

## LEOPARD DISTRIBUTION IN RELATION TO HUMAN PRESSURES AND PREY RESOURCES IN NORTH KHORASAN PROVINCE, IRAN

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### Abstract

The study aimed at identifying leopard-livestock conflict hotspots in the North Khorasan Province for the Persian leopard conservation and management programs. Camera trappings, tracking (i.e. footprints and faeces), systematic interviews with local communities were used. The most suitable leopard habitats in the province are found in the southern portion of Maneh and Samalghan, Bojnourd, and the northern parts of Jajarm and Esfarayen Townships. Among the four wildlife species found in human-related conflicts which are the leopard, wolf, wild boar and Indian crested porcupine, leopards were responsible for 10.6% of the total conflicts studied. Complaints from the local communities were mostly with regards to damages rendered by wild boar and porcupines, and livestock depredation by wolves. Local community awareness about compensation programs currently conducted by the Department of Environment and the introduction of livestock insurance regulations might effectively reduce and prevent leopard revenge killings in the region.

Keywords: leopard-livestock conflict, habitat, Persian leopard

### INTRODUCTION

The main population of Persian leopards in the Middle East are known to be found in Iran (Kiabi *et al.*, 2002; Habibi, 2004; Khorozyan *et al.*, 2005; Lukarevsky *et al.*, 2007). This population possibly supports the viability of their survival in the neighbouring countries (e.g. Armenia, Azerbaijan, Turkmenistan, and Turkey) through transboundary migration (Khorozyan and Abramov, 2007). However, recent studies suggest that development, habitat destruction and fragmentation, illegal hunting, poaching, animal husbandry and livestock present in protected areas threaten leopard survival in Iran (Sanei, 2007; Sanei and Zakaria, 2008; Ghoddousi *et al.*, 2008 and 2010). In addition, the depletion of leopard preys is also a cause of threat for the leopard population. The Persian leopard mortality from 2007 to 2011 is about 70% due to poisoning and deliberate hunting in the country (Sanei *et al.*, 2012).

## MATERIALS AND METHODS

### Data collection

Secondary data regarding human/livestock-leopard conflicts, observations, mortalities and prey annual census in the region were obtained from records kept in the Department of Environment. For the entire province, grid cells of 12 km x 12 km were established for questionnaire survey and interview conducted with the local communities to identify livestock-leopard conflicts and matters pertaining to wildlife disease and awareness of local people about compensation and insurance programs. In major conflict areas, the sites were then divided into grid cells of 3 km x 3 km where systematic camera trappings were carried out to further investigate individual livestock - leopard conflict issues.

### Data Analysis

The MAXENT software was used for modelling the distribution of potential leopard habitats in the region. The ArcGIS Ver. 9.3 was used for mapping taking into account 17 variables (11 natural and 6 human). In conjunction with the use of MAXENT, the Jackknife and AUC tests were used to determine the contribution of the environmental variables to the distribution of leopard habitats.

## RESULTS AND DISCUSSION

### Secondary Data

The potential Persian leopard habitats in the North Khorasan province are found in a near linear pattern crossing of Sarigol, Salouk and Ghorkhod, Darkesh and Haver, and the eastern parts of Golestan NP (Figure 1). In the analysis of environmental factors contributing to the leopard distribution model in the study region, slope (34.5 %), geology (25.5 %), climate (15.9 %), presence of villages (8.9 %), elevation (5.2 %), vegetation types (4.9 %), land use (2.2 %), protection status of habitats (2.2 %) and annual rainfall (0.2 %) are the most relevant.

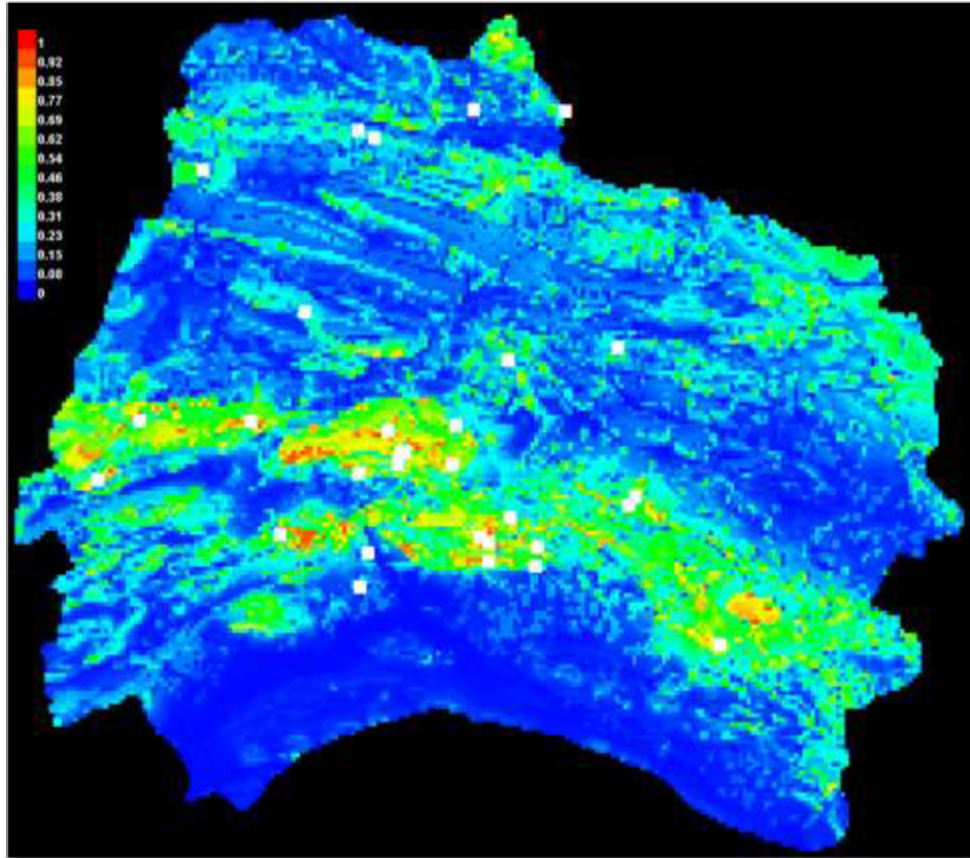
Previous studies indicated that the size and protection level of protected areas as well as the presence of wild goats and wild sheep are correlated with leopard presence (Sanei *et al.*, in press). Generally, the southern parts of Maneh-Samalghan and Bojnourd Townships, and northern Jajarm and Esfarayen Townships have the most suitable leopard habitats in the region. In addition, the main leopard preys were mostly recorded in Esfarayen Township followed by Golul - Sarani and Ghrokhod protected areas.

A total of 25 % of all human/livestock-leopard conflicts were recorded in Jajarm, 7.6 % in Shirvan and 10 % in Bojnourd Townships. Questionnaire surveys carried out in 22 villages across the region suggested that 21.4 % of the interviewees have livestock insurance. Although leopards were found to be responsible for about 10.6 % of all wildlife conflicts, the lack of knowledge among the local communities on insurance and compensation led to increased revenge killings by the local people.

### Primary Data

At the local study site level, camera trappings in the non protected areas of Dehghah and Rein detected only one leopard individual out of 1,041 camera trap nights. In Salouk NP, 3 individuals were detected.

Since livestock guard dogs can significantly reduce livestock-carnivore conflicts, several villages were identified for breeding guard dogs as a measure to control leopard intrusion in conflict hotspots.



**Figure 1.** Distribution of Persian leopard potential habitats in North Khorasan province, north-eastern Iran. Darker blue show less habitat suitability and subsequently less chances of leopard presence in the area. Light colours show suitability of habitats and higher probability of leopard presence in the region. White squares are leopard presence areas used for modelling (taken from Sanei *et al.*, 2012).

## CONCLUSION

The most suitable leopard habitats in the province are found in the southern portion of Maneh and Samalghan, Bojnourd, and the northern parts of Jajarm and Esfarayen Townships. With regards to the human/livestock – leopard conflicts, local community awareness about compensation programs and livestock insurance might effectively reduce and prevent leopard revenge killings in the region, a major problem in north-eastern Iran.

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