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A brief study on the true freshwater crab *Potamon ibericum* (Bieberstein, 1808) absence downstream of Kasilian River, Mazandaran, Iran

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1. Introduction

The Hyrcanian forests, located in northern Iran, are a biodiversity hotspot and host a wide variety of living organisms. These forests provide favorable environmental conditions and are crisscrossed by numerous rivers, creating an ideal habitat for the *Potamon ibericum* freshwater crab. However, with increasing human population and expanding residential areas, the downstream habitats of this species are under threat. In this study, we investigate the relationship between the presence of *P. ibericum* and both human activities and environmental factors.

2. Materials and methods

- The study was conducted along the **Kasilian River**, in Mazandaran province, Iran. This area was selected due to the proximity of the forest and river to human settlements.
- Crab presence was monitored across **eight periods** throughout the year, recording the location and number of observations.
- Topographical variables, including **slope, aspect,** and **elevation**, as well as **vegetation** data, were obtained using Google Earth Engine.
- Other environmental variables, such as **livestock farms, poultry farms, orchards, agricultural lands, human settlements, the presence of heavy machinery**, and **hooded crow** sighting points, were mapped in ArcGIS Pro.
- The **Species Distribution Modeling (SDM)** tool in the R environment, along with 4 machine learning algorithms, **SVM, MLP, GLM**, and **GAM**, was used to analyze the relationship between these variables and the distribution of *P. ibericum*.

3. Results

The results indicate that human activities have the most significant impact on the distribution of *Potamon ibericum*. In particular, **areas with heavy machinery pathways, human settlements and poultry farms showed an absence of the species**, suggesting that the crab has **retreated to upstream locations**, avoiding these disturbed areas. Additionally, **temperature** was found to be a key environmental factor influencing the species' presence, with the highest number of crabs observed in **temperature ranges between 20 and 28 degrees Celsius.**
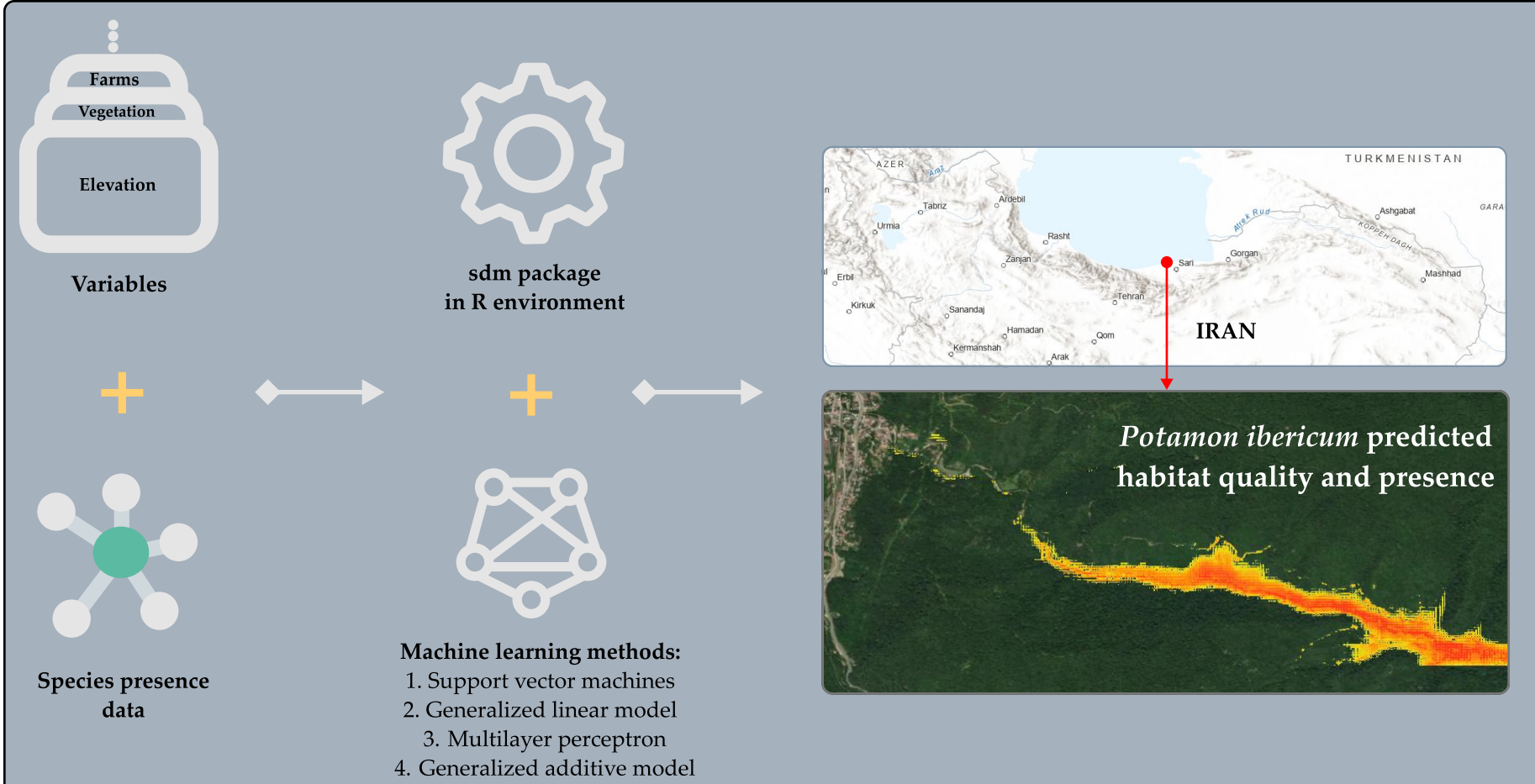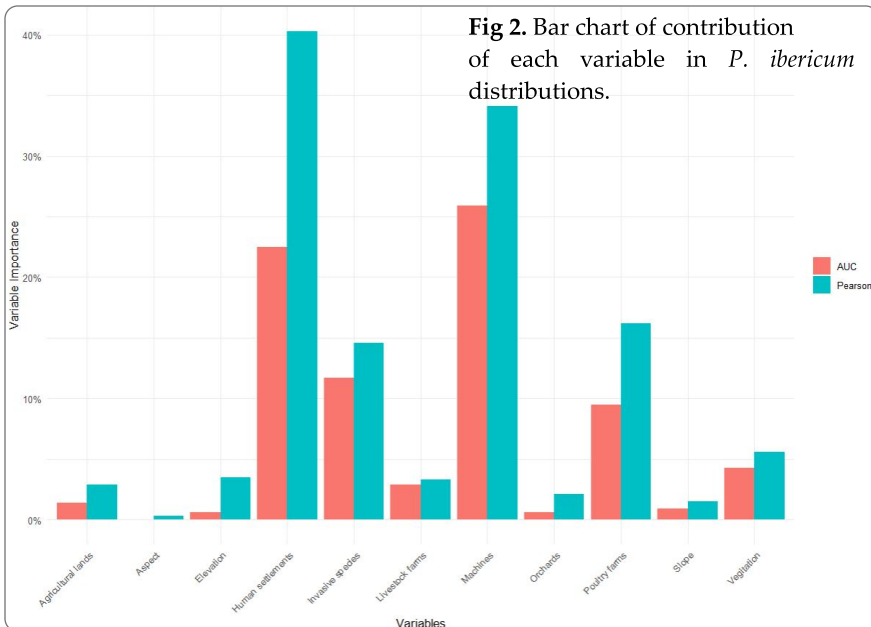

Fig 2. Bar chart of contribution of each variable in *P. ibericum* distributions.

Fig 1. *Potamon ibericum* distribution modeling process and ensemble reults.

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Potamon ibericum predicted habitat quality and presence

Variables
Farms
Vegetation
Elevation

sdm package in R environment

Species presence data

Machine learning methods:
1. Support vector machines
2. Generalized linear model
3. Multilayer perceptron
4. Generalized additive model

4. Conclusion

The lack of proper monitoring and management of human settlements and activities near forested areas has a significant impact on biodiversity. These activities often negatively affect habitat suitability, leading to disruptions in species distributions. Our modeling results show that *Potamon ibericum* has primarily lost its habitat due to human activities in areas where the species was once expected to thrive. Therefore, it is crucial to implement better management practices to mitigate these negative effects, rather than allowing human factors to exacerbate other environmental challenges.