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Impact of climate change on *Fritillaria zagrica* distribution in the Zagros Mountains, Iran

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INTRODUCTION & AIM

Ongoing climate change affects the phenology and physiology of organisms, species distribution, community interactions, and ecosystem structure. Mountain ecosystems are highly vulnerable to climate change, as global warming can lead to ecological imbalances that affect specific plant species, especially rare or endemic ones. We still lack a complete understanding of the distribution of many of these plants and the environmental factors that affect their distribution. This makes it challenging to develop effective conservation strategies. Considering the importance of *Fritillaria zagrica* in flora of Iran (Rix 1977, Kiani et al. 2017), it is essential to conduct species distribution modeling to safeguard this valuable plant species and offer management solutions.

METHOD

In this study, we developed a maximum entropy model (MaxEnt) to predict the present and future ranges of *Fritillaria zagrica* (*F. zagrica*) under two representative concentration pathways (RCP 4.5 and RCP 8.5) for the 2050s and 2070s.

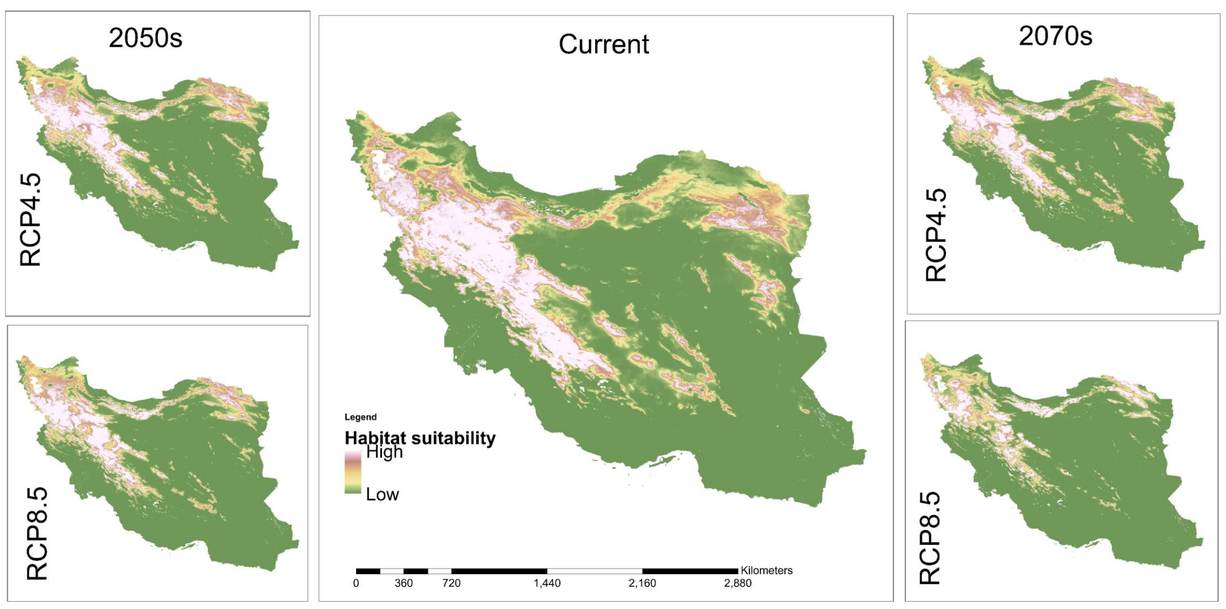

Fig. 3. Map for potential current and future habitat suitability of *F. zagrica* in Iran

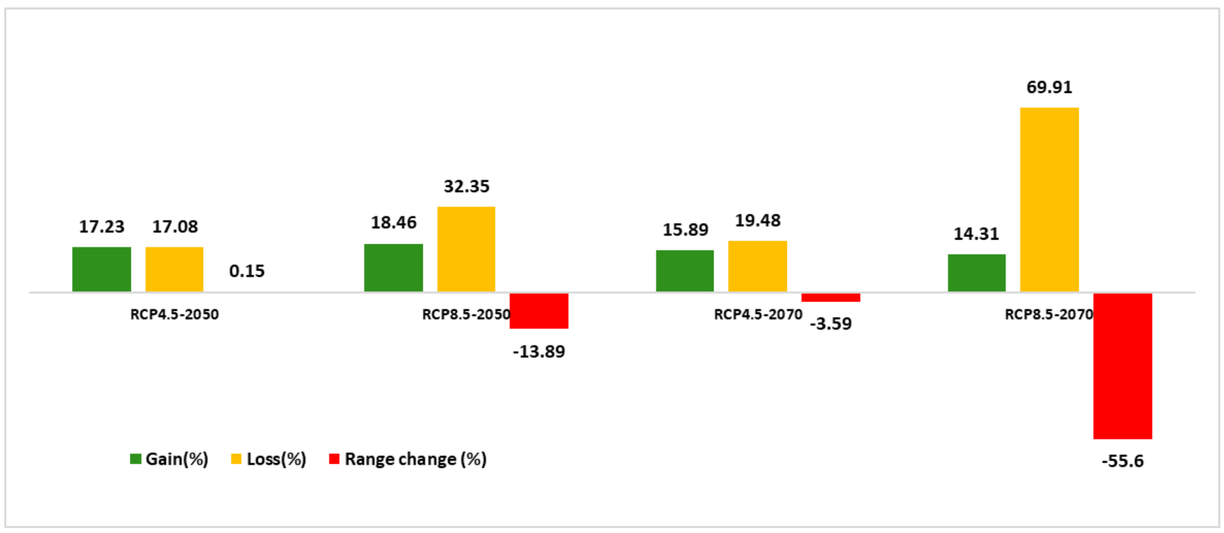

Fig. 4. Percentage of the gain, loss, and range change of *F. zagrica* under greenhouse gas emission scenarios of the 2050s and 2070s.

RESULTS & DISCUSSION

Fritillaria zagrica is a unique dwarf species found in the Zagros Mountains of Iran, and it typically thrives at high altitudes as a snow-melt species (Fig. 1). According to the findings of this research, the performance of the prediction model was excellent, with an AUC of at least 0.9. The results indicated that the mean temperature of the coldest quarter (Bio11), precipitation of the driest month (Bio14), and temperature annual range (Bio7) were the most significant factors influencing the distribution of *F. zagrica* (Fig. 2). Based on the projections, it is expected that *F. zagrica* will undergo negative changes in its range in all the aforementioned climatic scenarios, except for RCP 4.5 in the 2050s (Figs. 3 and 4).

Fig. 1. *Fritillaria Zagrica* Stapf., Photographed by A. Zeraatkar

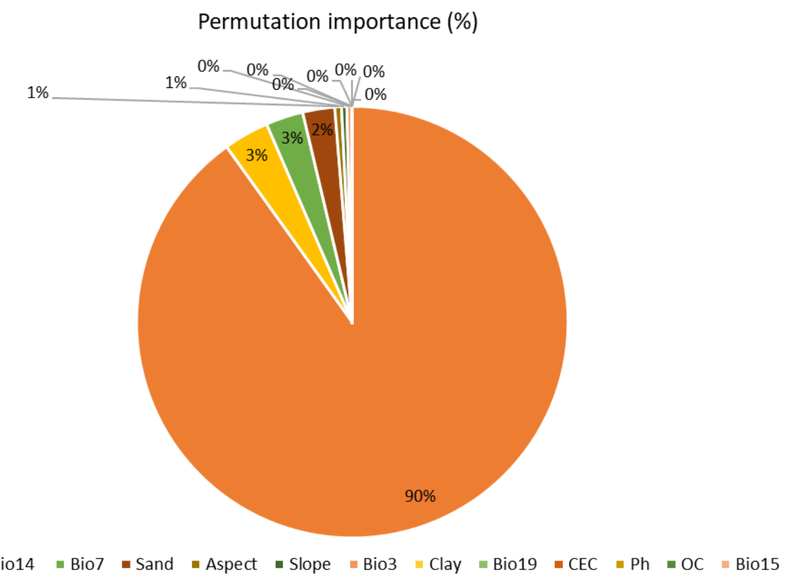

Fig. 3. The percentage of permutation importance for environmental factors used in SDM of *F. zagrica* in Iran

CONCLUSION

The findings can be a valuable resource for developing adaptive management strategies to enhance the protection of *F. zagrica* in response to global climate change.

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