

# **Conserving Natural Heritage through Genetic Assessment: the case of Snow Leopards in Ladakh**

**Vishnuvardhan**

**Wildlife Institute of India**

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**Supervisor:**

**Dr. Y. V. Jhala, Scientist G, Department of Animal Ecology Conservation Biology**

**Co Supervisor:**

**Mr. Yellapu Srinivas, Ph.D. Scholar, Wildlife Institute of India**

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## **Executive Summary**

Natural world heritage sites are landscapes that sustain rare ecological processes, provide crucial habitats for the survival of many iconic species of significance and provide a wealth of ecosystem services. A part of India's natural heritage lies in its youngest landscape, the Himalayas. This natural heritage is an asset in itself due to its immense intrinsic values. Snow leopard, an elusive inhabitant of the cold desert represents an important cultural and ecological symbol of the Central and south Asian mountain systems and acts as a flagship as well as an umbrella species. This study has been designed to assess the genetic status of this vulnerable species distributed across the union territory of Ladakh using non-invasive genetic methods. The study site comprised of four distinct regions, Hemis-Leh, Kargil, Changthang and Nubra. Putative snow leopard scat samples (N=391) were collected from the study area. DNA was extracted from all the samples and a 148 bp Mt-DNA region was amplified with a carnivore specific primer. Successfully amplified samples were sequenced for species identification. From the 95 snow leopard positive samples 56 individuals were identified using a panel of 10 microsatellites. Sex identification was also done by using AMELY gene and results showed male biased sex ratio in Ladakh. PIDsib value was  $3.8 \times 10^{-4}$  was indicative of sufficient power of the microsatellite panel to discriminate between siblings in a population of 10,000 snow leopards.

Low genetic variation was observed in snow leopards ( $H_o = 0.585$ /  $H_e = 0.674$ ) and bottleneck analyses were indicative of genetic bottleneck events in the recent past. Genetic distance and geographic distance showed no significant correlation. Migration rates between the four regions were high showing maximum dispersal between Hemis-Leh and Kargil. Population genetic structure revealed one single population with high admixture in the region. This study provides a baseline for future comparisons since increased anthropogenic development projects may fragment this contiguous population. Genetic integrity and large genepools are essential for long-term viability of species especially in the advent of climate change and anthropogenic modifications. This study using genetic markers on the snow leopard exemplifies the use of this important tool for natural heritage management and conservation.