Agenda item 3.2
In-depth review: Implementation of the Global Strategy for Plant Conservation

Do we need new targets relating to emerging issues such as climate change and nutrient loading?

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Why do we need new targets?

- Scientific research revealing possible effects of climate change on plant distribution
- April 2006 Gran Canaria Declaration II. GSPC and Climate Change
- February 2007 IPCC Fourth Assessment Report
- Scale of nutrient loading becoming apparent

Gran Canaria Declaration II

- More than 100,000 plant species currently threatened with extinction
- Extinction expected to increase at an unprecedented rate as global temperatures rise
- There is a need to look beyond 2010
- Biodiversity conservation plans need to integrate mitigation and adaptation strategies against climate change

IPCC Fourth Assessment Report 'Climate Change 2007'

"Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global mean sea level."

"The understanding of anthropogenic warming and cooling influences on climate has improved since the Third Assessment Report, leading to ***very high confidence*** that the globally averaged ***net effect of human activities*** since 1750 has been one of warming."

"Annual fossil CO_2 emissions increased from an average of 6.4 GtC per year in the 1990s, to 7.2 GtC per year in 2000-2005."

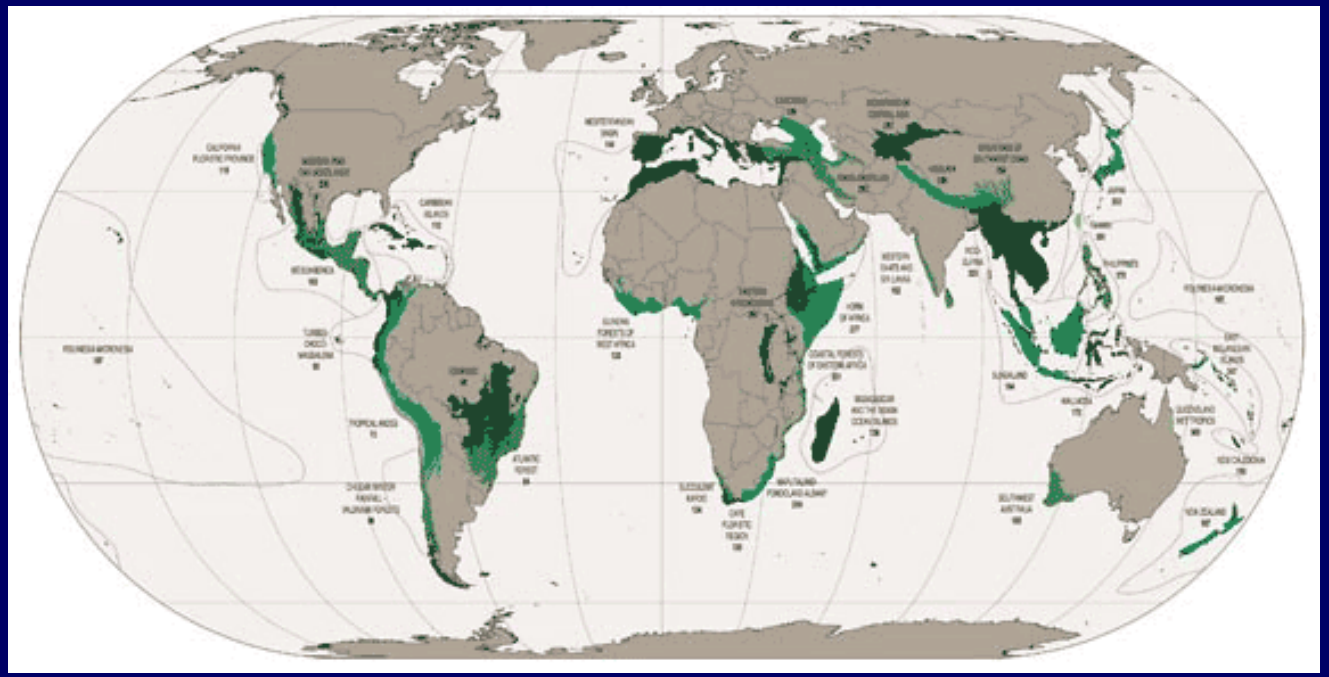
IPCC Fourth Assessment Report 'Climate Change 2007'

- Significantly increased precipitation in eastern parts of North and South America, northern Europe and northern and central Asia
- The frequency of heavy precipitation events has increased over most land areas - consistent with warming and increases of atmospheric water vapour
- Drying in the Sahel, the Mediterranean, southern Africa and parts of southern Asia
- More intense and longer droughts observed since the 1970s, particularly in the tropics and subtropics

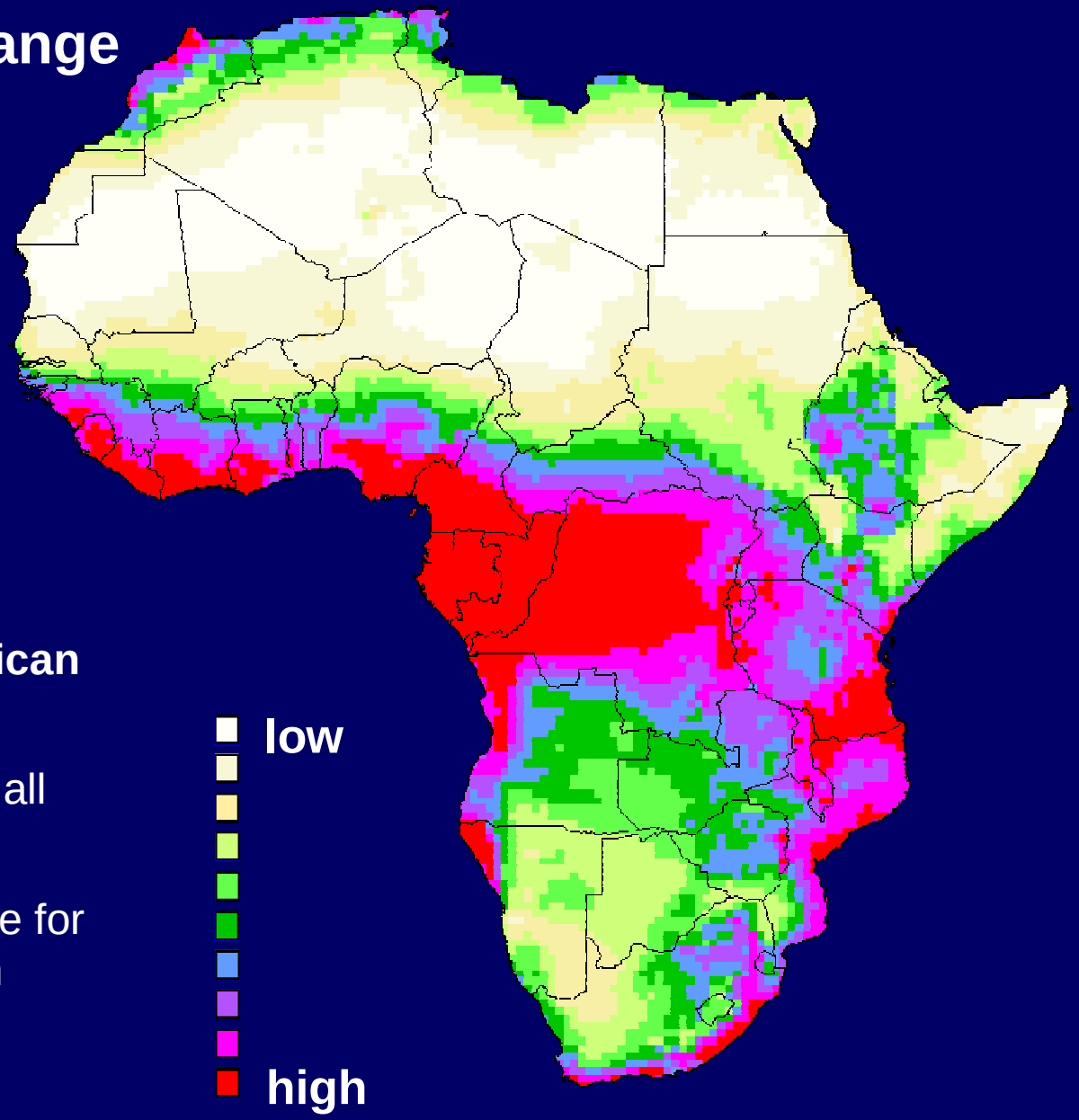
Hotspots Example

Target 5. Important Plant Areas
Target 6. Threatened Species

- Distribution of plants suited to IPA approach
- 25 biodiversity hotspots identified, 44% of the world's plants as endemics in 1.4% of Earth's land surface



Effect of Climate Change Africa Example

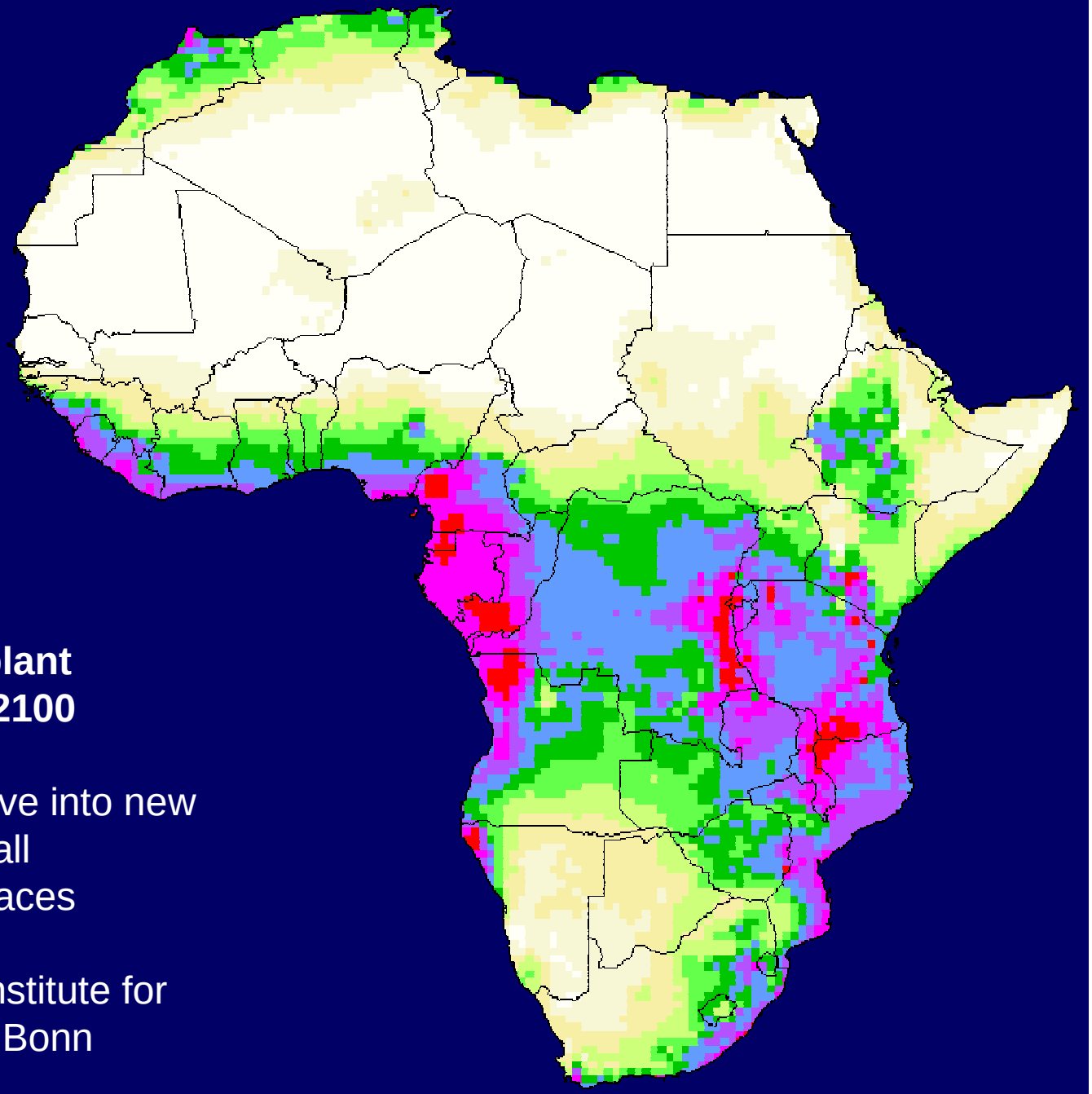


Modelled present day African plant species richness

Assuming species occur at all climatically suitable places

Sommer et al. Nees Institute for Biodiversity of Plants, Bonn

Effect of Climate Change Africa Example



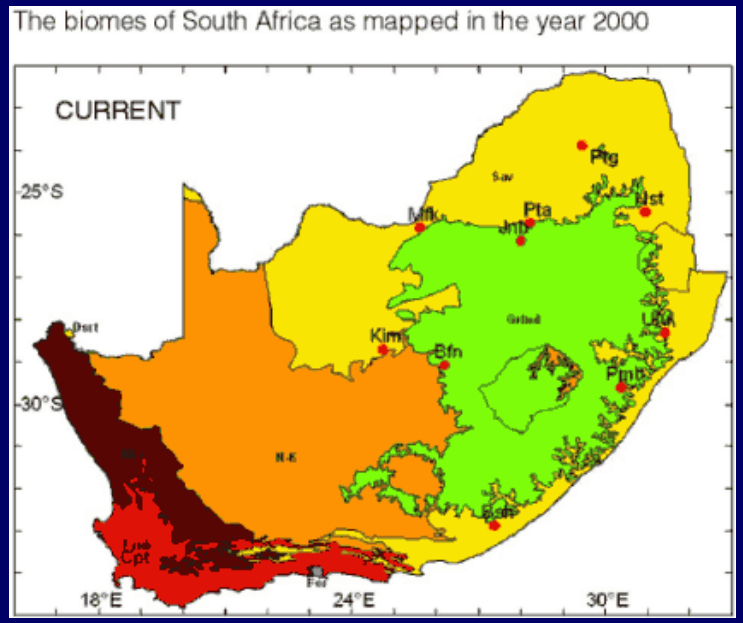
Patterns of African plant species richness in 2100

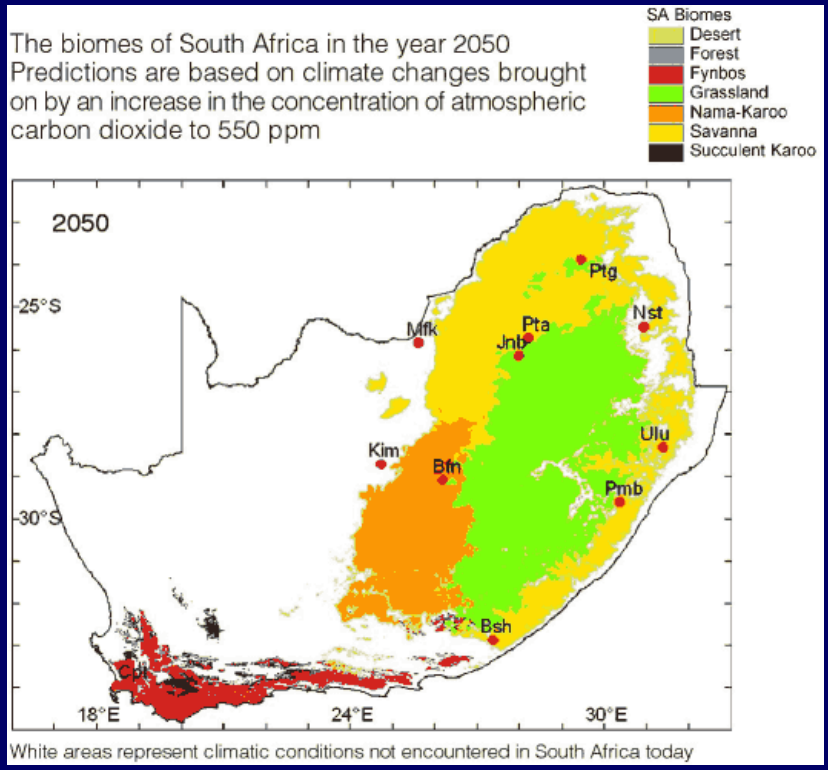
Assuming species move into new habitats and occur at all climatically suitable places

Sommer et al. Nees Institute for Biodiversity of Plants, Bonn

Modelled impact of climate change in South Africa

Dramatic change in Karoo ‘hotspot’

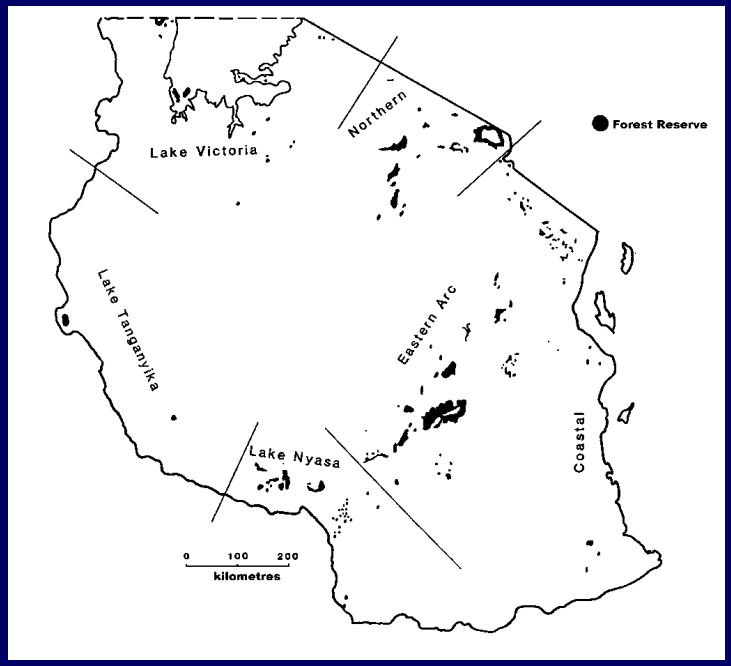




Source:
South African National Biodiversity Institute
http://www.sanbi.org/climrep/4.htm

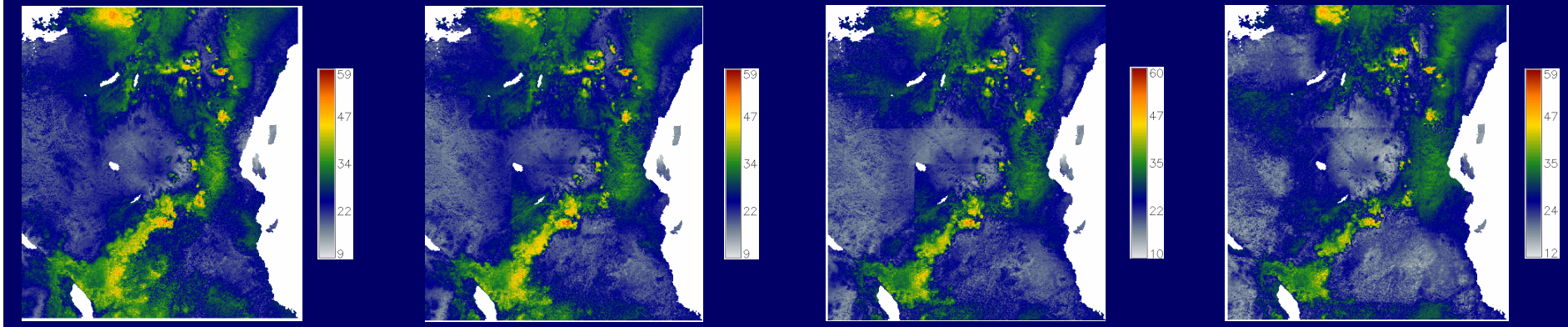
Eastern Arc Biodiversity Hotspot

- Ancient crystalline mountains under direct climatic influence of the Indian Ocean
- Many pre-Miocene biogeographic relicts
- Long-term ecological stability



Eastern Arc Species richness (habitat suitability scores summed over 120 tree species). Phil Platts et al., KITE, York

Present 2025 2055 2085



Africa Modeling Results

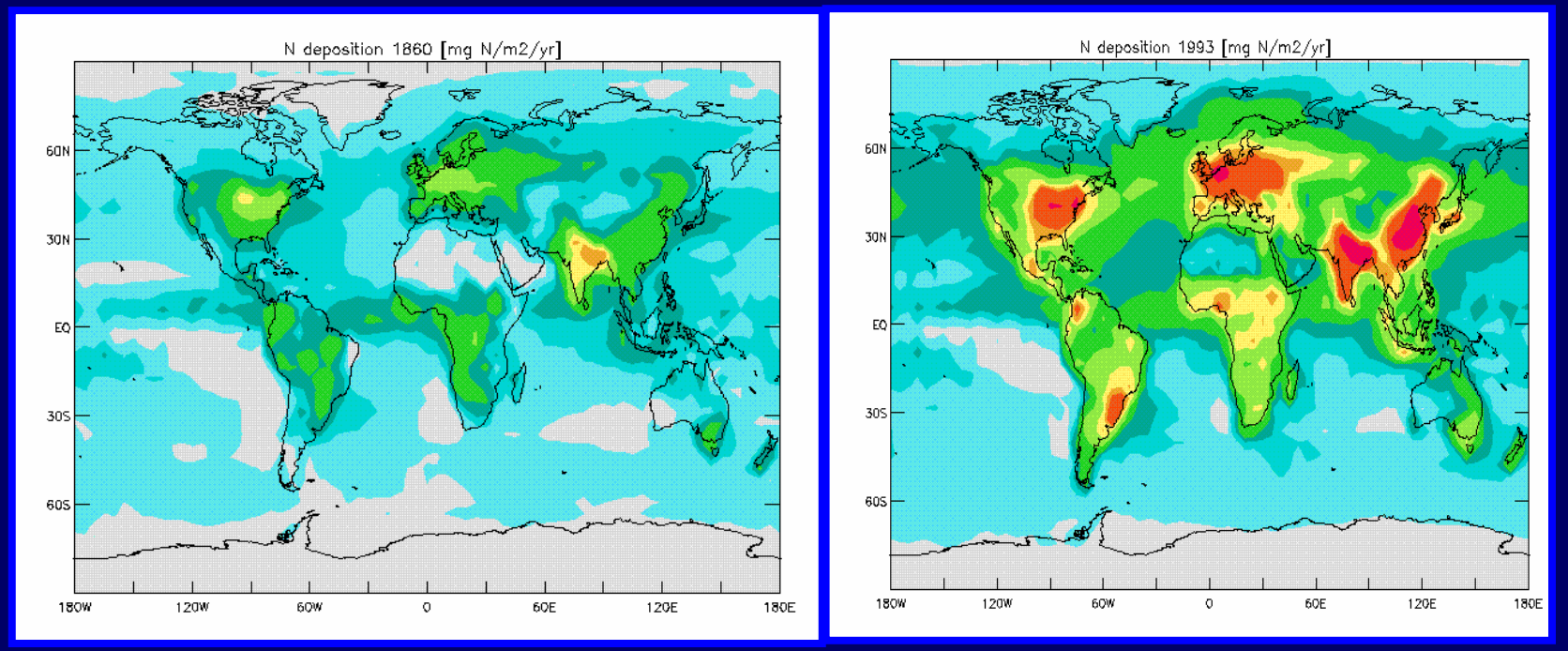
- Under the assumptions used here, nine out of ten species ranges will markedly decrease in size by 2100
- On average, species lose almost 50% of their climatically suitable habitats by 2100
- In some areas, more than 80% of all species may lose their climatically suitable habitats
- Up to 26% of species may lose their entire climatically suitable habitats (predominantly restricted-range species)
- Good news: Some areas maintain centres of high species richness, or even provide new habitats for species

Climate Change Conclusion

- Climate change will have major impacts on ecological regions and plant diversity
- Some Important Plant Areas will change
- Other IPAs will remain fairly stable
- GSPC needs to take climate change into account

Atmospheric N Deposition: Past and Present

mg N m^{-2} yr^{-1}



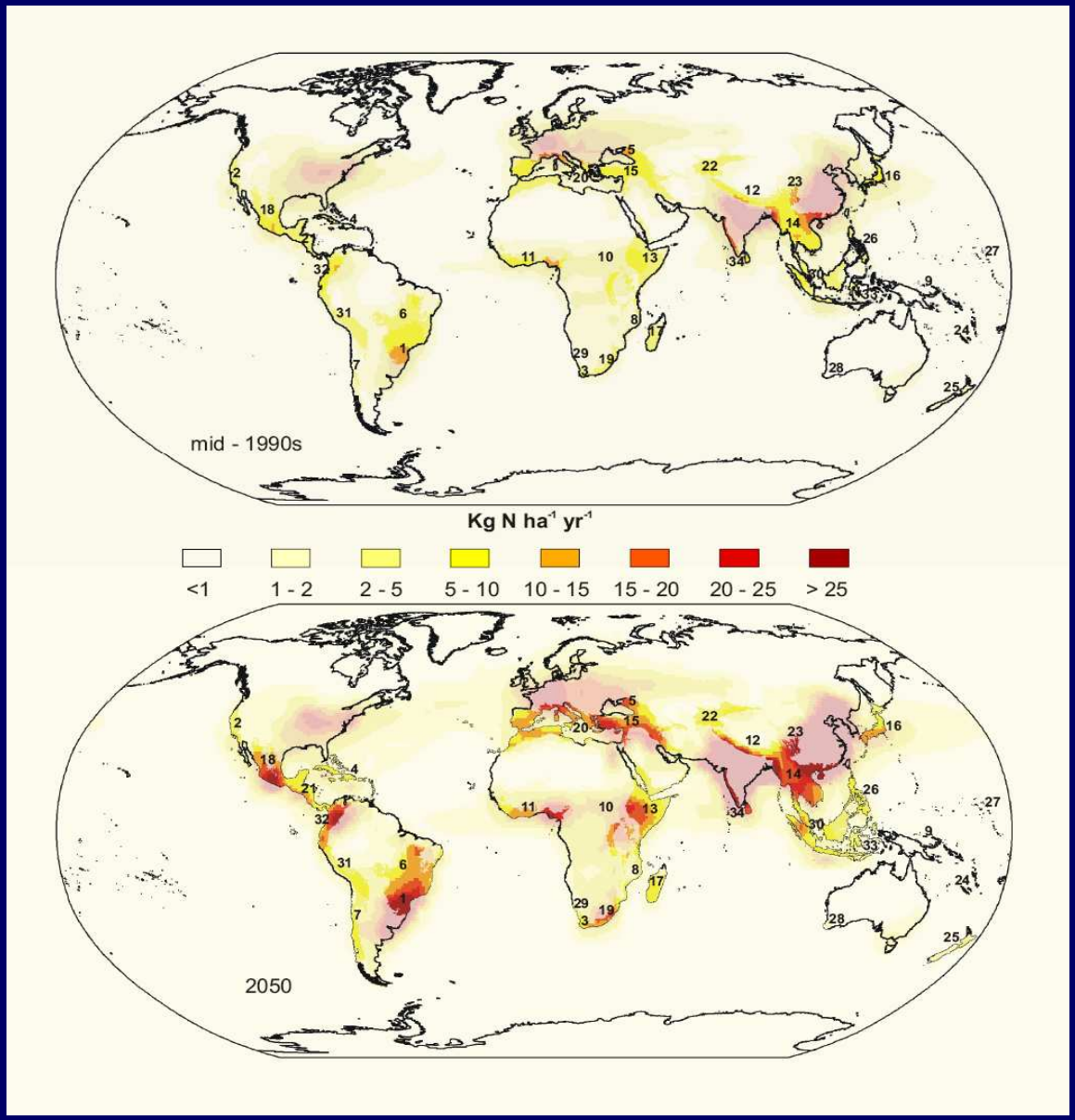
1860 **1993**

Galloway et al., 2004

Nutrient Loading

- 5 biodiversity hotspots have significant nitrogen deposition (above 10 kg ha-1 yr-1)
- These are in India, Brazil, China, Caucasus, Indo-Burma
- They contain 22,280 endemic plant species
- We know nothing about the actual effects of N on biodiversity in these regions

Atmospheric Nitrogen Deposition in World Biodiversity Hotspots



By 2050 17 hotspots could have between 10% and 100% of their area receiving greater than 15 kg N ha^{-1} yr^{-1}

Phoenix *et al.* *Global Change Biology* (2006)

Nutrient Loading Conclusion

- Nutrient loading is increasing globally
- Increased nutrients are known to decrease plant diversity in some cases
- Biodiversity hotspots are affected
- We know nothing about the effects of nutrient loading in the areas of highest plant diversity

Questions

- Do we need new targets in GSPC, if yes, what could they be?
- When and how should they be integrated into GSPC?
- What time frame should be defined for these targets?

Potential New Targets

F) Adaptation to Global Environmental Change

Target 17: Climate change

In situ plant conservation actions implemented to meet the GSPC targets take into account effects of climate change by 2010. Plants most at risk of extinction under conditions of climate change are conserved by ex situ conservation by 2015.

Target 18: Nutrient loading

Research into the effects of nutrient loading on important areas of plant diversity conducted and results incorporated into in situ and ex situ conservation planning by 2015.