Future climatic refugia in the Mediterranean Europe

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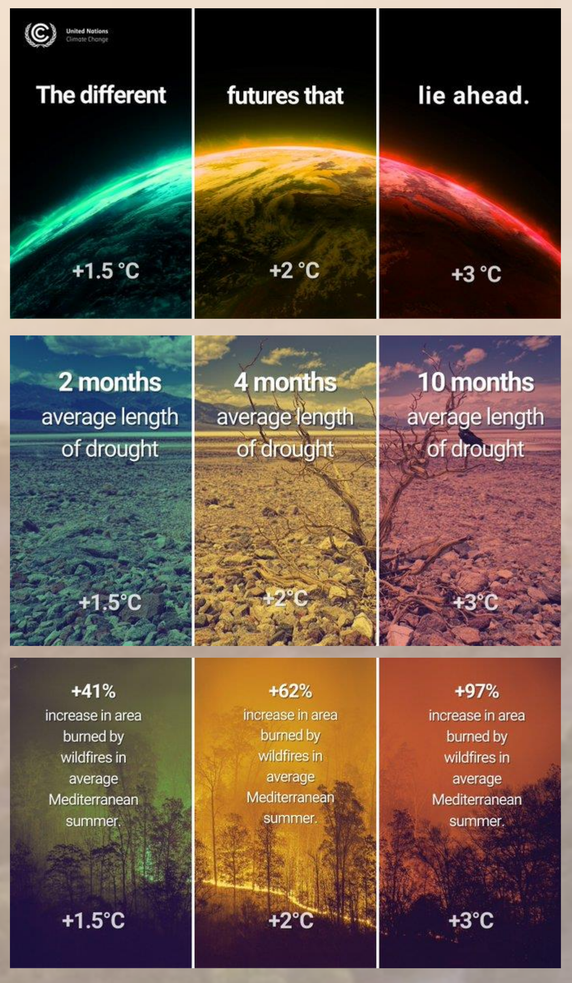
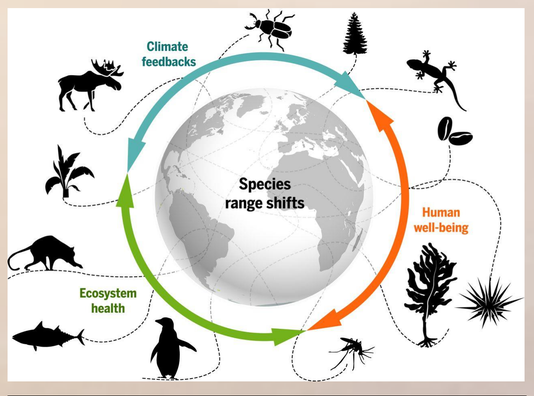
○ CONTEXT

Various scenarios of climate change [1]





Climate change has multiple impacts on biodiversity, jeopardizing the efficiency of static protected area networks at the global scale [2,3]

○ AIM- METHODS

Aim: To identify which areas could serve as climatic refugia of local biodiversity in the future under different scenarios of climate change [4]

Case study : The Euro-Mediterranean biome

Climate analog velocity algorithms [5]

Analogs when : $ED_{i,j} \leq ED_t$

$$ED_{i,j} = \sqrt{\sum_{k=1}^{m} (\overline{x}_{k,i} - \overline{x}_{k,j})^2} \text{ and}$$

$$ED_t = \sqrt{\sum_{k=1}^{m} (\overline{x}_{k,i} - (\overline{x}_{k,i} + 1.5 * MAD_{k,i}))^2} = \sqrt{\sum_{k=1}^{m} (1.5 * MAD_{k,i})^2}$$

i and *j* are the baseline and future cells, *m* is the bioclimatic variable and $\overline{x}_{k,i}$, $\overline{x}_{k,j}$ are the corresponding (baseline and future) mean of each variable

Rao's quadratic entropy index [6,7]

$$Q = \sum\sum d_{ij} * p_i * p_j$$

Systematic conservation planning algorithms [8]

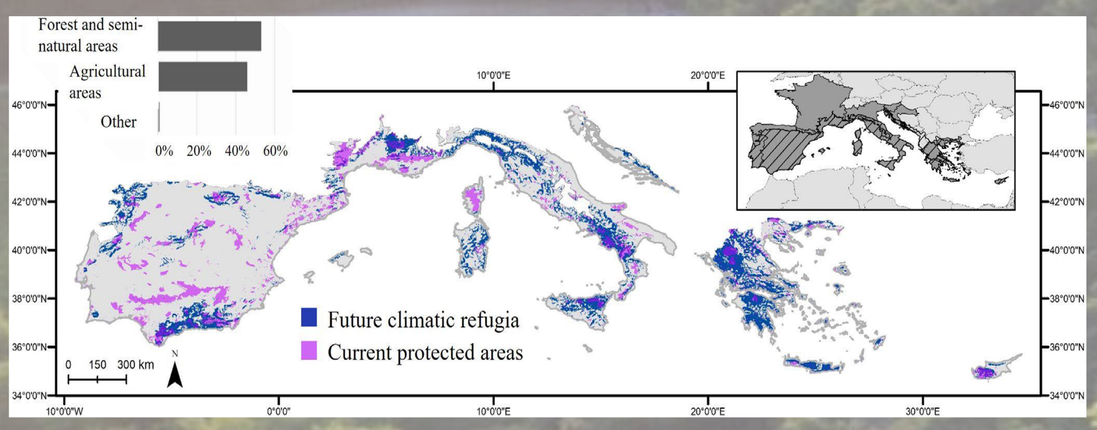
We identify potential future climatic refugia that have two important properties: (i) low climatic velocity, and (ii) high spatial climatic heterogeneity [7,9]

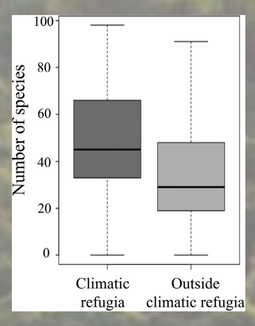
○ CONCLUSION

- Mediterranean mountainous areas will probably show high climatic velocity within the next 50 years, while mid-altitude areas will more probably host climatic refugia
- Highly rugged areas, such as gorges, will probably provide favorable conditions, serving as biodiversity refuges, even in low altitudes.
- Climatic refugia in Greece, Italy and the south-eastern part of France can be considered as "low-regret" climatic refugia, under both high and low emission scenarios

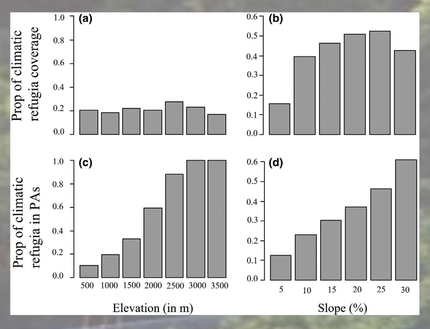
○ RESULTS

East Mediterranean countries had the highest proportion of climatic refugia [10]





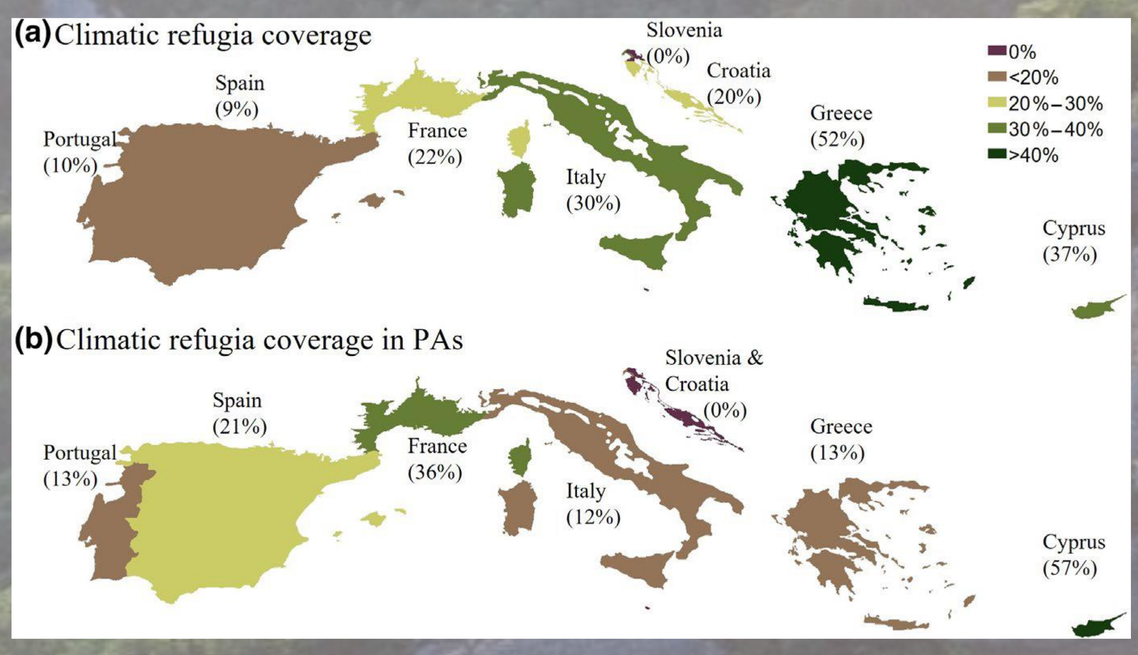
Future climatic refugia were generally located in areas with high tree species richness [11,12]



Protection gaps : The proportion of climatic refugia located inside existing PAs increased over altitude and slope, but less rugged and low to mid elevation climatic refugia overlapped to a much smaller extent with existing PAs [10]

○ RESULTS

The current protected area networks capture future climatic refugia only partially and disproportionally across countries [10]



Protection gaps : Greece has the highest coverage of climatic refugia in the Mediterranean Europe but one of the lowest percentages of climatic refugia under protection [10]

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