



Climate change, biodiversity and adaptation

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Overview of Presentation



- What is climate change adaptation?
- White paper on Adapting to Climate Change
- How can we help biodiversity adapt to climate change
- How can biodiversity help:
 - Adaptation in other sectors
 - Mitigation (i.e. reduction of Greenhouse Gases)

A twin-track approach to mitigate climate change impacts



- Limit climate change by reducing greenhouse gas emissions (and increasing CO² uptake?)
 - But, already committed to > 1^o C change
 - >2^o C change almost inevitable on current trends
- Facilitate adaptation to climate change

What is adaptation



- **Adaptation** – the process through which the environment and anthropogenic consequences of climate change are managed and their impacts limited.

White paper on adaptation



- “*Adapting to climate change: towards a European framework for action*” (April 2009)
- Objective: to improve the EU’s resilience to deal with the impacts of climate change
- Outlines two-phase framework to increase the EU’s resilience to climate change
 - 2009-2012: further research and analysis
 - 2013 onwards: implementation of comprehensive adaptation strategy based on national and regional adaptation strategies



Four pillars

- 1) Building a solid knowledge base on the impact and consequences of climate change for the EU.
- 2) Integrating adaptation into EU key policy areas.
- 3) Employing a combination of policy instruments (market-based instruments, guidelines, public-private partnerships) to ensure effective delivery of adaptation.
- 4) Stepping up international cooperation on adaptation.



- Loss or relocation of areas with suitable climate
 - Direct physiological responses
 - Indirect responses (e.g. via habitats, prey, competitors)
- Catastrophic events (fire, storms, droughts)
- Spread of alien species / pathogens
- Sea-level rise (coastal squeeze)
- Secondary impacts from increased human demands for land (esp for energy and food) and water



Direct Impacts

- **Sensitivity**
 - Narrow tolerances to changes in climate variables (or dependence on habitat / species that is)
- **Exposure**
 - Occur where sensitive climatic conditions will change
- **Adaptation constraints**

Overall impacts on species



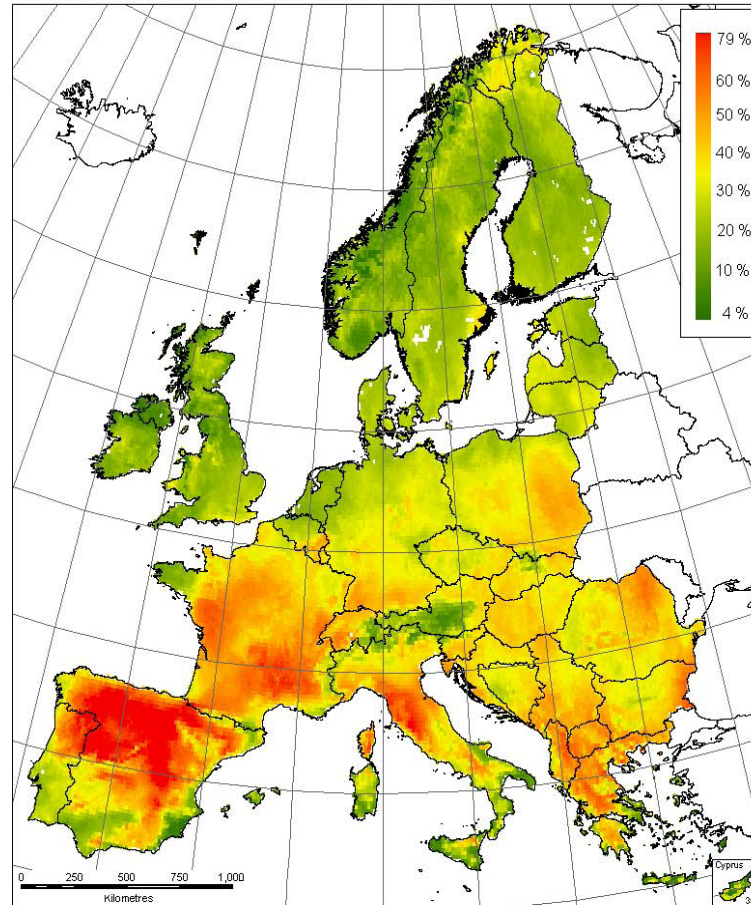
Using projections of species' distributions for future climate scenarios, it has been predicted that, on the basis of mid-range climate-warming scenarios for 2050, 15-37% of species in sample regions and taxa will be 'committed to extinction'.

Thomas, et al. (2004). Extinction risk from climate change. *Nature* **427**:145-148.

Biodiversity impacts



Modelled local extinction in plant communities
under the A2 HadCM3 climate model by 2080 [%]



Potential adaptation responses of affected species



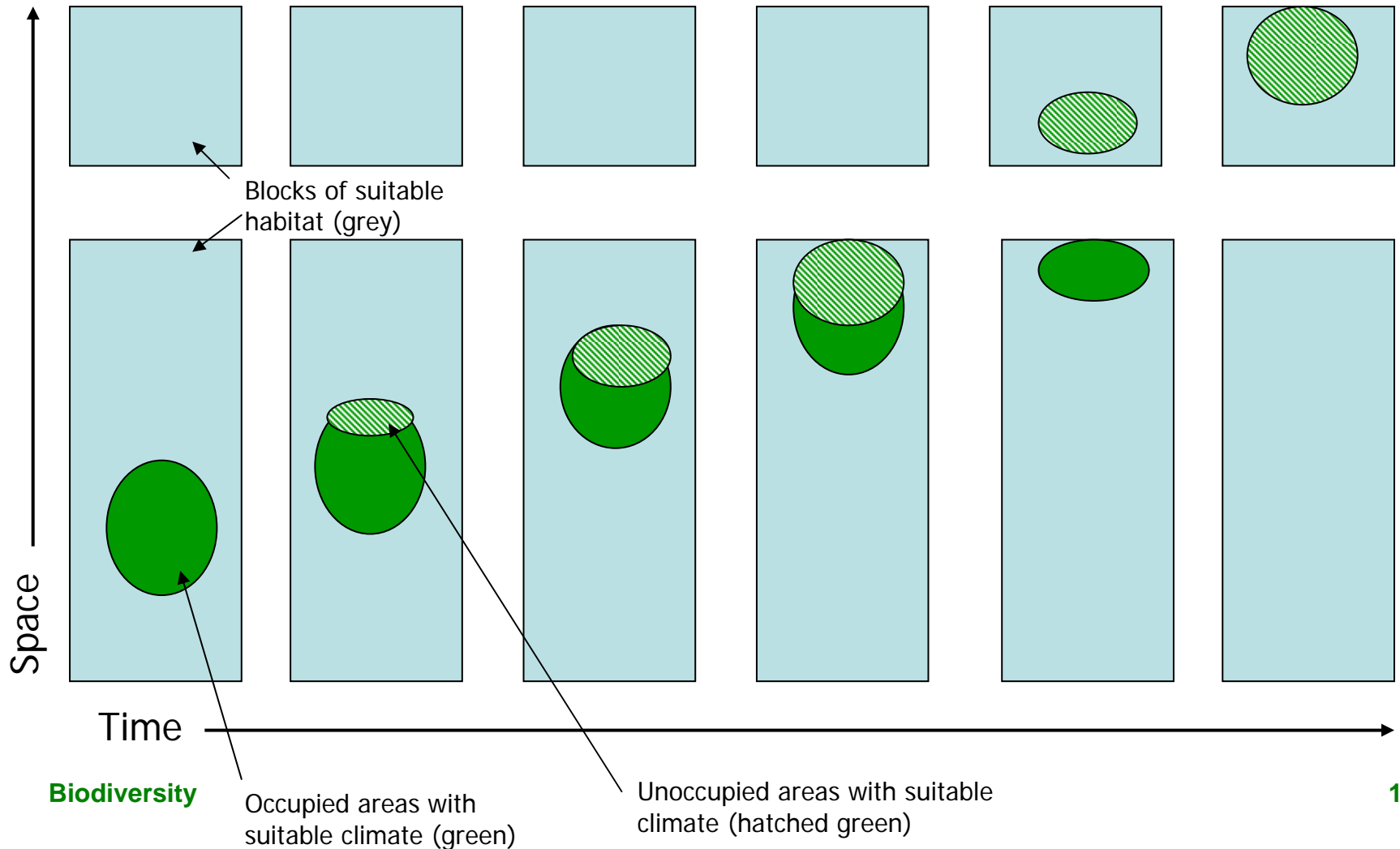
- Stay and adapt
 - Withstand declines in survival and productivity (and competitors)
 - Behavioural change
 - Natural selection of existing genotypes
 - Macro-evolution
- Move to new locations with suitable climatic conditions
 - Small-scale (altitude, depth, aspect)
 - Dispersal and colonisation

Adaptation constraints

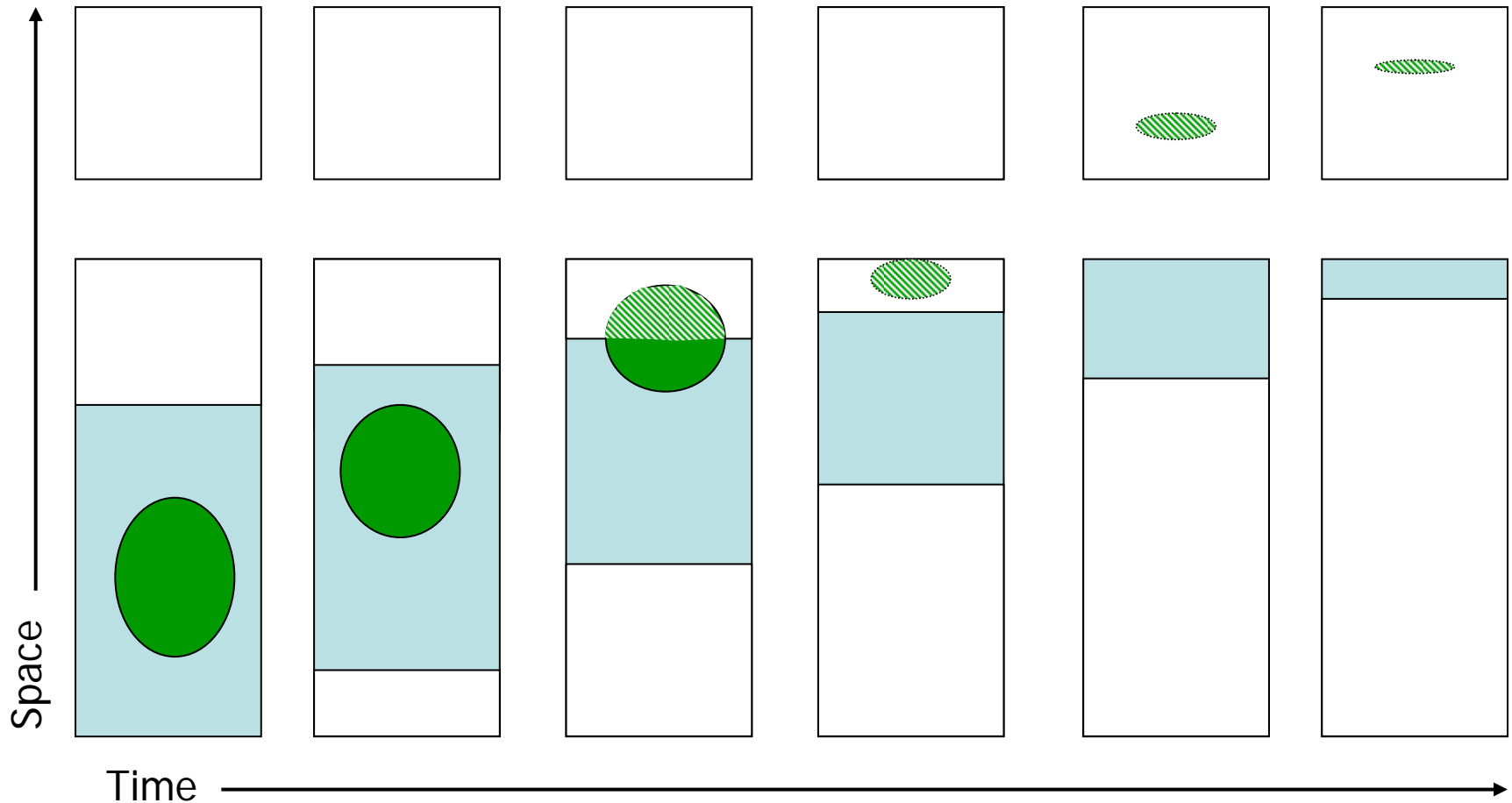


- Populations / habitats already in poor condition
- Restricted ranges and small population sizes
- Restricted movements
 - biological constraints on dispersal & colonisation
 - bounded distributions (e.g. islands, mountain tops, high latitudes)
 - blocked dispersal routes (e.g. by mountains, fragmented habitat)
- Dependence on specific habitats or prey etc

Spatial responses of species – speed & fragmentation



Spatial responses of species – the habitat lag effect



How can we help biodiversity adapt?



- Increase the resilience of ecosystems by reducing threats and enhancing habitats:
 - Fragmentation
 - Pollution
 - Disturbance
 - Predation (over-exploitation)
 - Alien species and pathogens
- Help species move to new locations in response to climate change
 - Reduce habitat fragmentation
 - Increase productivity & emigration rates
 - Improve the condition of individuals

Protected areas





Action: increasing the resilience of biodiversity, ecosystems and water

“Explore the possibilities to improve policies and develop measures which address biodiversity loss and climate change in an integrated manner to fully exploit co-benefits and avoid ecosystem feedbacks that accelerate global warming”



1. Implementation of the EU Biodiversity Action Plan
2. Development of climate change adaptation strategies and actions plans
3. Designation of Natura sites and other protected areas



4. Site management plans

- identify vulnerable species and habitats
- in-site adaptation management
- off-site needs for connectivity
- monitoring

5. Delivery of conservation management

- Cross-compliance
- Agri-environment measures



6. Control of invasive alien species (EU strategy)
7. Impact assessment and planning policy
 - SEA and EIA
8. Increasing functional connectivity
 - Agri-environment measures
 - Habitat banking
 - Ecosystem based adaptation

Ecosystem based adaptation (EbA)



CBD Ad hoc Technical Expert Working Group

- “the use of ecosystem management activities to support societal adaptation. EbA identifies and implements a range of strategies for the management, conservation and restoration of ecosystems to provide services that enable people to adapt to the impacts of climate change. It aims to increase resilience and reduce the vulnerability of ecosystems and people in the face of climate change ...”



- *“maintaining natural ecosystems (including their genetic and species diversity) is essential to meet the ultimate objective of the UNFCCC because of their role in the global carbon cycle and because of the wide range of ecosystem services they provide that are essential for human well being.”*

www.cbd.int/climate



Includes a request to

- “significantly increase consideration of the role of ecosystems in adaptation measures, with a view to improving resilience of ecosystems, reducing vulnerability and underpinning new and sustainable growth models.

Examples of ecosystem based approaches



- **Peatlands**

- Reduced drainage, grazing and damaging fires
- Favourable conservation status
- Adaptation: water resources, water quality & flood attenuation
- Mitigation: reduced Carbon loss



Examples of ecosystem based approaches



- **Agriculture**

Fallow land and reduced cultivations

- Improved farmland biodiversity, soil condition and reduced pollution
- Adaptation: improved soil structure and fertility, water retention and drainage
- Mitigation: reduced farming operations (fuel), fertilizer use and soil carbon losses



Examples of ecosystem based approaches



- **Green space in cities**
 - Increased nature conservation, social and health benefits
 - Adaptation: cooling effects, air quality
 - Mitigation: reduced energy use for air-conditioning

Key messages



- Climate change will have profound impacts on biodiversity.
- We can help ecosystems adapt, to some extent, mainly by increasing resilience.
- Increasing the resilience of ecosystems by improving their ecological condition can bring other adaptation and mitigation co-benefits.



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Thank you

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