

# Interlinkages between biodiversity and climate change

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- I. How biodiversity links to climate change
- II. What are the main observed and projected impacts of climate change and biodiversity?
- III. The role that biodiversity plays in mitigating and adapting to climate change
- IV. Conclusions and challenges

## I. Biodiversity and climate are intimately linked

- Biodiversity underlies the provision of ecosystem services that are crucial for human well-being — including climate regulation and carbon sequestration
- Associated changes in biodiversity are expected to modify the provision of ecosystem services further affecting global and regional climate



## I. Biodiversity and climate are intimately linked

- Ecosystems with a high diversity at the species, ecosystem, and/or genetic level are more likely to adapt to climate change and climate variability than impoverished ecosystems
- Some components of biodiversity affect carbon sequestration and thus are important in carbon-based climate change mitigation

## II. Current and expected impacts of climate change on biodiversity

- the timing of reproduction and/or migration episodes has changed
  - Spring is arriving earlier
  - many species have shifted their range about 6 km per decade towards the poles or m per decade upward
- increased frequency of pest and disease outbreaks—especially in forests
- increased incidence of coral bleaching—in some cases mortality
- species extinctions—the golden toad



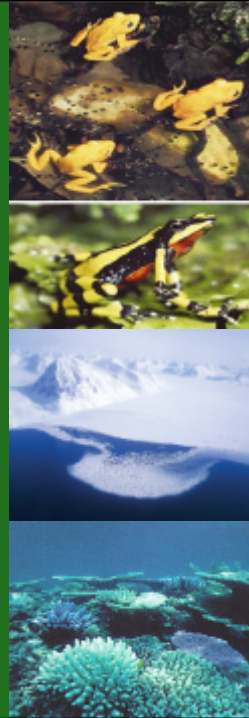
## II. Current and expected impacts of climate change on biodiversity

Climate change is expected to further impact biodiversity

- **Directly** through increases in temperature, changes in precipitation (and in the case of marine systems changes in sea level)
- **Indirectly** through changes in the intensity and frequency of disturbances such as wildfires, storms, and hurricanes

**The risk of extinction will increase** especially for species with low population numbers, restricted habitats, and limited climatic ranges

**Ecosystems that may be most threatened** include coral reefs, mangroves and other coastal wetlands, and high latitude/high altitude ecosystems



## II. Current and expected impacts of climate change on biodiversity

Climate change impacts will be amplified through

- habitat fragmentation
- land cover change
- diversion of water to intensively managed ecosystems
- pollution, and soil and water degradation
- uncontrolled exploitation
- spread of invasive alien species



### III. Biodiversity and climate change mitigation and adaptation

- Significant opportunities for mitigating climate change (UNFCCC-Kyoto Protocol) while enhancing the conservation of biodiversity
- Conservation, restoration, or establishment of biologically diverse ecosystems constitute important adaptation measures

### III. Biodiversity and climate change mitigation and adaptation

- Afforestation and reforestation can have positive, neutral, or negative impacts on biodiversity depending on the management options applied
- Avoiding deforestation and forest degradation can provide substantial biodiversity benefits in addition to mitigation of greenhouse emissions

### III. Biodiversity and climate change mitigation and adaptation

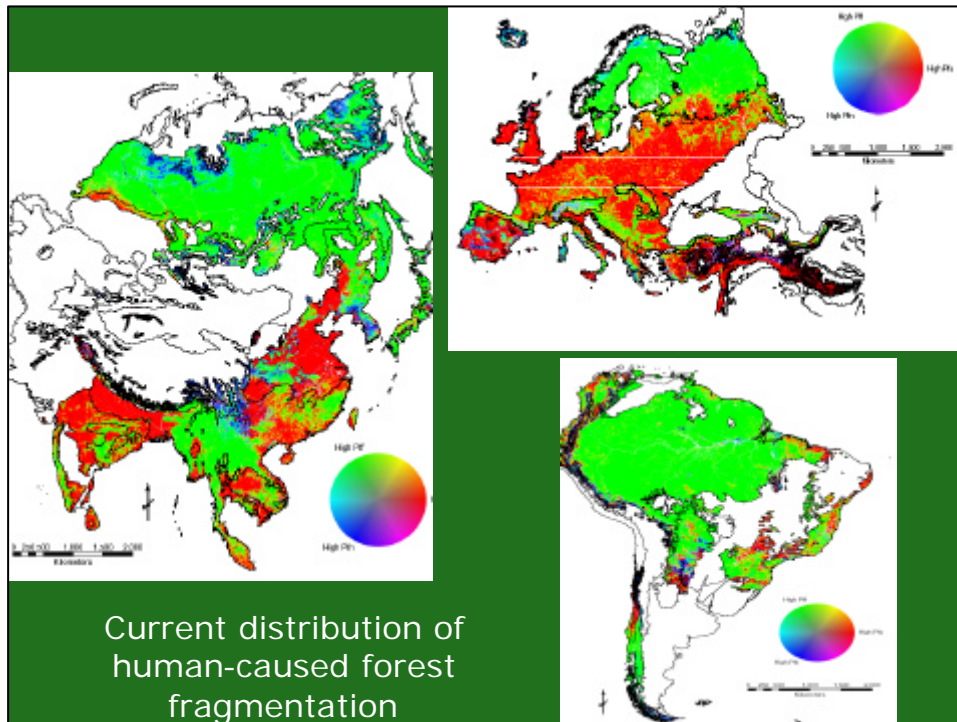
For example, establishing mixed-species tree plantations in degraded lands

- sequester atmospheric carbon (mitigation)
- restore critical ecosystem services such as watershed functions
- connect isolated forest fragments—in order to—
- allow for species migration in response to increases in temperature (adaptation)



### IV. Conclusions / challenges

- Past changes in the global climate resulted in extensive migrations and ecosystem reorganization but occurred in landscapes not as fragmented and/or degraded
- Yet lack of ecological connectivity is likely to limit both the capability of species to migrate and the ability of species to persist in fragmented habitats



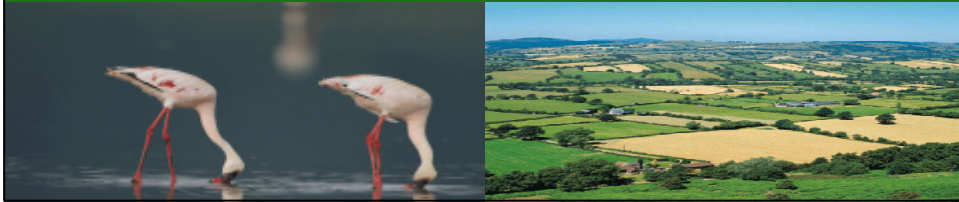
#### IV. Conclusions / challenges

- One of the great challenges of this century is to manage biodiversity in a changing climate with other multiple pressures
- **Intensively managed ecosystems:** switching varieties
- **Less managed ecosystems:** either minimize or facilitate change ("off reserve" approach)

#### IV. Conclusions / challenges

Management of biodiversity in the face of climate change will need :

- Increased understanding of species adaptations to their current environment for designing future options
- Development of mathematical models of plant and animal migration that take into account current patterns of land cover/ land use type



Thank you

