

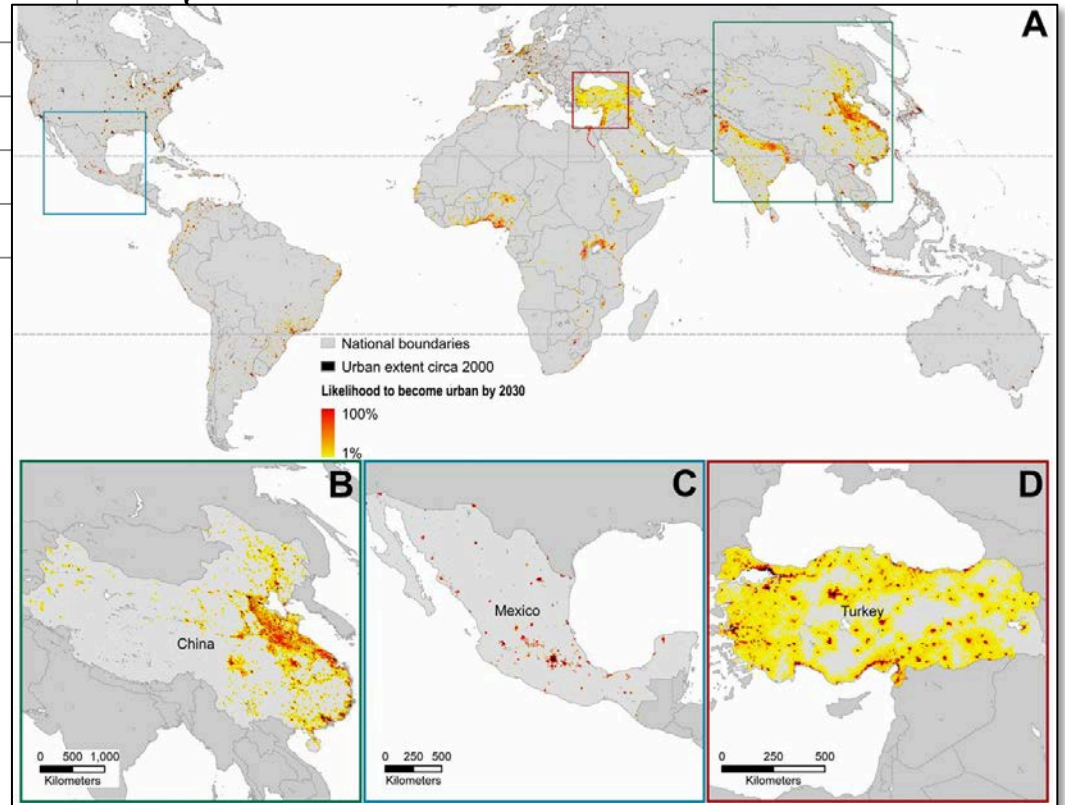
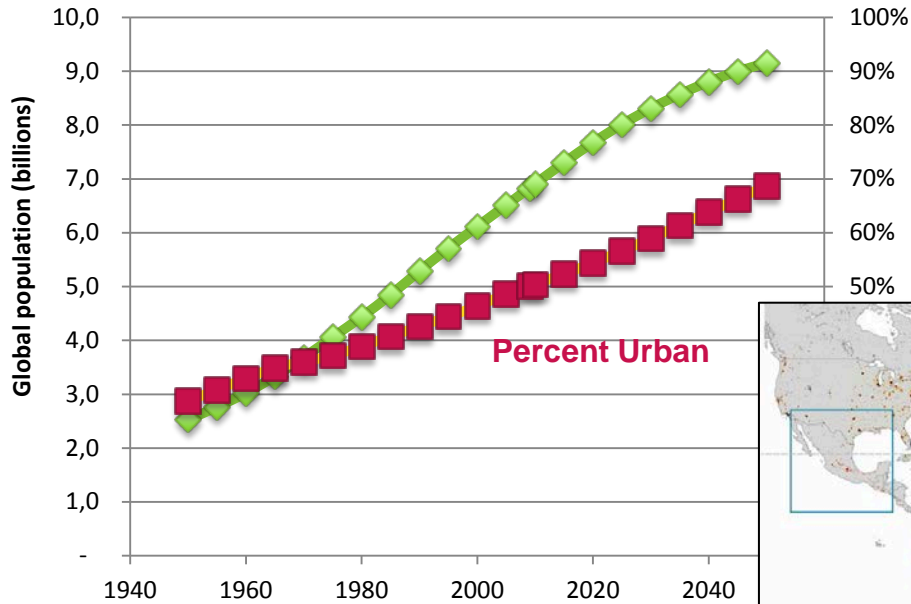
# Emerging research findings: Ecosystems and climate

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Pep Canadell, Rik Leemans, Karen Seto, Roberta Boscolo,  
Senay Habtezion, Leisl Neskakis, Barbara Solich

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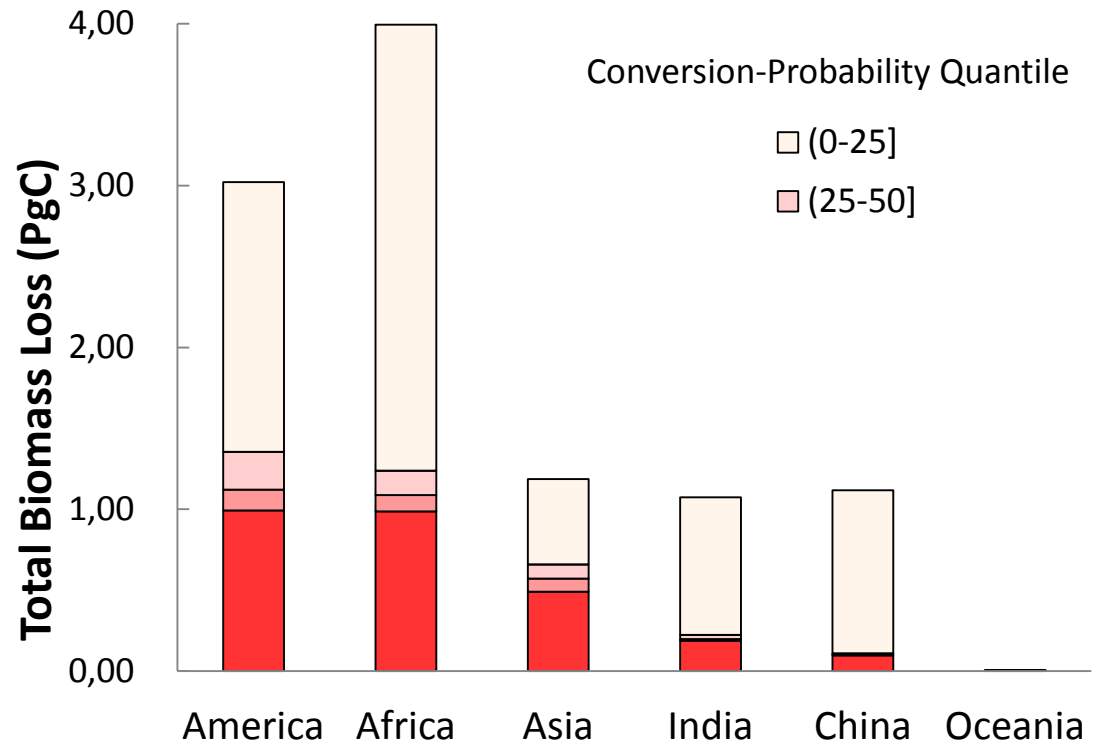
UNFCCC-SBSTA meeting Bonn  
4 June 2013

# Global forecasts: urban expansion 2030



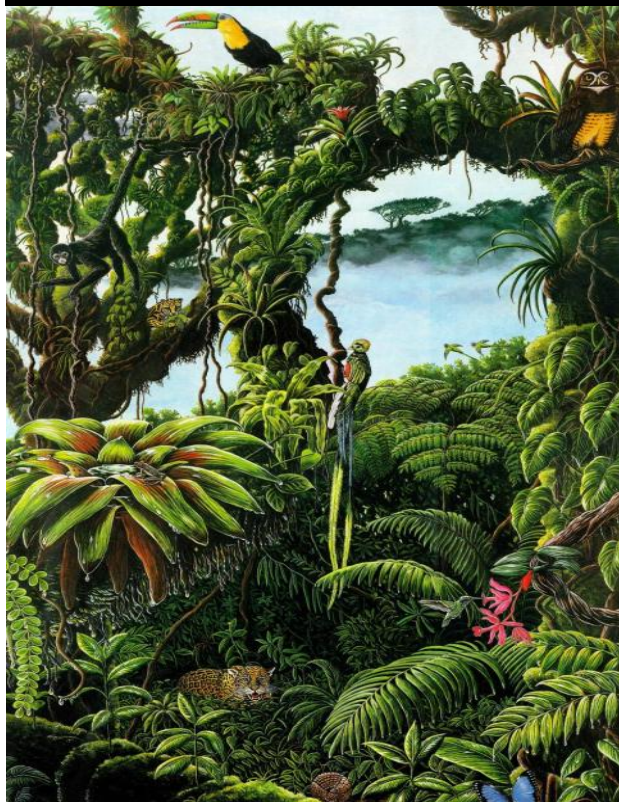
# Total biomass loss from urban expansion (2030)

- Pan-tropics
- Hi probability 1 Pg C loss America & Africa
- Additional loss soil C



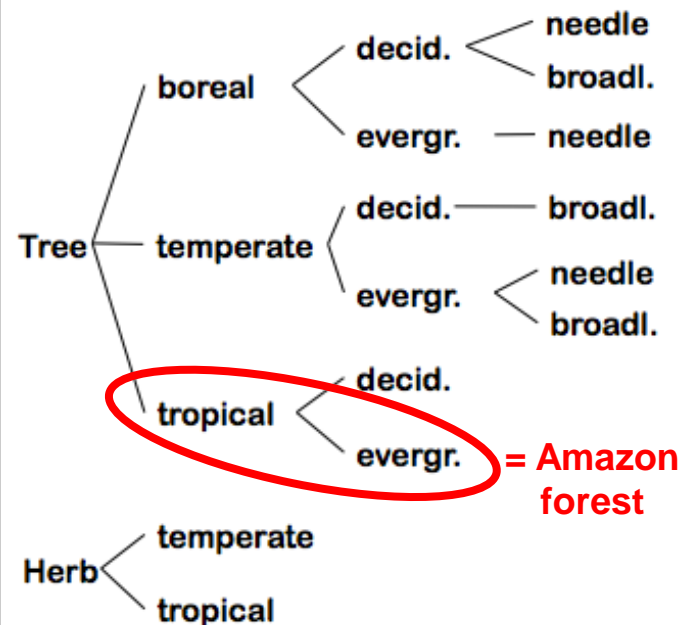
# Plant diversity in Earth system models

## Nature



~320.000 plant species

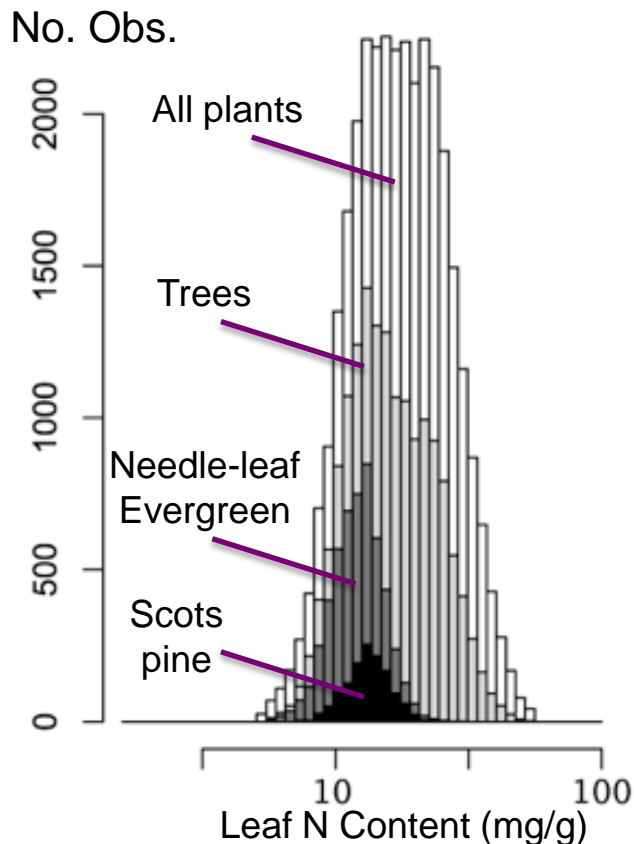
## Earth system models



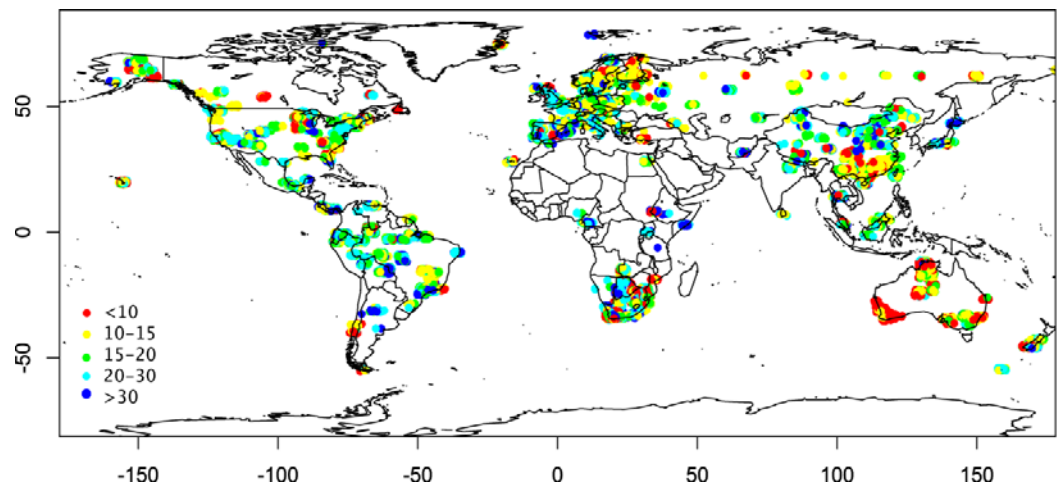
Most models group all plant species into  
~10 plant functional types

# Database (TRY): next generation global vegetation models

2.5 million trait entries / 61,000 plant species /  
52 traits relevant for Earth system modeling

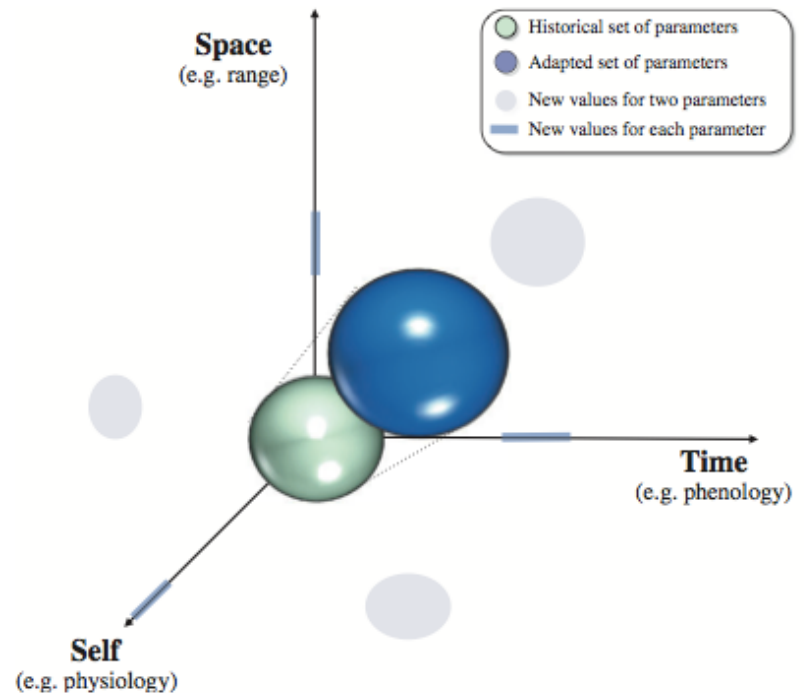


Example: Leaf Nitrogen content (mg/g)



# Species response to unfavorable climate

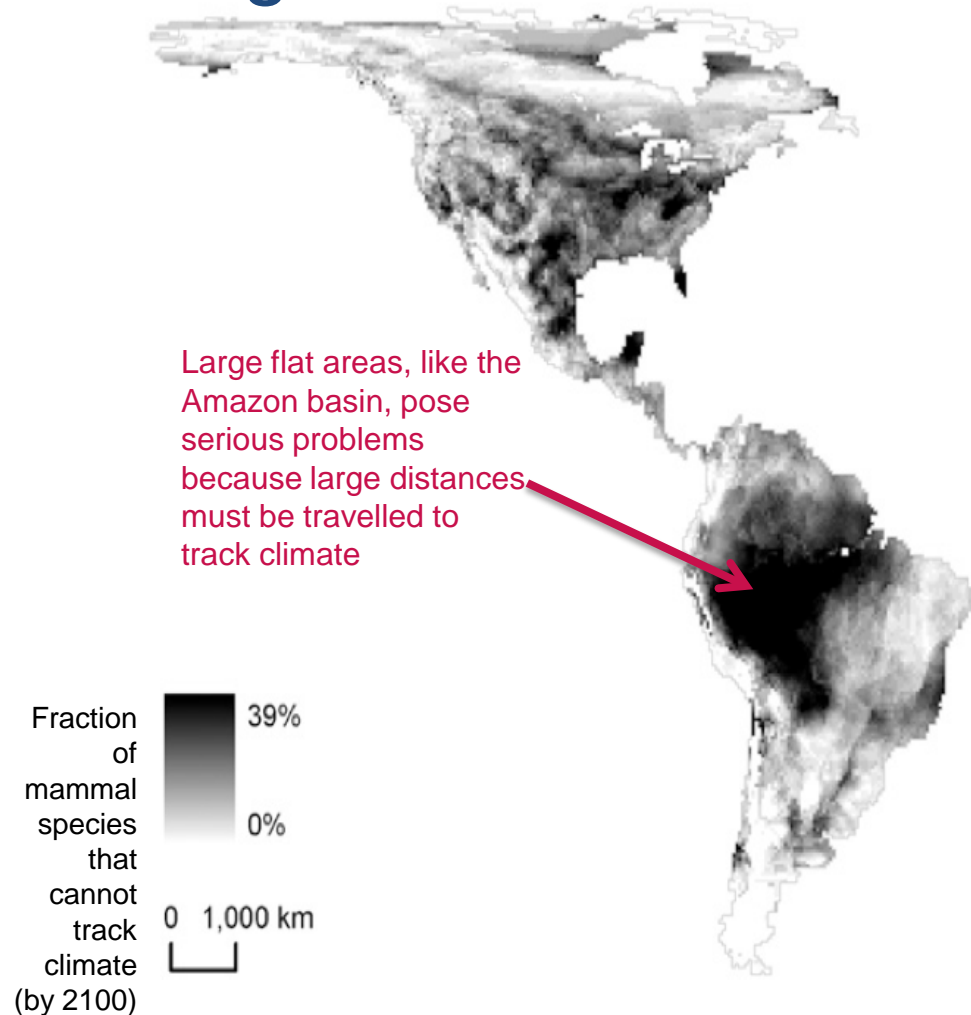
- Move – depends on dispersal and establishment capacity
- Adapt – can be physiological, phenological or genetic
- Extinct – common locally, but rarer globally



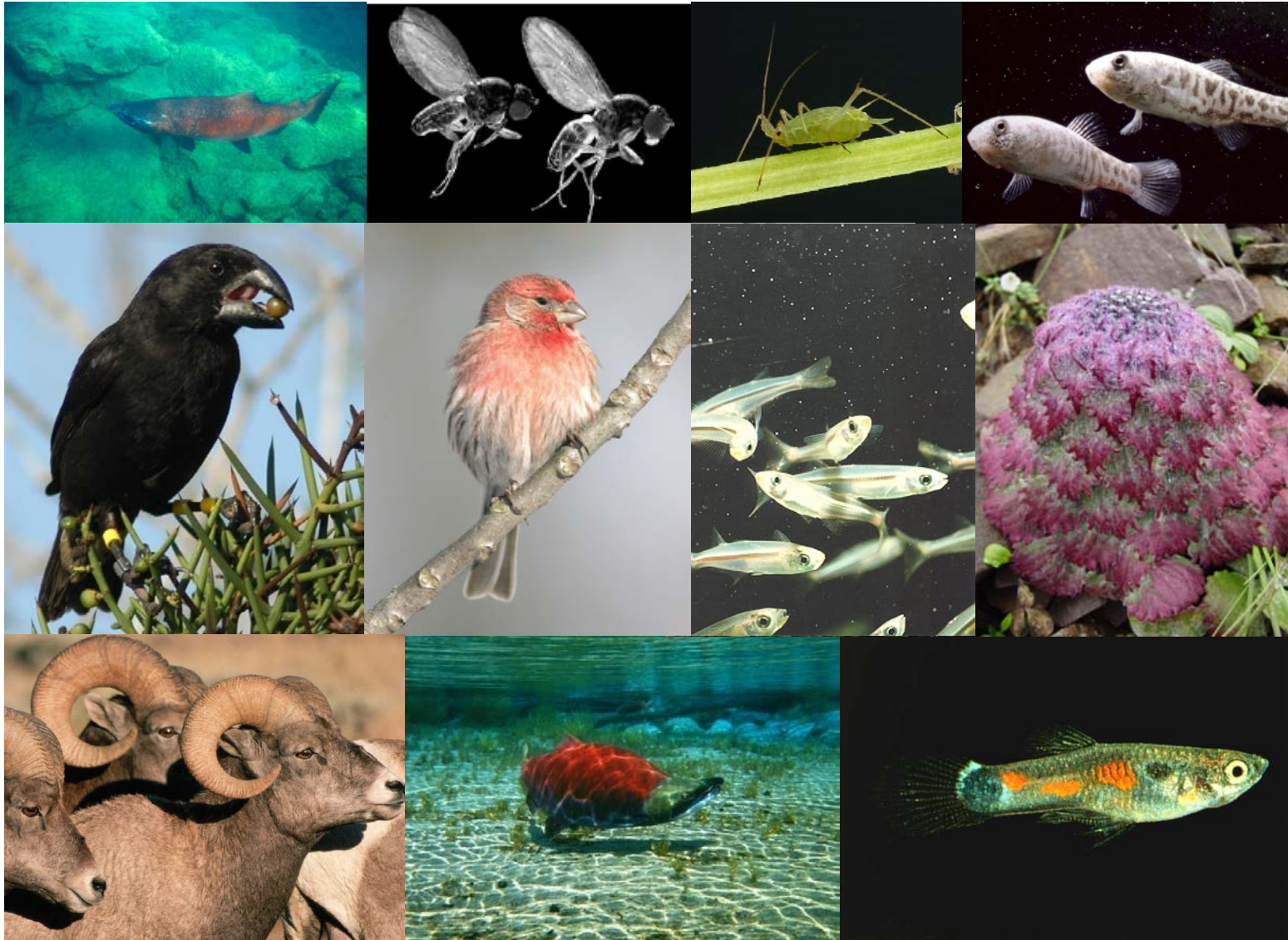
All of these have potentially large impacts on ecosystem functioning and services, especially when ecologically or economically important species are involved

# Dispersal will limit ability of mammals to track climate change

- Climate change velocity
  - temperature aver 0.42 km/y
  - precipitation aver 0.22 km/y
- Dispersal of mammals
  - distance/frequencies
  - human landscape changes
  - less than velocity climate



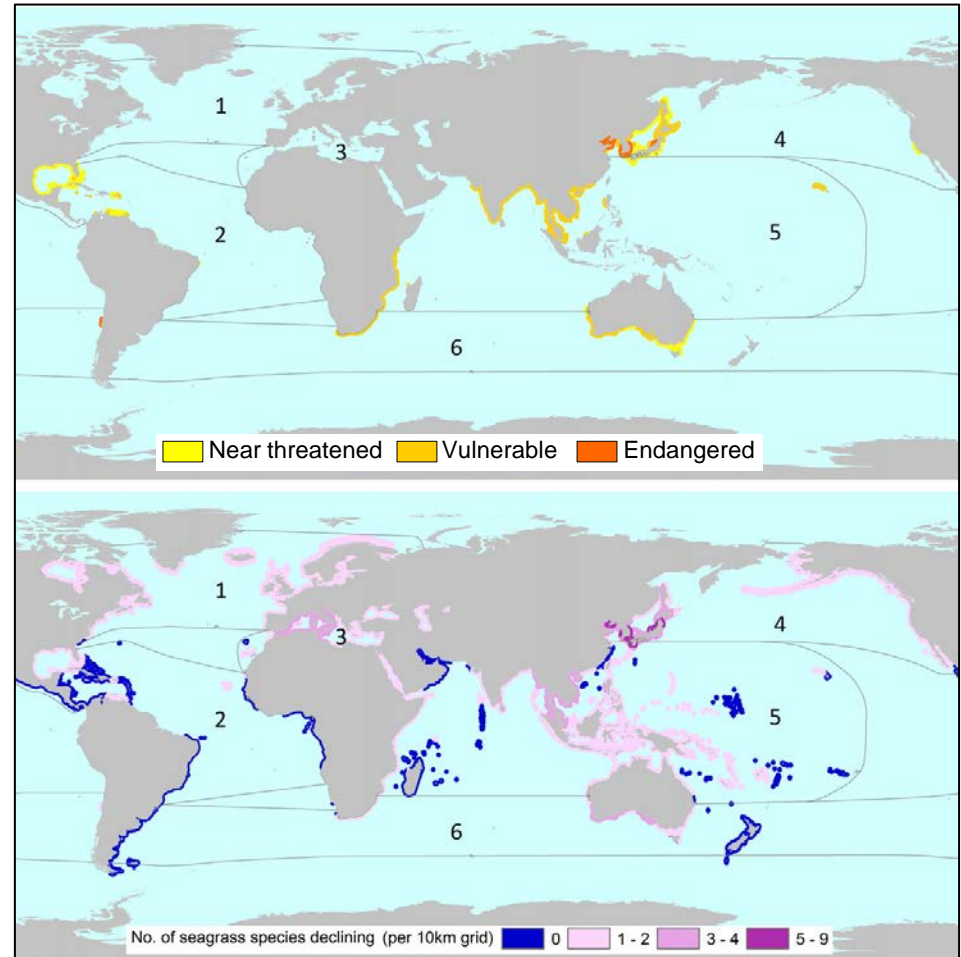
# Rapid evolution in the “wild”





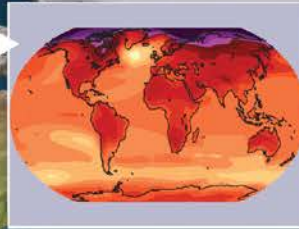
# Seagrass ecosystems

- Ecosystem services
- C burial 27 Tg C/yr
- Declining globally – 110 km<sup>2</sup>/yr
- Extinction assessment (IUCN)
  - 25% species Threatened or Near Threatened
  - 3 species endangered



# Consider multiple climate targets

**Target 1: Limit global warming.**



**Target 4: Limit the loss of carbon from cropland soils.**



**Target 2: Minimize the impact of ocean acidification on corals.**

The loss of surface waters with favorable conditions for coral reefs should not exceed X%.



**Target 3: Limit ocean acidification in the Southern Ocean**

No more than X% of surface waters should become corrosive to aragonitic shells of marine organisms.



**Target 5: Avoid decreases in food production.**

No more than X% of the global cropland areas should suffer from a productivity loss of 10% or more.



**Target 6: Limit sea level rise.**



# Emerging research findings: **Ecosystems and climate**

Sybil Seitzinger

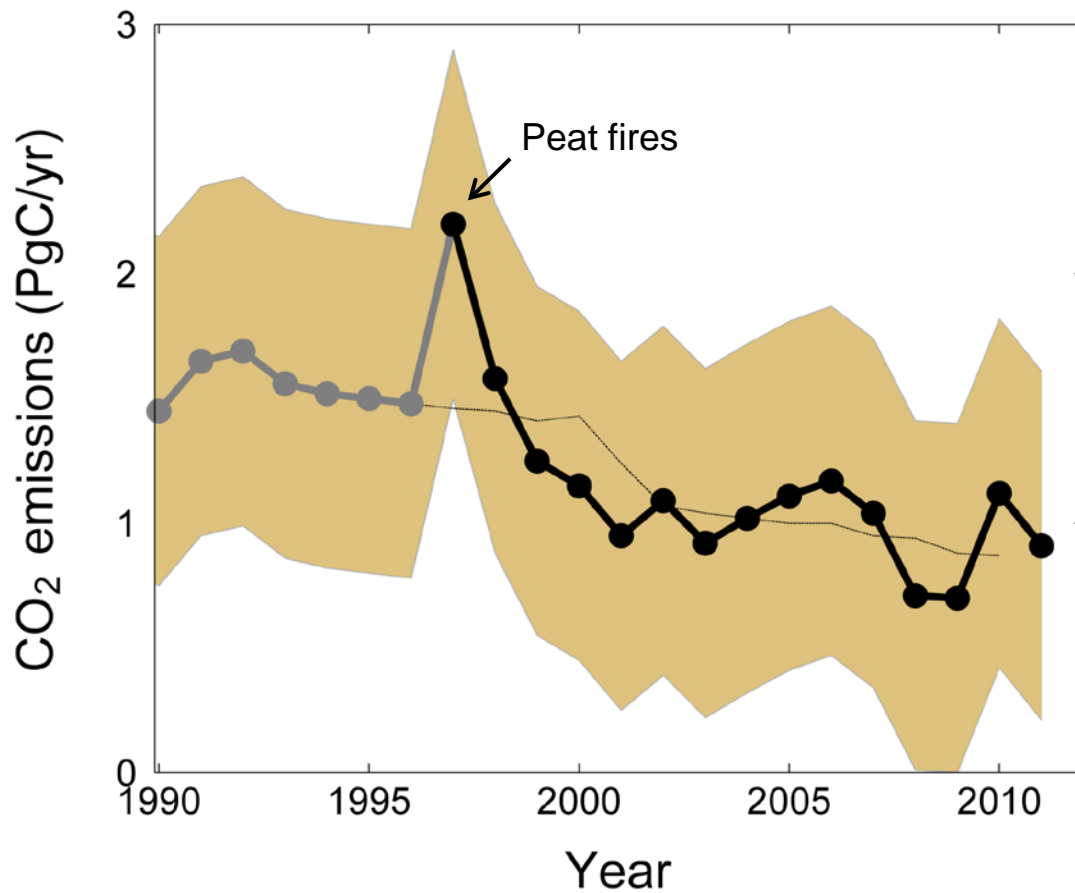
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# Land-Use Change Emissions

Global land-use change emissions:  $0.9 \pm 0.5$  PgC in 2011

The data suggests a general decrease in emissions since 1990



Black line: Includes management-climate interactions;  
Thin line: Previous estimate

