

Can we define effective conservation priorities for evolving systems? Mediterranean Basin as a training area

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BACKGROUND

Interspecific hybridization is one of the most controversial—and usually neglected—issues in conservation due to its multiple evolutionary consequences that might include the origin and transfer of adaptations, the blur of distinctive lineages or the formation of maladaptive hybrids.

However, despite the possibility of multiple outcomes, hybridization and hybrids itself are considered a threat to the persistence of parental species, despite their potential role under climate changes. Furthermore, IUCN specifically states that hybrids cannot be elected for Red List assessments.

Here, we assessed how much hybridization has contributed to species extinction considering all IUCN Red Data assessments. Because hybridization is stated as a threat by IUCN, we assumed its prevalence on a high number of assessments.



Example of a hybrid taxa not elected for protection according to IUCN guidelines.

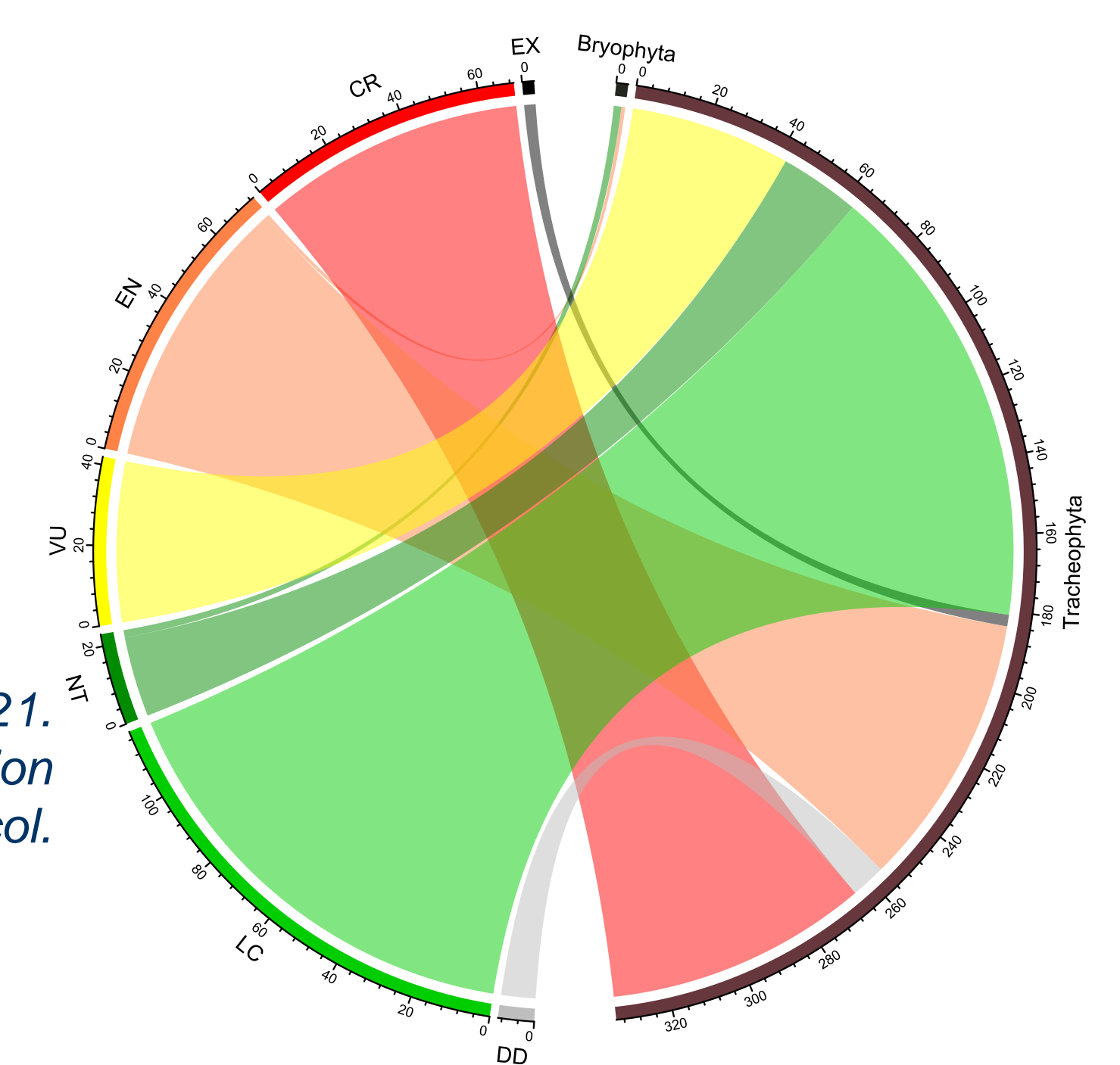


How Many Plant Species Went Extinct Because of Hybridization?

- From the 43556 global IUCN Red List assessments, 337 (0.07% of total) of them mentioned hybridization. In relation to extinct species, hybridization was mentioned on 3 evaluations of extinct species.
- Altogether, results showed that hybridization has been involved in species extinctions less often than thought, at least within the ones mentioned in IUCN assessments.
- Numbers within IUCN might even be lower because hybridization is not categorized independently in the classification scheme of IUCN threats since it also includes harmful plants, animals, or pathogens and other microbes. However, the reality could also be quite different as the direct genetic frequency of hybridization is not being measured.

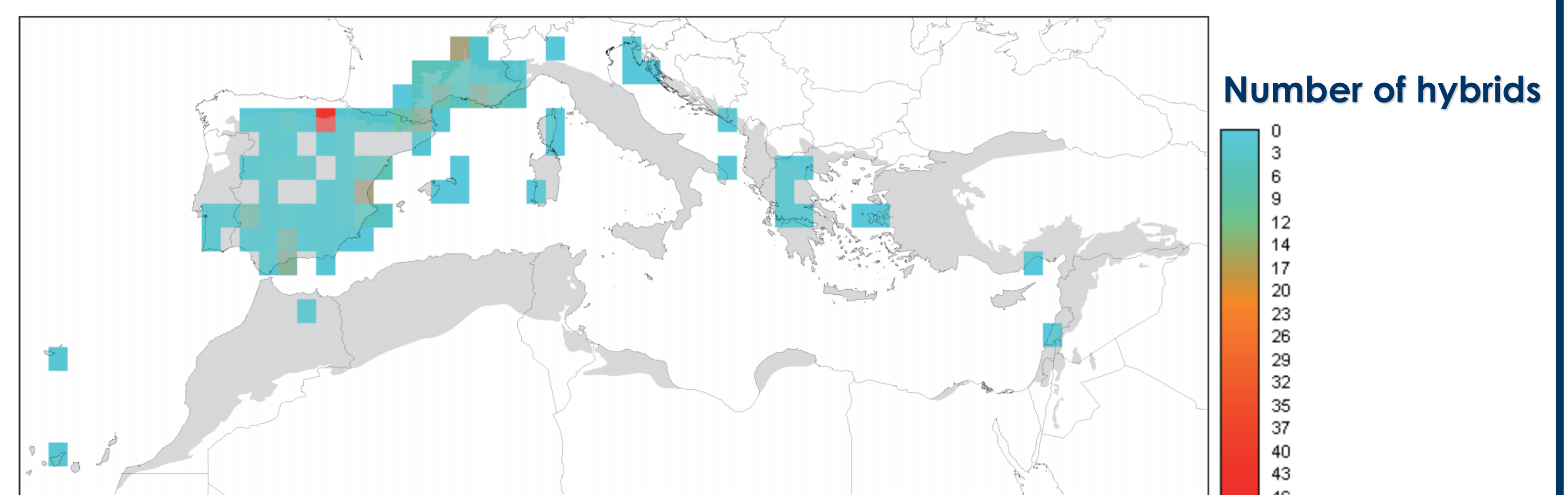
	Bryophyta	Tracheophyta
EX	0	3
CR	0	69
EN	1	72
VU	0	42
NT	2	21
LC	0	118
DD	0	9

Based on Draper, D, Laguna, E, Marques, I. 2021. Demystifying Negative Connotations of Hybridization for Less Biased Conservation Policies. *Front. Ecol. Evol.*, <https://doi.org/10.3389/fevo.2021.637100>



HOW ARE NATURAL HYBRIDS DISTRIBUTED IN THE MEDITERRANEAN BASIN?

- The Mediterranean region is a biodiversity hotspot where geological and climatic events have created numerous opportunities for speciation through hybridization. Still, our knowledge on its frequency and distribution is largely limited.
- Despite the paucity of available information, we found several biases while searching the GBIF database, that highlighted the lack of general information concerning the presence of hybrids in most Mediterranean countries.
- A large number of plant hybrids have been recorded in some countries of the western Mediterranean Basin (e.g. Spain, France). In contrast, only a few available public records are found in the eastern Mediterranean area and along the whole North African coast, despite such low numbers being hardly realistic.

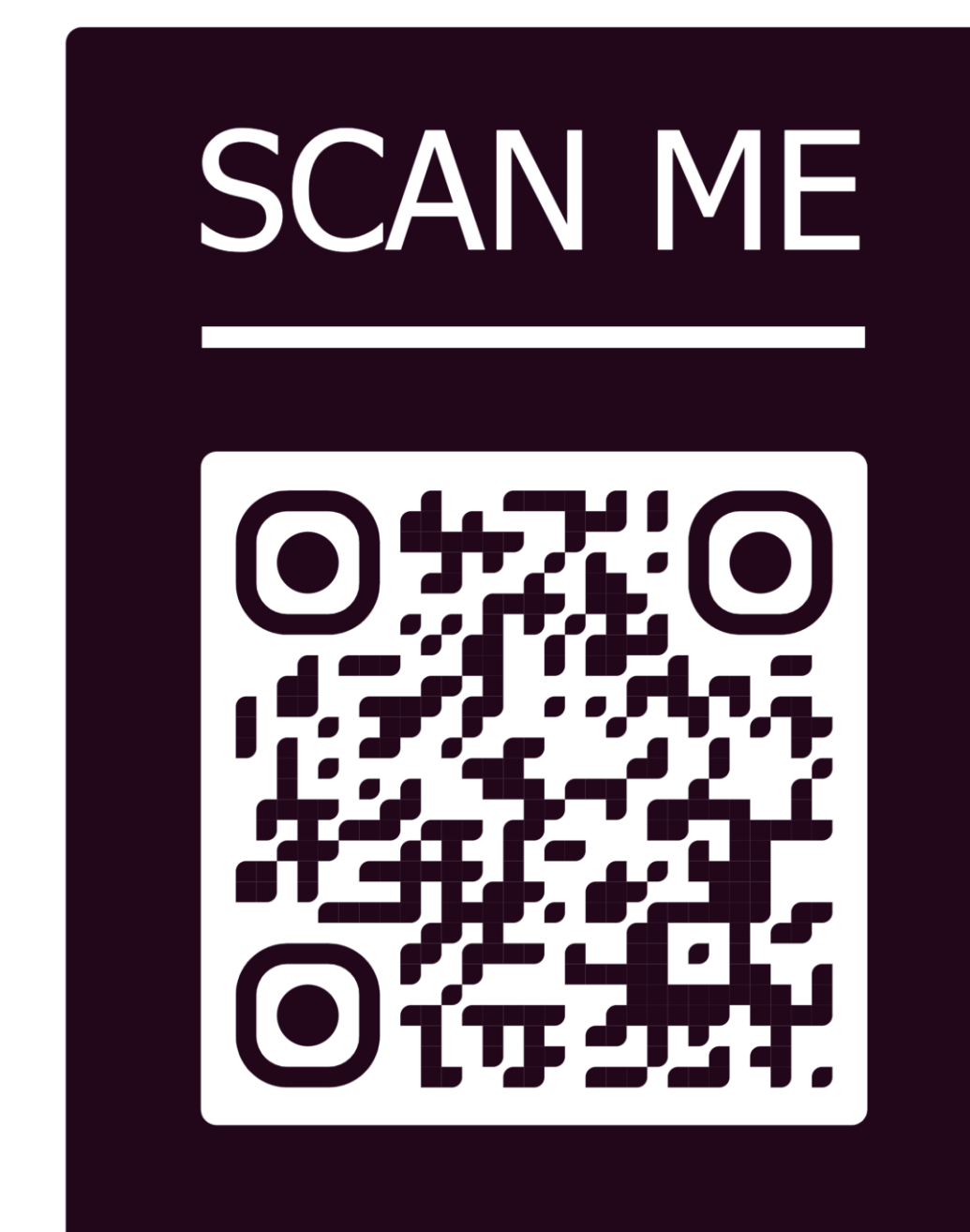


Marques, I, Loureiro, J, Draper, D, Castro, S. 2017. How much do we know about the frequency of hybridization and polyploidy in the Mediterranean region? *Plant biology* 20 (S1): Pages 21-37. <https://doi.org/10.1111/plb.12639>.

Where Do We Stand in the Future of Hybrids in Conservation or Assessment Lists?

- Although the causes that contribute to species extinctions should be controlled, the reasons for not conserving hybrids seem subjective rather than empirically supported.
- In the wide set of impacts of global change on biodiversity, it seems clear that hybrids should neither be neglected, nor should they all be selected for protection. However, there has been little progress in advancing this issue.
- Considering the large evidence supporting the presence of hybrids, the debate dealing with the conservation of hybrids should be re-opened. In what circumstances should hybrids be considered a threat and in what circumstances should they be protected? The resolution of this debate goes to the heart of what we mean to conserve and the time scale of conservation.
- However, hybridization is part of the evolutionary process and might even increase in the future due to human-induced changes. As such, it becomes clear that we need to move beyond the causes and instead tackle the consequences of hybridization to create environmental policies for the management of hybrids, considering both positive and negative consequences.

TO FIND MORE INFORMATION



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Funded by Fundação para a Ciência e a Tecnologia in the frame of the project UIDB/00329/2020 (cE3c), UIDB/00239/2020 (CEF) and the HyAdapt project (2022.01458.PTDC). Isabel Marques is funded by the 2021.01107.CEECIND/CP16 89/CT0001