

Oryx

Monitoring mountain ungulates with camera traps

By Ranjana Pal, 29th April 2021

'We disturbed the camera position again,' said Vinod, my field assistant. With a deep sigh, Vinod sat down on a rock beside me. After a moment for pause, I took a chocolate bar from my bag, broke it in two, and shared it with him. We sat and ate in silence, gazing at the distant peaks. It was mid-morning in the cold desert valley of Gangotri National Park, in the Himalaya of northern India, and the blustery wind was lashing our faces. We could see clouds approaching from behind the peaks, most likely laden with snow. From our base camp it had taken us 3 hours to climb to this site at 4,800 m, where we were would be deploying a camera trap.



The bharal, also known as the blue sheep, is a caprid species, and is an important prey for snow leopards in the Himalayan region. Photo: Ranjana Pal

After that 5 minute break, I started looking for bigger rocks to build the stone pile where the

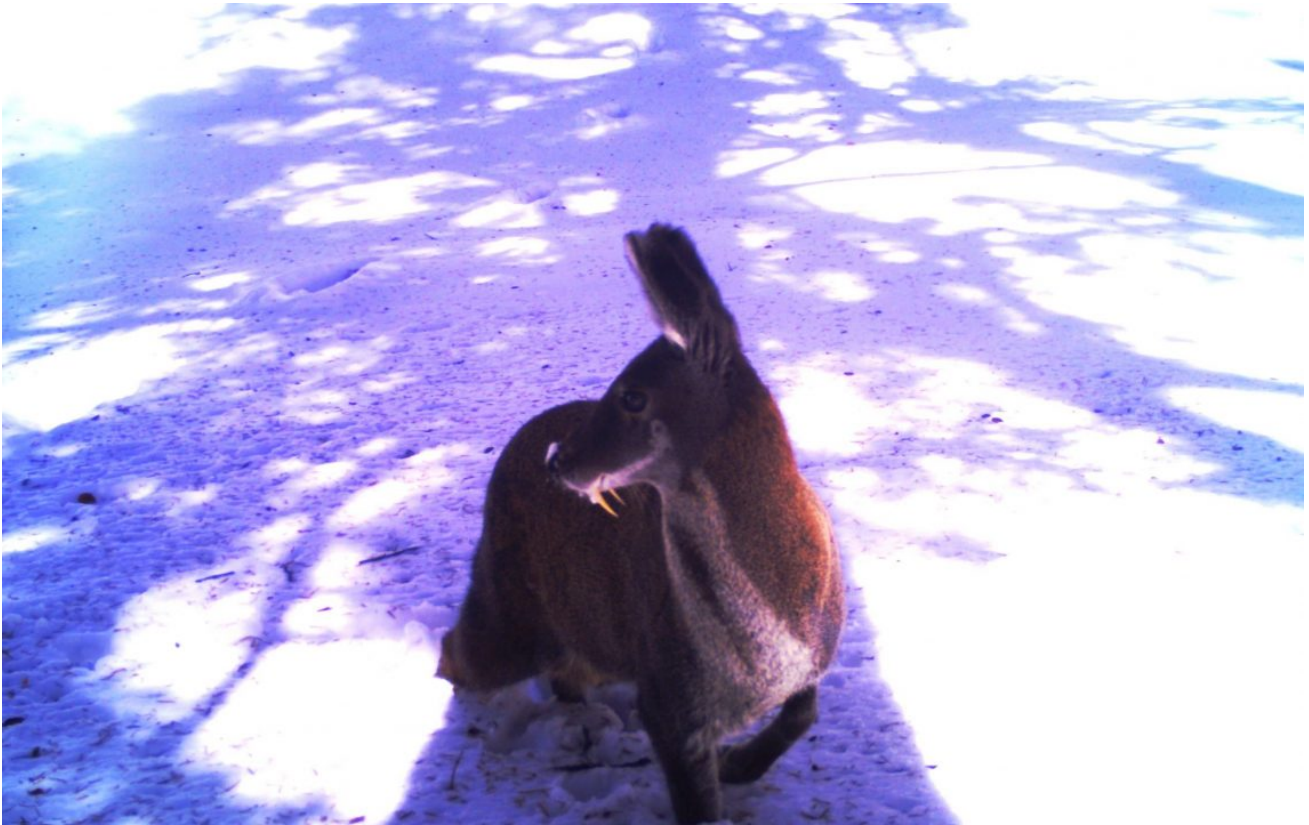
camera would be placed. Vinod joined the search. After positioning the camera, he picked up the calibration pole. We took photographs of the pole at different distances from the camera trap. With one hand sheltered in the warmth of his jacket pocket, Vinod struggled to hold the pole straight. I worked the camera, taking extra care not to move it.

This time-consuming calibration later helped us estimate the distance between the animals photographed and the camera trap. During this calibration we can only check images after removing the camera's memory card. Any disturbance to the camera's position can change the field of view and thus our efforts would be wasted.



Camera trap calibration in process. Photo: Ranjana Pal

The beautiful landscapes of these mountains are home to magnificent, rare species. In this part of India, wild goat and sheep are prominent in the diverse assemblage of mountain-dwelling animals. Described as mountain monarchs by George Schaller, these ungulates are adapted to survive in sub-zero temperatures, and take shelter in steep, rocky terrain. They are an integral component of the montane fauna and play an essential role in shaping this ecosystem. These species face several threats, in particular hunting for meat and sport, and disturbance, competition and disease transmission from livestock. The region's rugged terrain, harsh climate and the elusive and cryptic nature of these ungulates make it impossible to estimate their abundance using conventional approaches. Conservation practitioners and park managers continue to struggle to monitor these species and to assess the impact of conservation actions.



The Endangered Himalayan musk deer is a solitary deer-like ruminant belonging to the family Moschidae Photo: WII-DST-NMSHE

Camera trapping is an effective, non-invasive technique to study and observe wild species, and has been developed and integrated with several statistical methods. This tool has proved particularly useful for studying species that can be identified individually based on coat pattern, such as the tiger and snow leopard. Researchers from St. Andrews University and the Max Planck Institute for Evolutionary Anthropology have successfully integrated camera-trapping techniques with *Distance*, a popular statistical method to estimate species density. We explored the potential of this method to solve the difficult task of estimating the population of these mountain ungulates.

We used this technique to estimate the seasonal densities of the bharal *Pseudois nayaur* and the Himalayan musk deer *Moschus leucogaster*. Both species are declining across their range as a result of anthropogenic pressures. The bharal is a social species of the Caprinae subfamily. It is associated with alpine and steppe mountain pastures and subalpine slopes devoid of tree cover. The Himalayan musk deer is an Endangered, solitary deer-like ruminant. In the Indian Himalayan region, it inhabits subalpine habitats.



Left: The mountainous terrain makes the task of estimating abundance of mountain ungulates notoriously difficult. Right: Left unattended for long periods, camera trapping is an efficient method of studying elusive species. Photos: Ranjana Pal

In our [study](#) we demonstrated that Distance sampling with camera traps can be adapted to mountainous terrain to estimate the ungulate populations. This paves the way for a new analytical approach for studying mountain ungulates. An essential advantage of this approach over other techniques is that camera traps are better suited to monitor solitary, elusive, and nocturnal species such as the Himalayan musk deer.

However, despite these benefits, there are constrains such as the high cost of cameras and the considerable time required to process the resulting photographs and videos. Our density estimates for both the bharal and Himalayan musk deer were realistic, but were associated with high variability. This was probably caused by our limited number of camera traps, landscape topography and species herd behavior but could potentially be overcome by improving the sampling strategies. We hope that by discussing the issues we faced in using camera traps for distance sampling, and suggesting ways to address these for future studies, our research will help other interested in carrying out similar studies.



In addition to the rugged terrain, the harsh climate and inaccessibility have been major hurdles to studying mountain ungulates. Photo: Ranjana Pal

The open access article [Density estimates of group-living and solitary mountain ungulates using distance-based camera trapping](#) is available in *Oryx—The International Journal of Conservation*.



Ranjana Pal

Ranjana Pal is an ecologist and PhD Scholar at the Wildlife Institute of India, studying high altitude mammals of the Himalaya under the supervision of S. Sathyakumar. She is interested in studying the ecology of mountain mammals and promoting their conservation.