Working Group II

The contribution to the Fourth Assessment

Ecosystems, their properties, goods and services
Food, fibre and forest products

Andreas Fischlin and Guy Midgley
(Coordinating Lead Authors - Ecosystems)

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Contents

- Ecosystems
  - Andreas Fischlin
- Food and forest products - Guy Midgley

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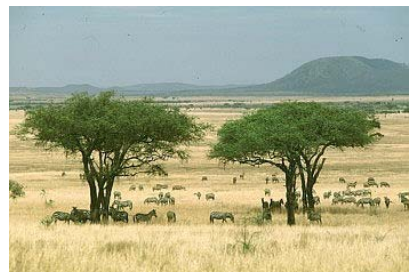
Ecosystems





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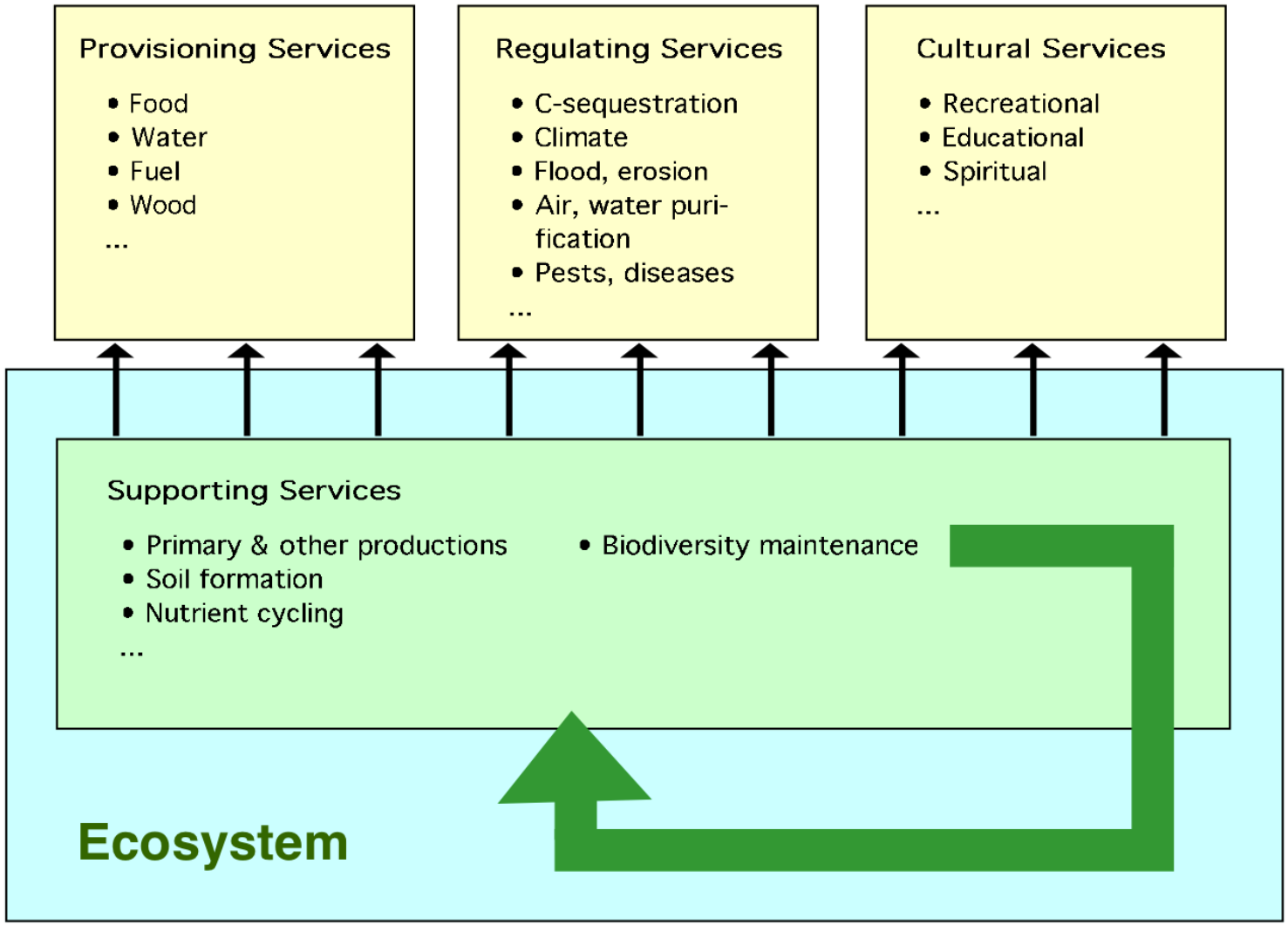
«Ecosystems, their properties goods and services»

- 2 CLAs: Andreas Fischlin, Guy F. Midgley
- 8 LAs: Jeff Price, Rik Leemans, Brij Gopal, Carol Turley, Mark Rounsevell, Pauline Dube, Juan Tarazona, Andrei Velichko
- 19 CAs with outstanding conributions from Jacqueline de Chazal and Rachel Warren
- 2 REs
- Hundred of expert reviewers, scientists etc.
- 3100 scientific articles reviewed
- 903 cited

Services Provided by Ecosystems



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Future climate change

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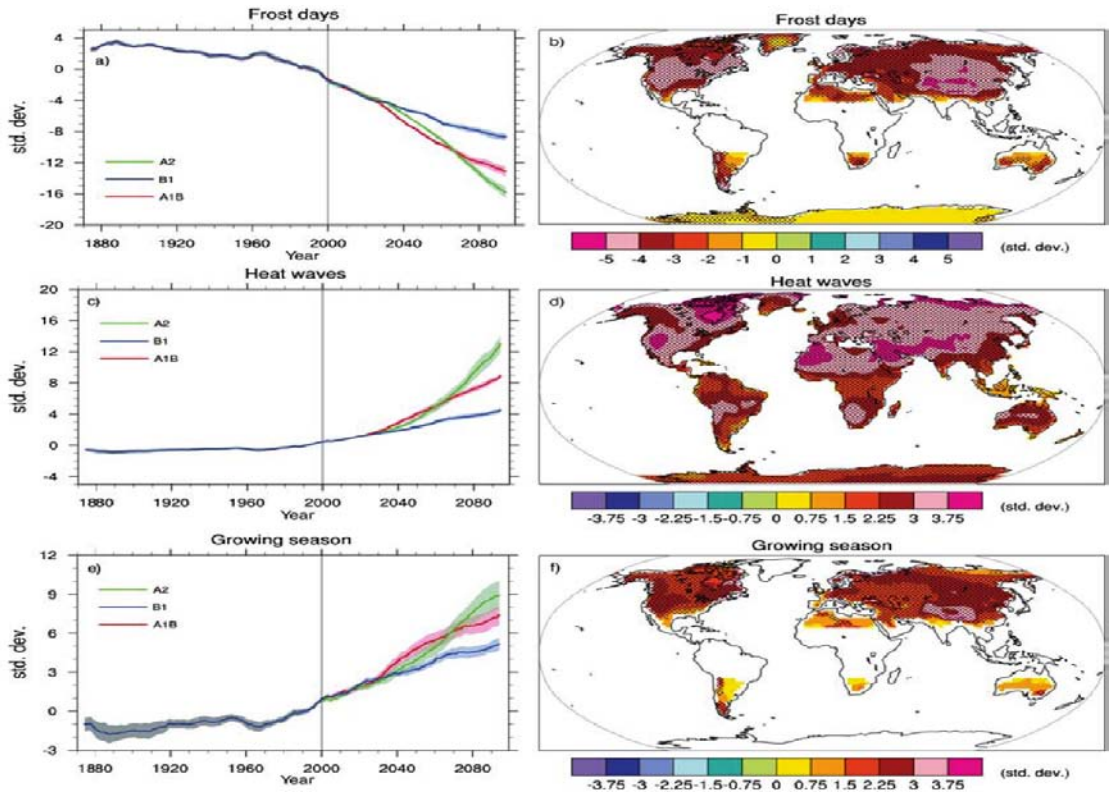
Building on new, more reliable projections for future climates

Frost days

Heat waves

Growing season



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Impacts on Biodiversity

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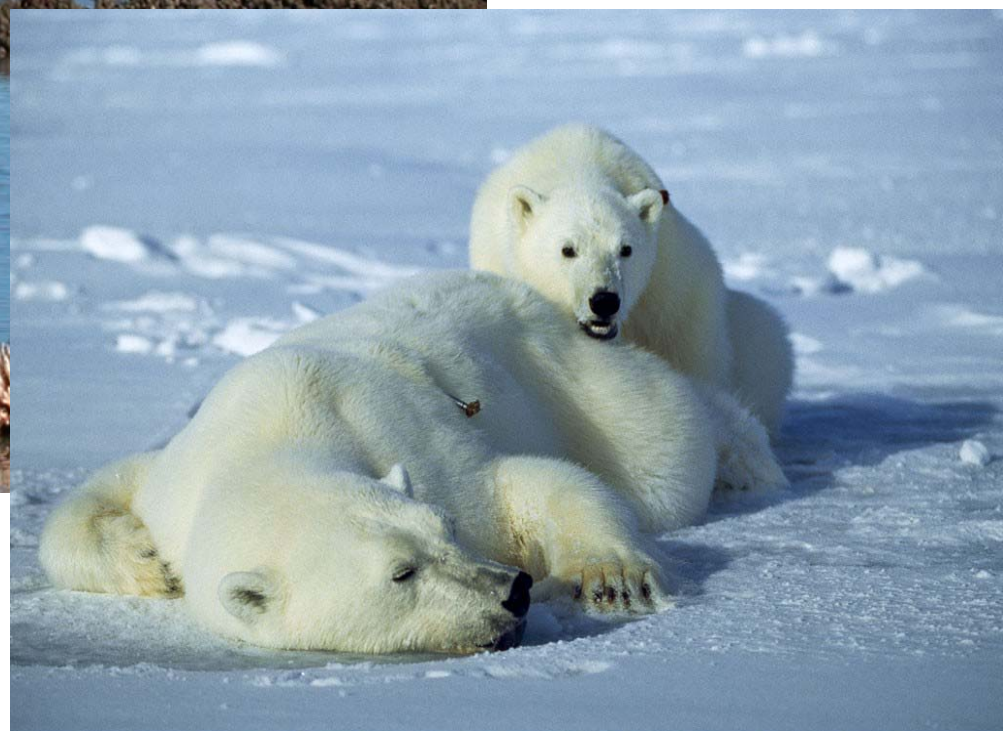
Biodiversity - Most Vulnerable

Extensively bleached community of corals near Great Keppel Island on the southern Great Barrier Reef in March 2002 at low tide.

Photo Ove Hoegh-Guldberg, Univ. of Queensland



Polar bears have recently been listed as vulnerable due to climate change by IUCN (Wiig, 2005; Schiebe et al., 2006) and also proposed as endangered species on U.S. list of endangered species (Eilperin, 2006; Heilprin, 2006; Roach, 2006)

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20% - 30% of higher plants and animals at high risk of extinction

if ΔT 1.5°C - 2.5°C over present

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Assessment (19 studies) involved:

- Higher plant species (vascular plants):
  - 40,587 species
  - 133,149 (~50%) species (global studies)


Larch


Cloudberry


Glacier buttercup

- Higher animal species (vertebrates, butterflies):
  - 4,826 species
  - 9,645 species (~40% of vertebrates) (global studies)

Sunbird

Arctic fox


Alpine blue

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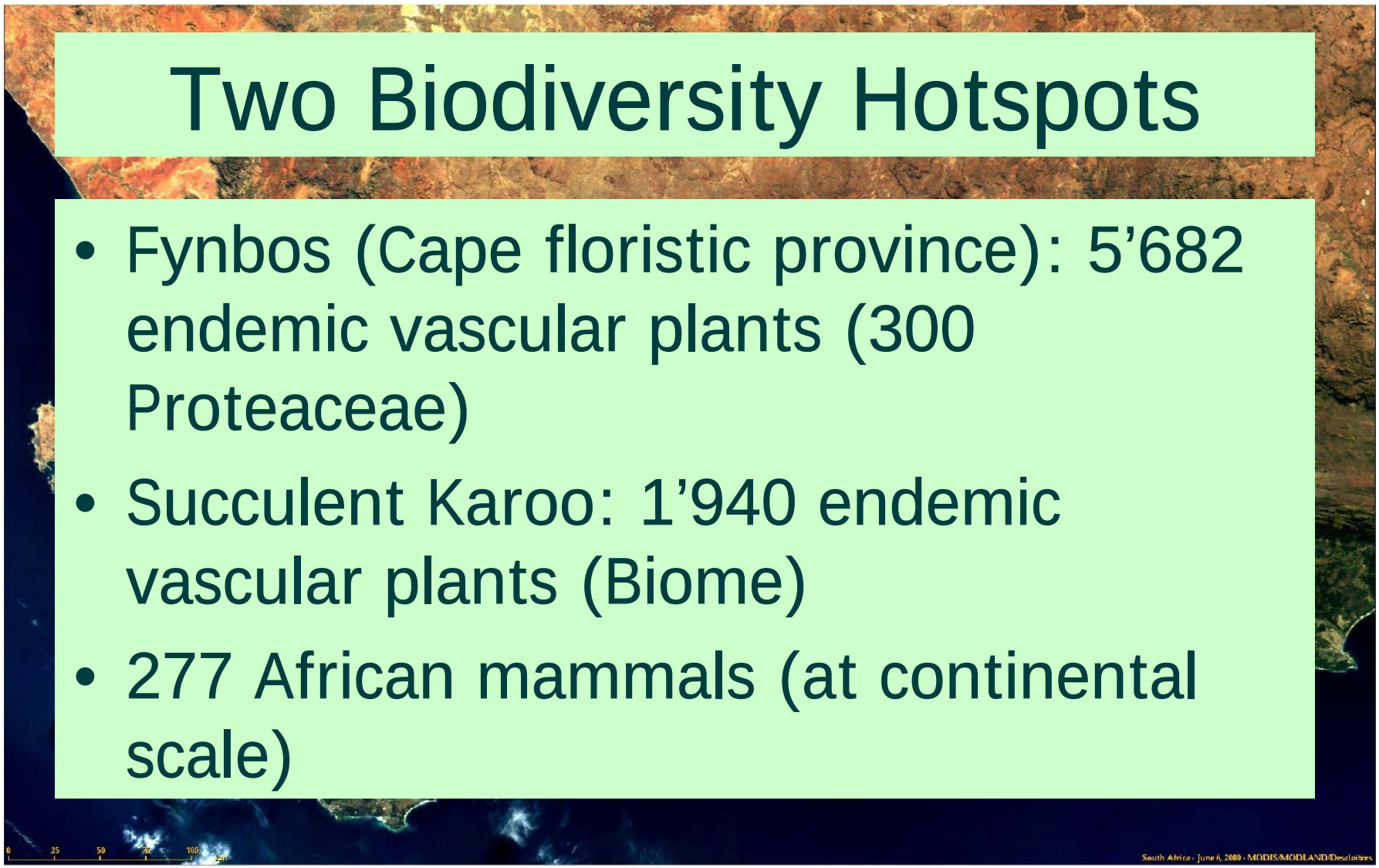
Two Biodiversity Hotspots

- Fynbos (Cape floristic province): 5’682 endemic vascular plants (300 Proteaceae)
- Succulent Karoo: 1’940 endemic vascular plants (Biome)
- 277 African mammals (at continental scale)



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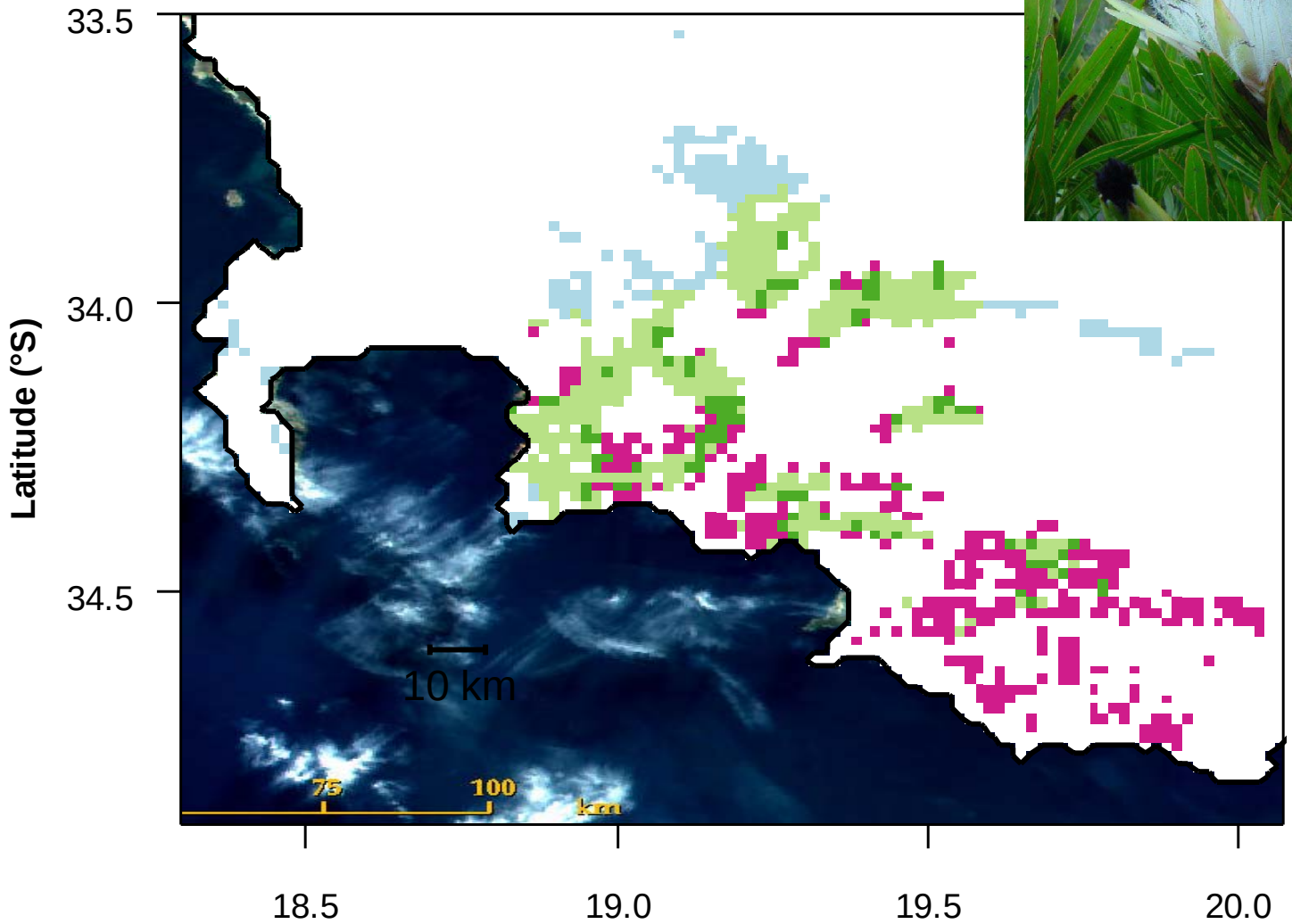
E.g. “Adapting” species



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E.g. “Loser” species

Sunshine conebush
Leucospermum tomentosum

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Range response types

6 (3%) winners	21 (9%) unchanging
36 (15%) adapting	178 (73%) loosers

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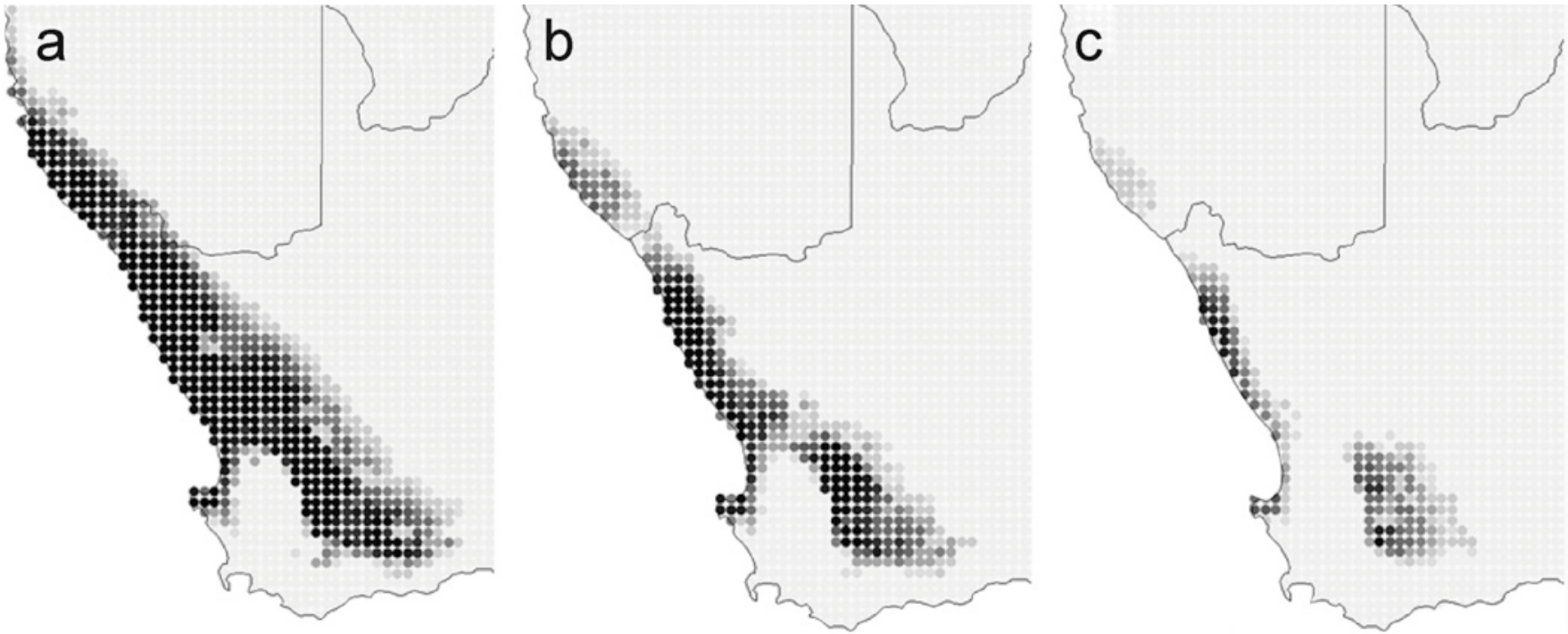
Entire ecosystem Example Succulent Karoo:

current ~2050 ~2080



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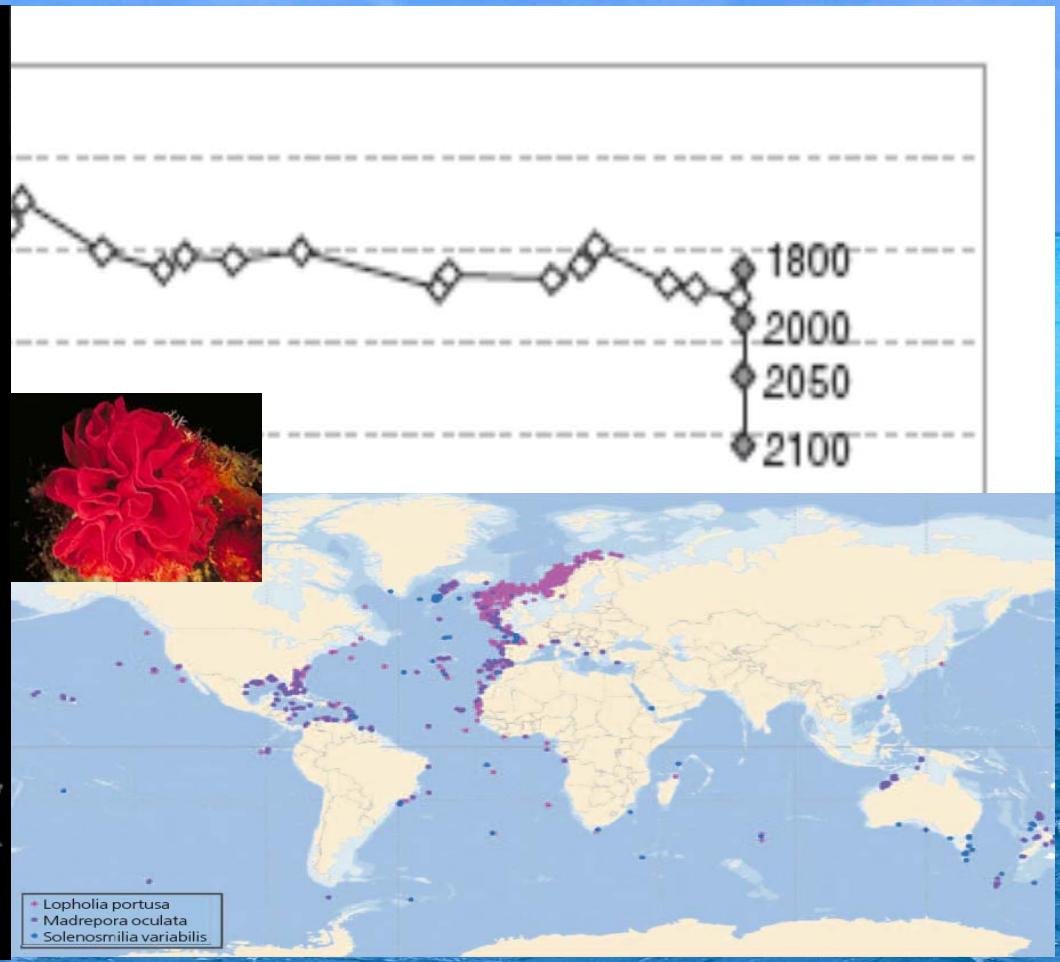
Ocean acidification

The progressive acidification of oceans due to increasing atmospheric carbon dioxide is expected to have negative impacts on marine shell forming organisms (e.g., corals) and their dependent species

(medium confidence)

Ocean acidification



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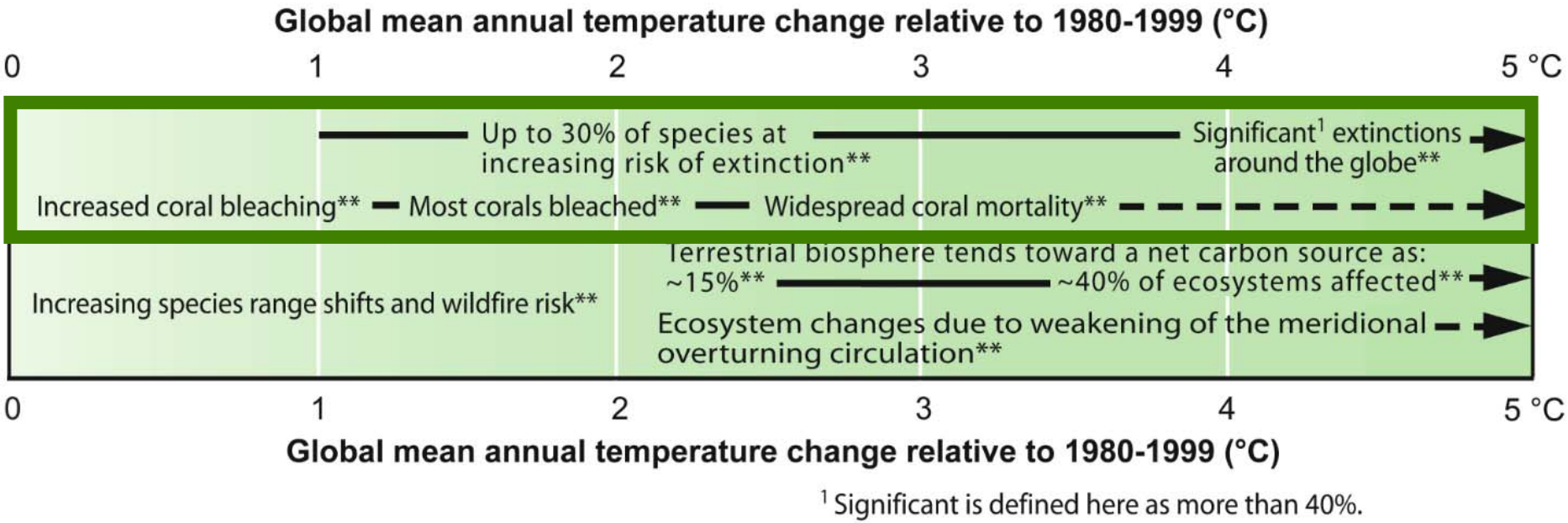
Summary
Impacts on Biodiversity



[1] Significant is defined here as more than 40%.

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Emissions from Terrestrial Ecosystems

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Terrestrial ecosystems become net source

Over the course of this century, net carbon uptake by terrestrial ecosystems is likely to peak before mid-century and then weaken or even reverse, thus amplifying climate change.

(high confidence)

More Carbon Stored in Ecosystems

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Effects from Fire included

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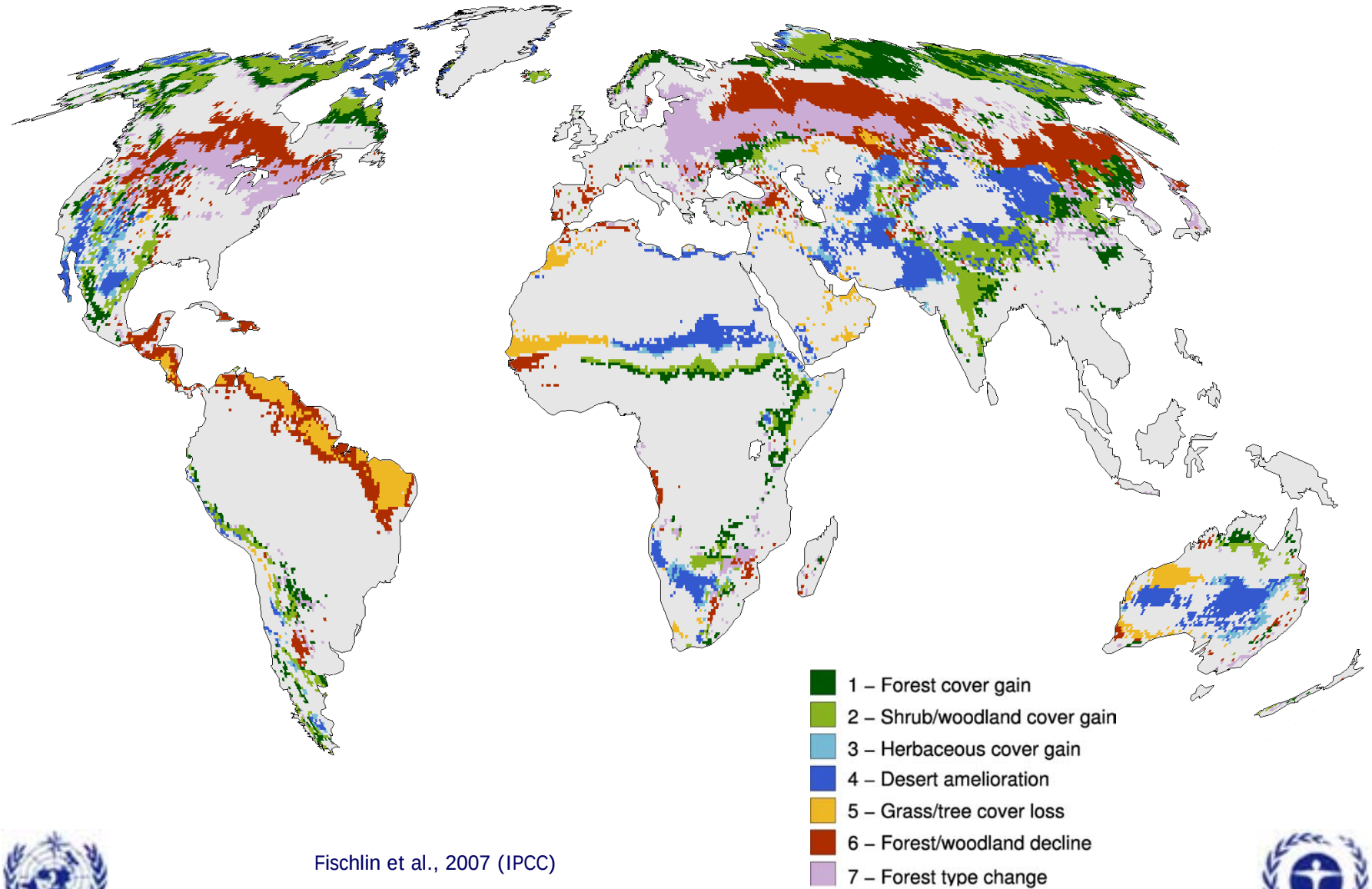
Some DGVM Results - LPJ A2 HadCM3



Fischlin et al., 2007 (IPCC)

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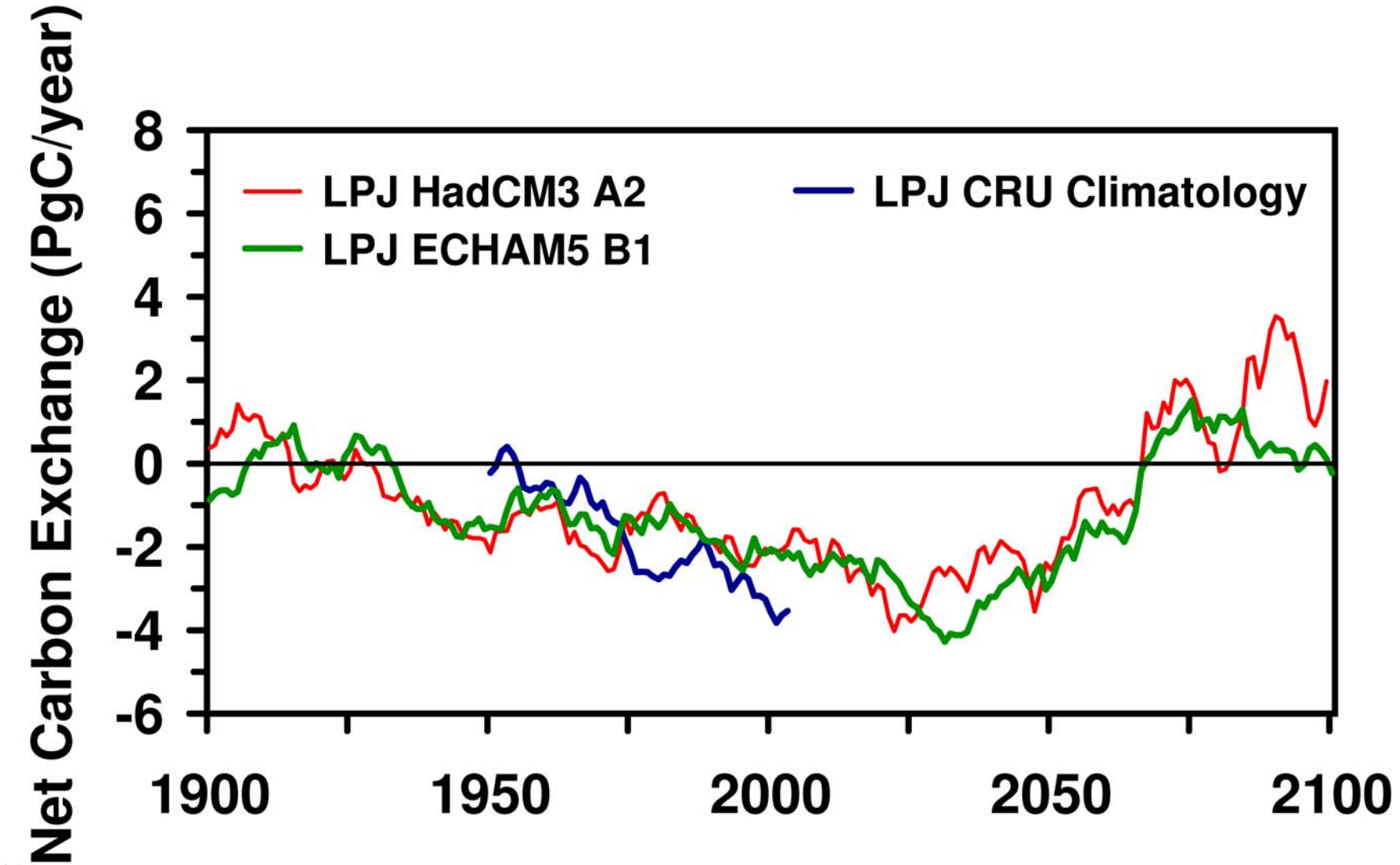
Some DGVM Results - LPJ A2 HadCM3



Fischlin et al., 2007 (IPCC)

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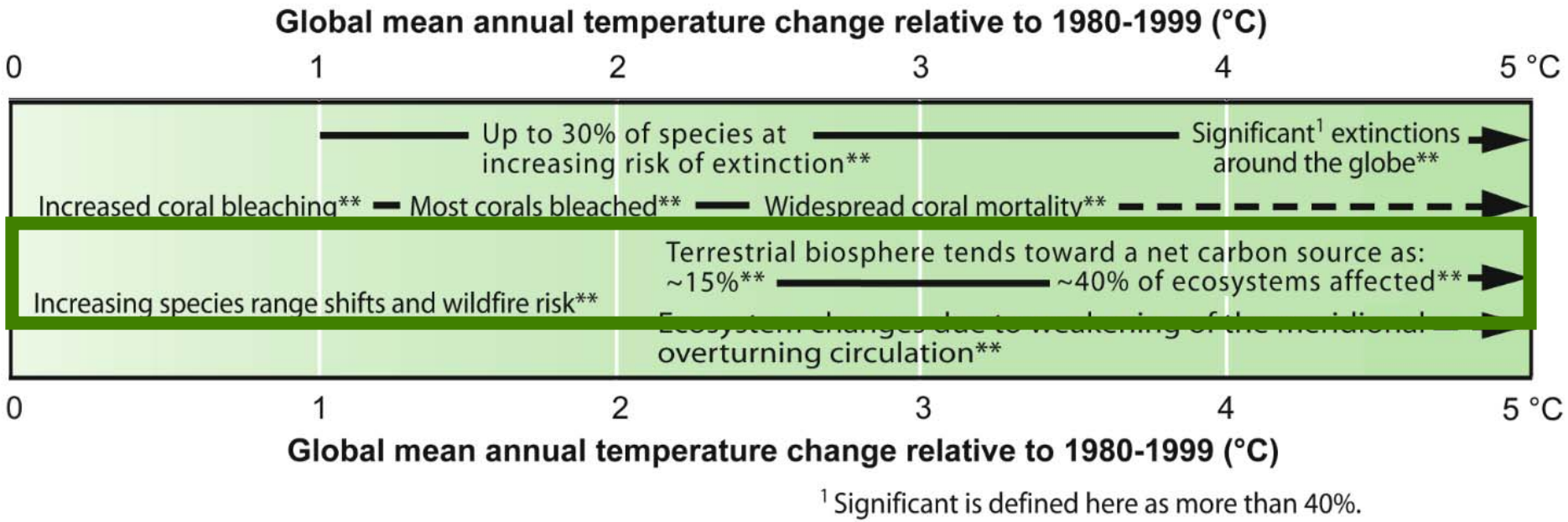
Summary

Emissions from ecosystems



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Key Vulnerabilities

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Vulnerable ecosystems

- Coral reefs, sea-ice biomes
- Tundra, boreal forests, mountain and Mediterranean regions
- mangroves, salt marshes

Vulnerable systems and sectors

- Some ecosystems:
  - Coral reefs; sea-ice regions
  - Tundra, boreal forests, mountain and Mediterranean regions, mangroves, salt marshes
- Low-lying coasts
- Water resources in mid-latitudes & dry Tropics
- Low-latitude agriculture
- Human health where adaptive capacity is low

Regions most affected:

- The Arctic
- Sub-Saharan Africa
- Small islands
- Asian megadeltas

Resilience Exceeded

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Ecosystems in this century

The resilience of many ecosystems is likely to be exceeded this century by an unprecedented combination of climate change, associated disturbances (e.g., flooding, drought, wildfire, insects, ocean acidification), and other global change drivers (e.g., land use change, pollution, overexploitation of resources).

(high confidence)

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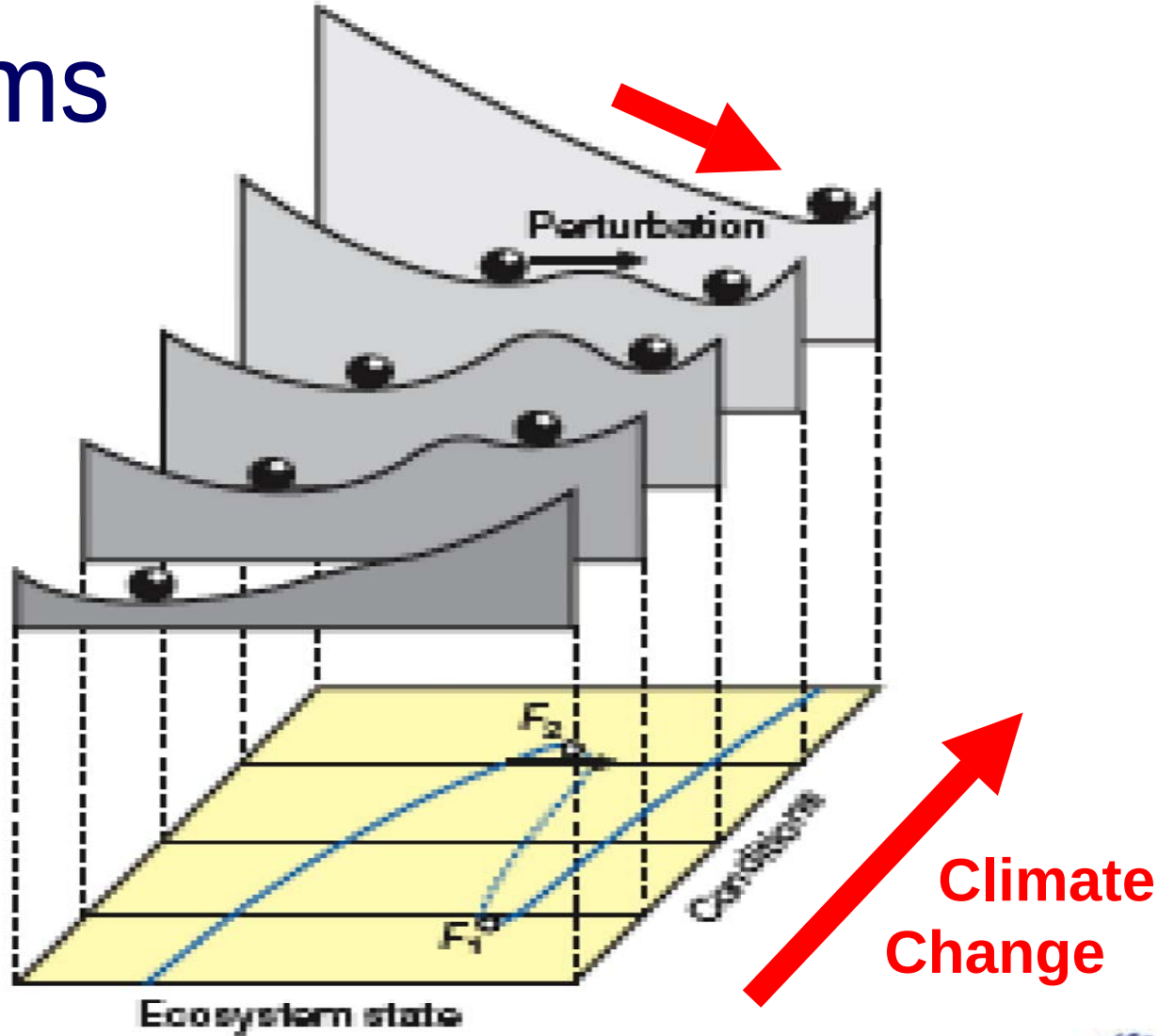
Resilience of ecosystems



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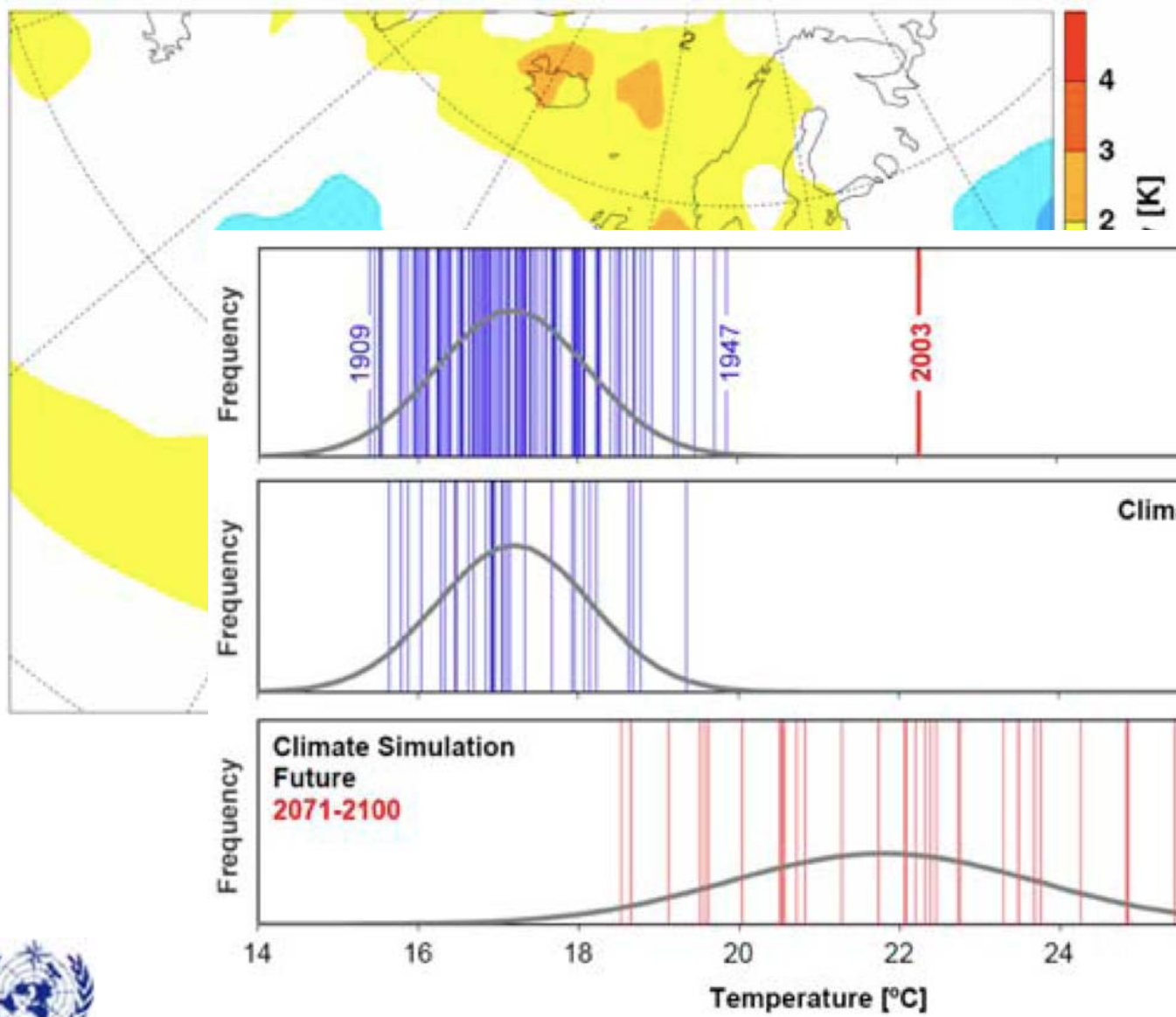
Summer 2003 - Model for end 21st Ct.



Regional chapter:
Europe

(after Schär et al., 2004)

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More extreme weather events

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Changes in fire regime

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Changes in insect outbreaks

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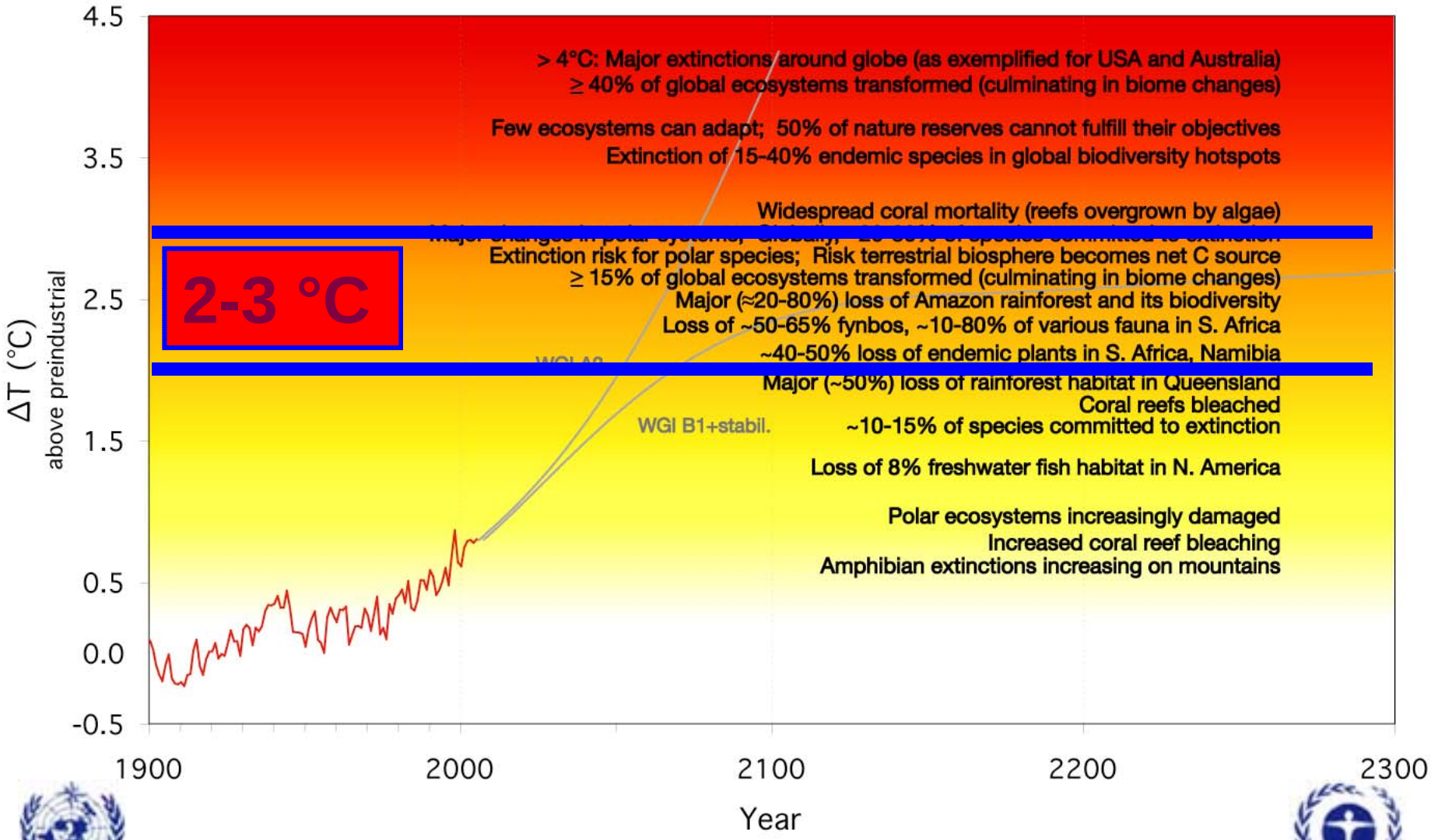
Summary - Ecosystem impacts



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Thanks for your attention!

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