh in the Indian Trans-Himalaya. Another successful example of the participatory conservation approach has been based on research carried out on snow leopard ecology, followed up by predator-proof corrals and community-run homestays in Ladakh by another NGO - the Snow Leopard Conservancy (SLC).

Building on these science-backed community-based conservation initiatives and taking into account the prevailing complex and challenging prospects, the Government of India launched "Project Snow Leopard" in January 2009 with an aim to safeguard India's unique natural heritage of high altitude wildlife populations and their habitats by promoting conservation through participatory policies and actions. This positive initiative has appeared on the Indian high altitude conservation horizon after five years of work with the central Government and the five Himalayan State Governments by scientists of NCF - an Indian NGO established in 1996 and its US-based counterpart the Snow Leopard Trust (SLT).

A document articulating the need and objectives of the Project Snow Leopard was drafted at a meeting in early 2004, which saw contributions from a small and diverse group consisting of scientists and conservationists, members of the Indian Forest Service and the local communities. The document was developed further through contributions by the Chief Wildlife Wardens of all the five snow leopard range states of India (who have strongly endorsed the effort), after NCF/SLT conducted consultative workshops within each of these states. In 2004-2005, we conducted state level workshops in all five high altitude snow leopard range states of the country (Arunachal Pradesh, Sikkim, Uttaranchal, Himachal Pradesh, and Jammu and Kashmir). Following these, we organised a National Workshop on 10-11 July 2006 in collaboration with the state government of Jammu and Kashmir and the Ministry of Environment and Forests, Government of India during which an outline of the strategy and action plan was developed (see www.conservation.in/publication.php). Among the 13 recommendations of the workshop was the formation of a drafting committee with the responsibility of preparing a full strategy document that will guide Project Snow Leopard in the country. NCF scientists, Yash Veer Bhatnagar and Charudutt Mishra were part of this 13-member committee that drafted the document, which was released by the Honourable Minister of State for Environment and Forests, Government of India on 20th January, 2009 (www.conservation.in/publication.php).

Project Snow Leopard is unique as it encourages a landscape approach to wildlife conservation in the Himalayan high altitudes and is founded on the twin principles of robust science and strong community involvement in conservation. It is essentially a project that will help in the development of a clear conservation vision for biologically important landscapes and suitable scientific management plans, while also providing financial support for implementation of these plans. During the first year, each of the five states will identify one landscape under the project that may include PAs, but will not be limited to these areas alone. Surveys will be conducted to identify a mosaic of multiple 'cores' where human use will be minimised, harmonised or completely stopped in a consultative process with the community. The implementation structure of the project will



Snow leopard. Photo: Milan Trykar (SLT).

include representation from the village cluster level up to a steering committee at the central level. At the central level, a Steering Committee chaired by the Director General of Forests and Special Secretary to the Government of India will help guide the project. Each Range State will have a State Snow Leopard Conservation Society that will coordinate work by the Landscape-Level Implementation Committees, which in turn will coordinate work by the Village Wildlife Conservation Committees. A central steering committee has been notified that has representation of NCF. In fact, NCF and the Wildlife Institute of India (WII) have been identified as the main NGO and government organisation, respectively, to help implement Project Snow Leopard. Project Snow Leopard also provides scope and resources for conservation and research by NGOs, individuals and civil society groups interested in the snow leopard and other high altitude wildlife of the Indian Himalaya.

To conclude, this exciting development represents a major up-scaling of our research and community-based conservation efforts in the higher Himalaya. It also is a sign of positive change and motivation for several other NGOs and civil society institutions involved in wildlife research and conservation in India to evolve and implement participatory conservation models with support of the government. This, in a sense, represents a success at the planning level in conservation - in that it has led to formulation of a people-sensitive, semi-decentralised and science-based wildlife conservation policy at the national level. The snow leopards will have much to rejoice if the project achieves its aims.

References:

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- PSL (2006) *Towards Project Snow Leopard: report of the national workshop on Project Snow Leopard*. 10th & 11th July, 2006. Leh, Ladakh. Department of Wildlife Protection, Jammu

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Honorable Minister of State, Environment and Forests Government of India at National workshop Project Snowleopard. Photo: Yash Veer Bhatnagar.

and Kashmir, Nature Conservation Foundation, and International Snow Leopard Trust, India.

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More details at: www.conservation.in or www.ncf-india.org and www.wii.gov.in

The Importance of Mediterranean Alpine Biodiversity in Central Spain

Rosario Gavilán and Alba Gutiérrez Girón

Alpine communities in central Spain are found at the top of the Sistema Central, an east-west running mountain range consisting of different mountain chains. These communities grow in a somewhat reduced space, at altitudes of over 2,000 metres; the summits in this range are always below 2,300 - 2,350 metres, except Almanzor (2,592 metres), Peñalara (2,429 metres) and El Calvitero (2,401 metres) among others. The threats affecting conservation of alpine biodiversity are mainly related to the influence of big cities such as Madrid, the third most populous city in Europe with over three million inhabitants and more than six million in the Greater Madrid Area. The city is only 60 kilometres from the Sierra de Guadarrama, one of the mountain ranges in the Sistema Central. There are other smaller cities such as Ávila and Segovia with populations of approximately 50,000 which are also located very near the Sistema Central mountains. They exert an influence on the landscape similar to Madrid and there are similarities in their use of mountain resources.

Threats to mountain environments come mainly from recreational uses such as the presence of traditional ski resorts or worse still, the new ski resorts being built in some areas of the western Sistema Central. Hiking is probably the least harmful leisure activity in mountain areas, but hiking trails in many cases require some form of refurbishment.

Water supply in Mediterranean countries is always a serious concern for governments. In Madrid water comes from precipitation, as well as from snowmelt from mountain areas and is conserved in reservoirs situated in the surrounding valleys in the Sierra de Guadarrama. The conservation of natural vegetation can guarantee slope stabilization and prevent erosion processes which impact plant communities at lower altitudes and exert a strong negative influence on the capacity of reservoirs downhill.

The outlook for conservation of small alpine areas close to high population concentrations is poor in terms of sustainable development. We are currently developing research into alpine vegetation which includes interspecific associations, spatial patterns and processes, the study of rare flora and the monitoring of alpine vegetation to detect future changes. These surveys may assist decision-makers and people in charge of these areas to improve their conservation policies.

We have studied the role of plant species in forming organised communities by comparing small-scale spatial associations among species. High-mountain vegetation in these areas includes different communities depending on the habitats. We have focused on vegetation that covers the top of mountains in two areas: Sierra de Béjar and Sierra de Guadarrama, where communities are organised in patches or sometimes strips. The particular geomorphology of these ranges and the natural erosion processes have caused the tops of these mountains to be more or less flat, usually exposed to strong winds. In these environments, plant communities have a wide variety of species adapted to extreme conditions. There is an abundance of cushion plants together with other hemicryptophytic taxa and a scarcity of annuals (Gavilán et al. 2002).

Patch composition shows a majority presence of perennial plants, mainly cushion chamaephytes and hemicryptophytes. Among cushion plants, *Armeria caespitosa*, *Jasione crispa* and *Plantago penyalarensis* are common in patches, restricted to the highest altitudinal level. There is a larger number of hemicryptophytic species than cushions and most of them have a wider altitudinal distribution range; these are grasses such as *Festuca curvifolia*, *F. iberica*, *Nardus stricta*, etc., frequently found in patches. Only a few species of Compositae, such as *Leucanthemopsis alpina* or *Pilosella vahlii* show a more restricted altitudinal distribution.



Aspect of alpine plant community in Sistema Central. Blooming cushions of *Minuartia recurva* enclosing plants of *Jurinea humilis*, *Pilosella vahlii* or *Festuca curvifolia* inside. Photo: Rosario Gavilán and Alba Gutiérrez Girón.