Shafqat Hussain Research Proposal for Pakistan

Full Text:

1. Introduction

Globally, the Snow Leopard is under threat of extinction or approaching a minimum viable population size. The 1996 IUCN Red List of Threatened Animals (IUCN, 1996) describes the snow leopard as Endangered. There are an estimated 3000-7000 animals left in the wild in the world. The main threats to snow leopards include habitat fragmentation, small isolated populations, decline in prey species and conflict with local farmers.

In Pakistan, the number of snow leopards are estimated to be 200 (Schaller, 1977). Of that, around 90% are estimated to be resident in the Northern Areas. These figures are from over twenty years ago, therefore, the actual current status of snow leopard population in Pakistan may be different. A long term study is overdue to assess the current status of its population and the magnitude of various threats to it. Very few studies have been conducted to look at the variables and factors associated with each kind of threat to the snow leopard population in the world. The lack of research into this means that the threats remain poorly understood both in terms of their effect on the snow leopard population and the factors behind the threats themselves.

Conflict with the local farmers which is a continued and visible threat to the snow leopard population in the Northern Areas of Pakistan is one such threat. Snow leopards often kill domestic livestock, thereby threatening the local farmers' livelihoods. The local farmers retaliate by killing snow leopards. The IUCN/SSC Cat Specialist Group (1996) describes retaliatory killing of snow leopard as a major threat to the future of the species. Studies from other regions of its home range have identified retaliatory killing as a major threat to the species. In two studies from Annapurna Conservation Area in Nepal and the Indian Himalayan, Oli (1994) and Mishra (1997) looked at the extent of hardships caused by and the perceptions of local people about the predation. They mainly looked at the magnitude of the conflict and its effects on conservation prospects for the future. They both suggest that for the future conservation of the species the conflict must be resolved.

Whereas both Oli and Mishra highlight the severity of the conflict and the exigency of action needed, they do not analyse the factors that causes predation. They mainly analyse predation with respect to its role in the conflict, i.e., how predation causes conflict. Their studies however, do mention commonly held, but so far untested (in the Himalayan region) factors of predation, such as decline in prey species, habitat fragmentation and poor livestock management practices. It seems that these factors have been borrowed from the studies carried out in other region on predators other than snow leopards.

Lack of research into these factors of predation for the Himalayan region has left us with poor understanding of the phenomena in the Himalayan region. While these factors do seem that they could be reasonably associated with predation at first glance, but without proper research, their status remains that of assumptions. Moreover, these factors as they are forwarded do not provide us with information on the processes through which they collectively and individually effect not only predation, but also each other. Rodney Jackson (1988) writes: To my knowledge, there are no studies examining the relationship between domestic loss rates, predator density, habitat quality and range or livestock management practices for Asian alpine ecosystems.

2.The Research design

To contribute towards the resolution of farmer/snow leopard conflict in the Himalayan region, a context specific understanding of the factors that cause predation will be carried out. A better understanding will be developed by analysing the collective and individual relationships of various independent variables that are mainly associated with factors such as status of prey species, habitat quality and herding techniques. A further understanding will be developed by analysing how these factors influence each other and which ones are more important that others in determining predation rates. Once the factors causeing of predation are analysed and understood, we will be in a better position to focus on them to reduce the predation rate and contribute towards resolution of the conflict and hence conservation of snow leopards.

A. Overall Aim of the Research

The overall aim of this research is to contribute towards a better understanding of the process of predation of domestic livestock by snow leopards in the Western Himalayan, the Karakoram and the Hindukush mountains region of Northern Pakistan.

B. Specific Aims

The specific aim of the research is to identify and analyse some of the main factors (independent variable) that cause predation of domestic livestock by snow leopards (dependent variable) in a village in the Northern Areas of Pakistan

C. Operational Aims

The operational aims of the research are to analyse three independent variables to see how they collectively and individually effect the killing of domestic livestock by wild predators. The research will also analyse how variation in each of these variables effects each other and the dependent variable, killing of livestock in a village.

The three independent variables that will be analysed are:

1   Topography
2   Status of prey species in the village
3   Herding techniques

D. Specific Data Needed for the Analysis

Data will be required for not only the three independent variables but also on the dependent variable. The data required for each of the four variables is listed below. This is not an exhaustive or final list data could be added to or removed from it.

1. Topography: altitude, slope, aspect, vegetation cover, terrain, temperature regime,

2. Status of prey species: mean density of prey species in the village area,

3. Herding technique: design of corrals, area of pastures, number and type of livestock, herd guarding mechanism, grazing pattern, gender and age structure in pasture management and physical livestock management,

4. Killing of livestock by predators: Number of yearly attack incidences in the last five years, number and type of animal lost in each attack, number and type of predator that attacked, relative geographical location of the attack, time of the year and day of attack, number of people who lost animals, size of the group, if applicable, which was attacked, eye witness account of the attack, if any,

In addition to the above, variables on village classification will also be used to see the effect. These variables include, village ethnicity, total household, and relative geographical and administrative position in the NAs.

Statistical Methods

This is a study that looks at multiple variables and their combined and individual effect on predation. The kind of variables that will be looked at are those that are commonly held factors of predation rate. The collection process of variables will then be naturally influenced by this preconceived notions of association. Also data collection on variables is made easy once they are structured under broad categories/types/factors. It must, however, be mentioned that these variables will be grouped in the beginning only to structure and ease the data collection process. It may turn out after the analysis that variables thought to be belonging to a factor in the beginning does not belong their, but in fact it correlates with variables from other categories to reveal a new factor. The main techniques that will be used for analysis are multiple regression, factor analysis and cluster analysis.

Multiple regression will be used by regressing the variables of status of prey species, topography and herding techniques against predation. It will be more difficult to regress herding technique against predation as it will be difficult to obtain quantitative data on herding techniques. But it will tried out during the questionnaire testing process to develop an index of herding technique (as in the case of topography to give a habitat type) and then regress it against predation.

The multiple regression will be the first test that will be used. The multiple regression results will isolate the independent variable one by one and will show us the correlation coefficient of each of them with the dependent variable predtaion. This correlation will essentially mean that how much each variable contributes to the explanation of the predtaion. Furthermore the results will also be produced in a manner that will show how much of the variance in predation is explained by all the independent variables.

The advantage of running the multiple regression as a first test is that before proceeding on to do more sophisticated statistical tests, an initial familiarity with the significant of different variables is established. Furthermore it may feasible after the regression results to discard some of the non-significant variables from later tests to make the results more robust. Multiple regression, however, is a heuristic test, i.e., it is exploratory in nature. In order to see the causal relation between the three main independent variables and predation rate more analytical test will be used mainly factor analysis.

Factor Analysis will be carried by first looking at the correlation matrix of independent variables and their sub-groups. Using factors analysis variables that are highly inter-correlated will be grouped together. This will show how structured and important the underlying dimensions of the process are. Through rotation and oblique rotation underlying dimension will be further refined to be classified as factors.

In this research it is hypothesised that predation will come out as a three dimensional structure with all three dimensions accounting for more than 80% of the variation in predation rate. The hypothesis test will establish that predation of domestic livestock by snow leopards is caused by decline in the number of snow leopard prey species, lax herding techniques and improving habitat quality of the snow leopard.

Cluster analysis will be carried out mainly to use the results of factor analysis and multiple regression to cluster the villages into different categories of risk from predation. This may also provide us with the opportunity to verify the results and help better define/better identify characteristics of a high risk village in the region.

Missing data:
Missing data can be generated through regression but in regression variables are tend to overfit (since regression is best fit) so some of the factors that are formed, during factor analysis may seem manufactured.

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