



# Proteas, land use change and climate change in the Cape Floristic Region

## How global change affects threatened plants at the southern tip of Africa



### Problem

Threatened species are commonly classified according to **IUCN Red List categories and criteria**. Although the criteria allow for future threats to be included in Red List assessments, to date they rely mostly on past population processes and present distribution patterns of species and, thus, the question remains: **Are they useful for protecting biodiversity against future threats?** To estimate how many species could be affected by future threats that are commonly not included in current Red List assessments, I investigated:

**How does the threat status of 227 Proteaceae taxa endemic to the Cape Floristic Region (CFR) change as a result of land use change and climate change predicted for the year 2020?**

### Methods

Four future scenarios were developed for the year 2020 using spatial predictions of land use change and climate change. Two scenarios include only the effects of land use change with a minimum and maximum rate of potential habitat loss (Fig. 2a), while the other two scenarios also include the effects of anthropogenic climate change (HadCM2 IS92a GGa), using niche-based models. For all species a Red List status including future threats was compared to a Red List status excluding future threats, using the IUCN Red List categories and criteria. The distribution of Red List species was mapped (Fig. 2b-d).

### Results

Potential changes in Red List status resulting from the inclusion of future threats:

- Up to 30% of the species could be 'uplisted' by up to 3 threat categories
- Proportion of threatened species could rise by 2% to 16% (Fig. 1)
- Ca. 2% of the species could become Extinct due to climate change
- Current Lower Risk species could become Critically Endangered species
- Not all species and areas are affected equally by future threats (Fig. 2)
- Climate change has potentially more severe impacts than land use change

### Discussion

My results are a first estimation of the 'shadow extinction risk' from future land use change and climate change that is commonly not included in current IUCN Red Lists. Lack of data and legal implications may be reasons for not including future threats in current Red List assessments. **Such information is however vital** for identifying species and areas of future concern; prioritising for modelling, monitoring and planning; identifying causes of future 'uplistings' and appropriate actions; and developing early warning systems.

Figure 1. Red List status without (present) and with future threats

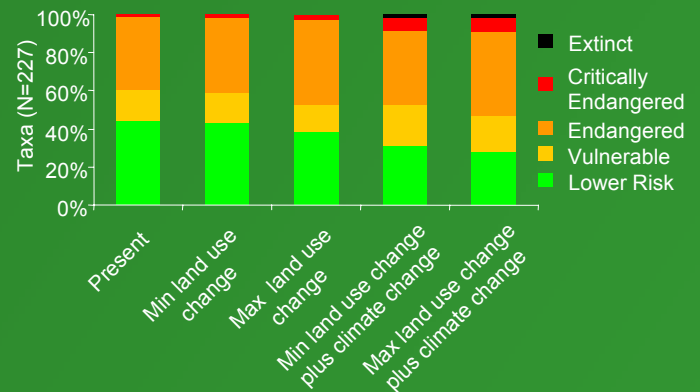
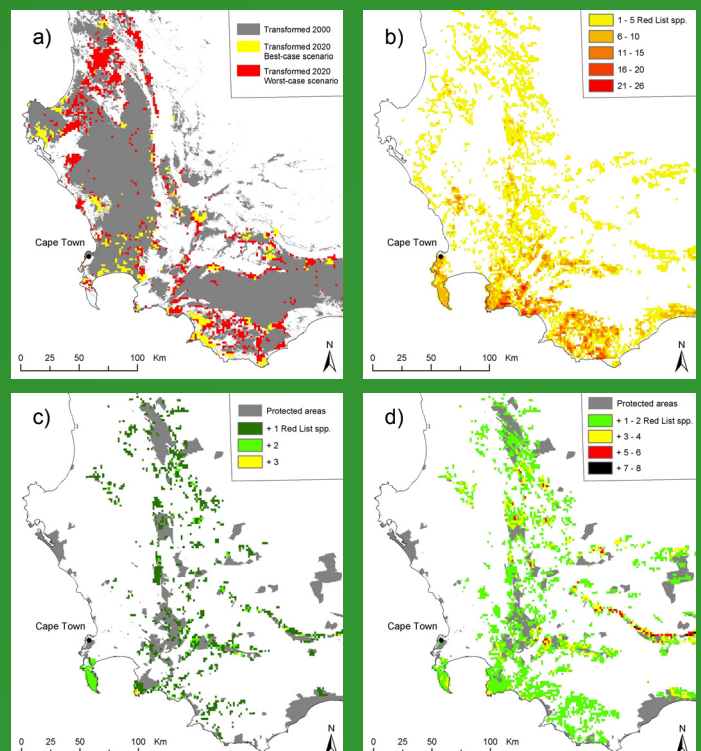


Figure 2. a) Transformed areas in the SW CFR in 2000 and in 2020; b) Number of threatened species per grid cell (2.9 km<sup>2</sup>) in 2000; c+d) Protected areas and increase in number of threatened species per grid cell (2.9 km<sup>2</sup>) if future threats are included: here maximum land use change without (c) and with (d) climate change by 2020



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### Solution?

Introducing a Red List reporting criterion to red-flag species potentially affected by future threats such as predicted land use change and climate change.