Definition of a micro-reserve for endangered *Narcissus cavanillesii* in Portugal

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Summary

Selecting a particular area with the purpose of conserving a species or a population is a huge challenge. Population dynamics and ecological plant requirements must be taken into account. In addition, it is important that the selection of the site considers what we know and also what may be relevant to know, but still misunderstood. Present conditions and the future evolution of these conditions should also be considered.

The selection of a micro-reserve in Portugal for a translocated population of *Narcissus cavanillesii* is discussed taking into account 4 years of population survey. Using a multidisciplinary approach, all information compiled is used in the delimitation of this micro-reserve.

Why a Micro-reserve for *Narcissus cavanillesii*?

The only two plant localities of *Narcissus cavanillesii* A. Barra & G. López recorded in Portugal were going to be affected by the construction of the Alqueva dam, in the Guadiana basin. One of the localities was going to be completely flooded and the other will be affected by changes in habitat and in human activities. Therefore, a translocation was performed (2001) as part of a series of mitigation activities oriented to minimising the impact of the dam (Draper *et al.*, 2001).

N. cavanillesii is listed in EU Directives (Habitat Directive - 92/43/CEE).

How is a Micro-reserve Selected?

Following Laguna *et al.* (2004), the selection is based on the taxonomic status, species distribution, ecology, population dynamics and threats assessment. Once a target species is defined, it is necessary to find an area to be protected.

The small reserve is selected according to species distribution and endemic species hotspots. The delimitation is carried out considering vegetation types, arable land, land ownership and Natural Protected Areas.
The micro-reserve is meant to be as large as possible whenever land is available around the area of occupation of the population of the target species.

Considerations to the selection method

The main consideration is on the long-term population dynamics. If one of the purposes is long-term conservation, the delimitation of small areas needs to be precise and accurate in order to ensure not only present conservation but also the future development of the population, as well as that of the surrounding areas.

In this context present species area distribution may be accurately documented, but present conditions may not be at their optimum situation for target species. Furthermore, including surrounding areas into a micro-reserve does not necessarily ensure the ecological needs for plant population development. In some cases, for instance, the best places may be found in isolated patches occurring nearby. A final consideration is the need to have into account that the smaller the area selected is, the risk of any mistake in area selection is larger.

According to the background information about the target population and considering that: we know the species distribution, we can obtain the ecological envelope of the population. The envelope of the population can be used to select which areas have the same environmental

conditions and are suitable for a small area reserves network. The main factors that explain species distribution as well as the constraints can be also modelled.

The main modification that is suggested to the selection method is to join all the knowledge to optimise the area selection and to generate predictive distribution models in a GIS environment in order to define the ecological range and assess the habitat value of the surroundings of the target population.

Micro-reserve selection for *N. cavanillesii*

The quantity and quality of information needed is different depending on two levels: site selection and the delimitation of the micro-reserve. We have been using in the first level the data that represents as best as possible the species distribution, including taxonomic information and ecological factors. A habitat suitability model has been created based on these data sets. This suitability model provides information on where the plant will find favourable conditions but cannot tell if land use or some other local characteristics are appropriate.

Final delimitation

Once the suitability model has been obtained, it was necessary to accurately delimit the area in the field. Several additional factors (population dynamics, plant-animal interactions, main threats...) that had not been used to build the suitability model should be considered at this stage.

Using most of the existing particular information about the Portuguese populations (base-line information) the following premises were taken into account:

- To maximise the common soil cover profile (fig 1).
- To optimise positive interactions (pollinators, dispersors,...).
- To minimise negative interactions (predators, threats,...).
- To favour the presence in a protected area.
- To favour the possibility of agreement with owners.
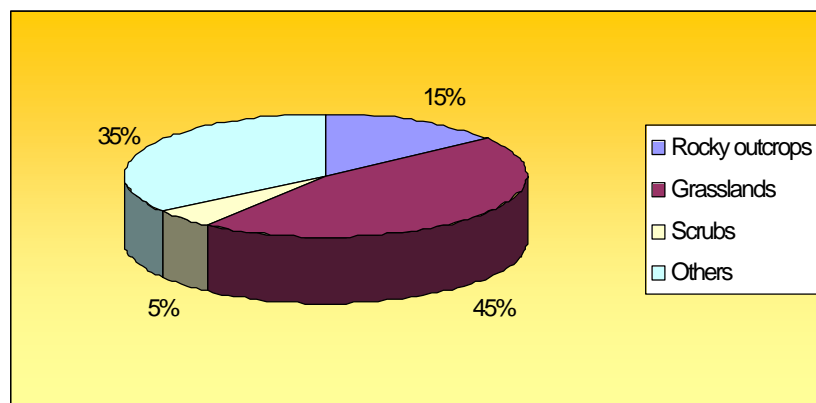- To look for areas of sustainable development.

Figure 1. Types and frequency of land cover of Iberian populations of *N. cavanillesii.*

Based on highly accurate digital cartography, the areas selected for the micro-reserve were finally delimited to a total 6.5 ha. including the most suitable places surrounding the *N. cavanillesii* populations and also the premises defined above. The resulting area selected is illustrated in Figure 2.

A final consideration

Implementation of suitability models in the selection of protected areas requires data of a minimum quantity and quality. However, this requires time and it may not always be possible to fill the gaps of knowledge. In these cases the application of common sense based on existing information may be the only alternative.
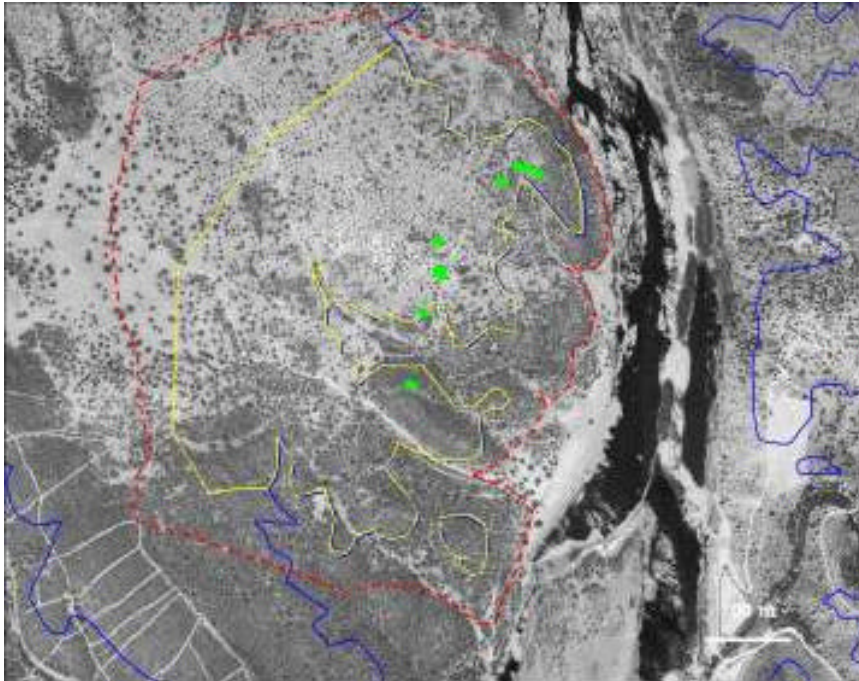

Figure 2. Green dots indicate the *N. cavanillesii* plots. Yellow lines show suitable areas for the species and red lines the final delimitation of the reserve.

References

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