Science and society: the context for developing conservation adaptation strategies

Mike Morecroft and Nick Macgregor

How do we practically develop adaptation strategies?

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Science

- evidence of change
- projections
- population dynamics
- interactions
- etc.

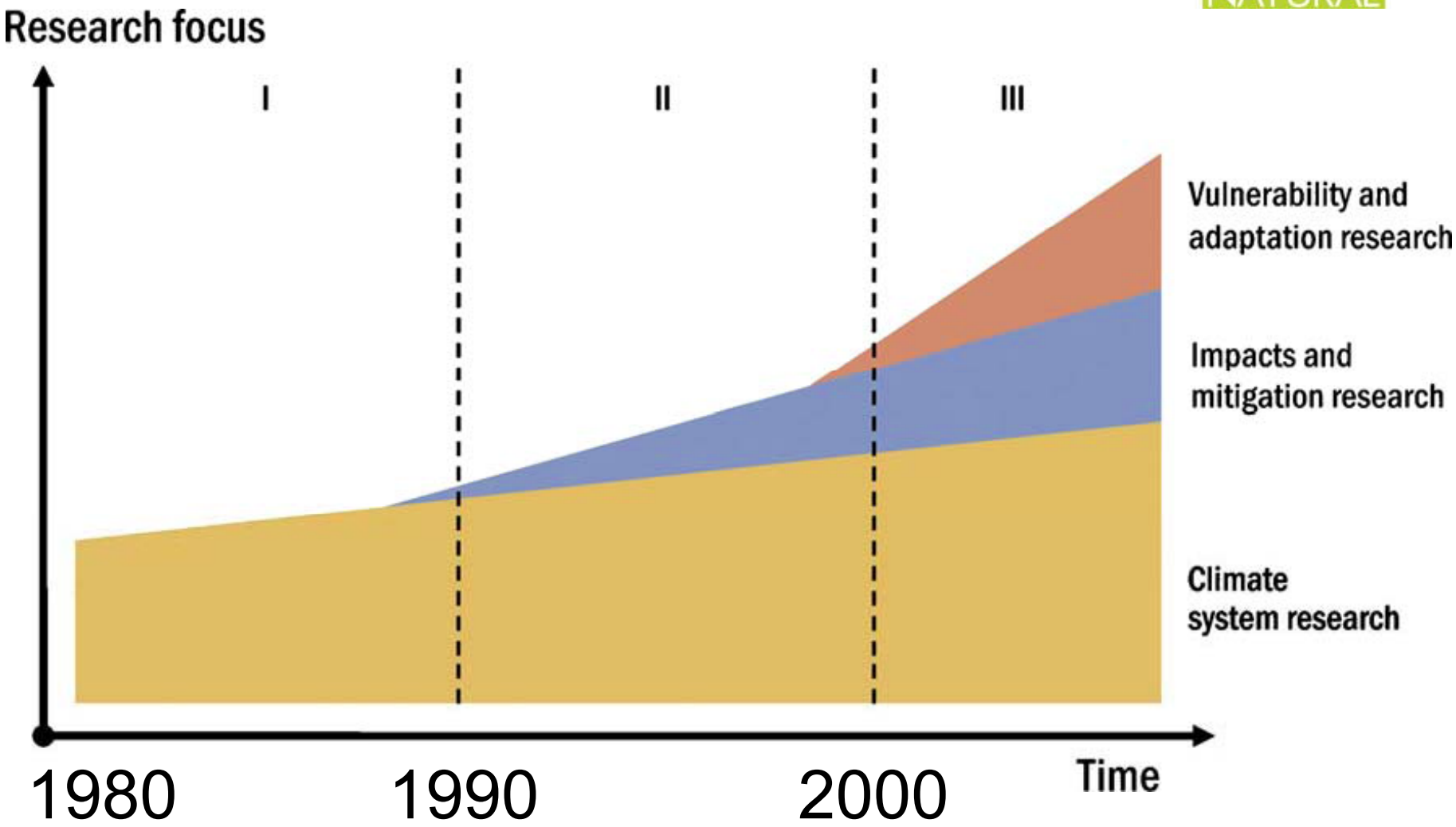
Society

- values
- policy
- legislation
- economic factors
- etc.

Conservation plans and strategies

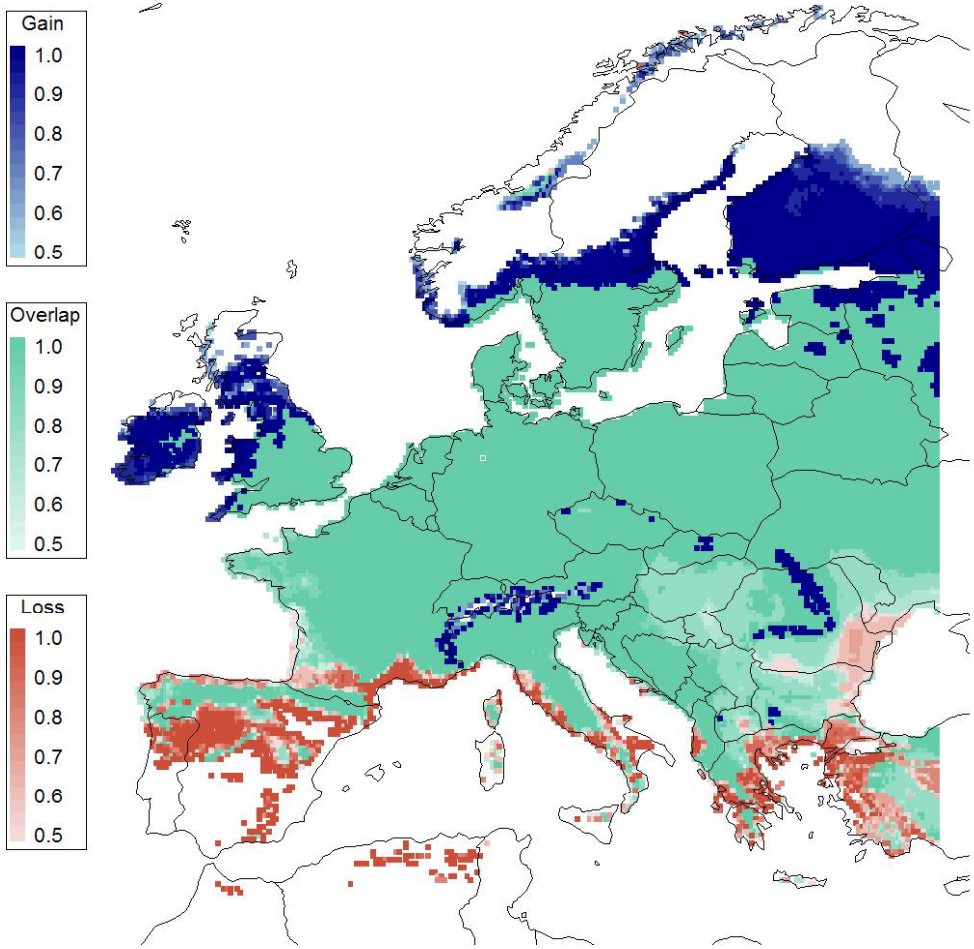
Science

Development of climate change research



Biesbroek et al. (2010) *Global Env. Change*

Modelling



Stag beetle BRANCH Project

2050s suitable projected climate space - **HAD A2** model

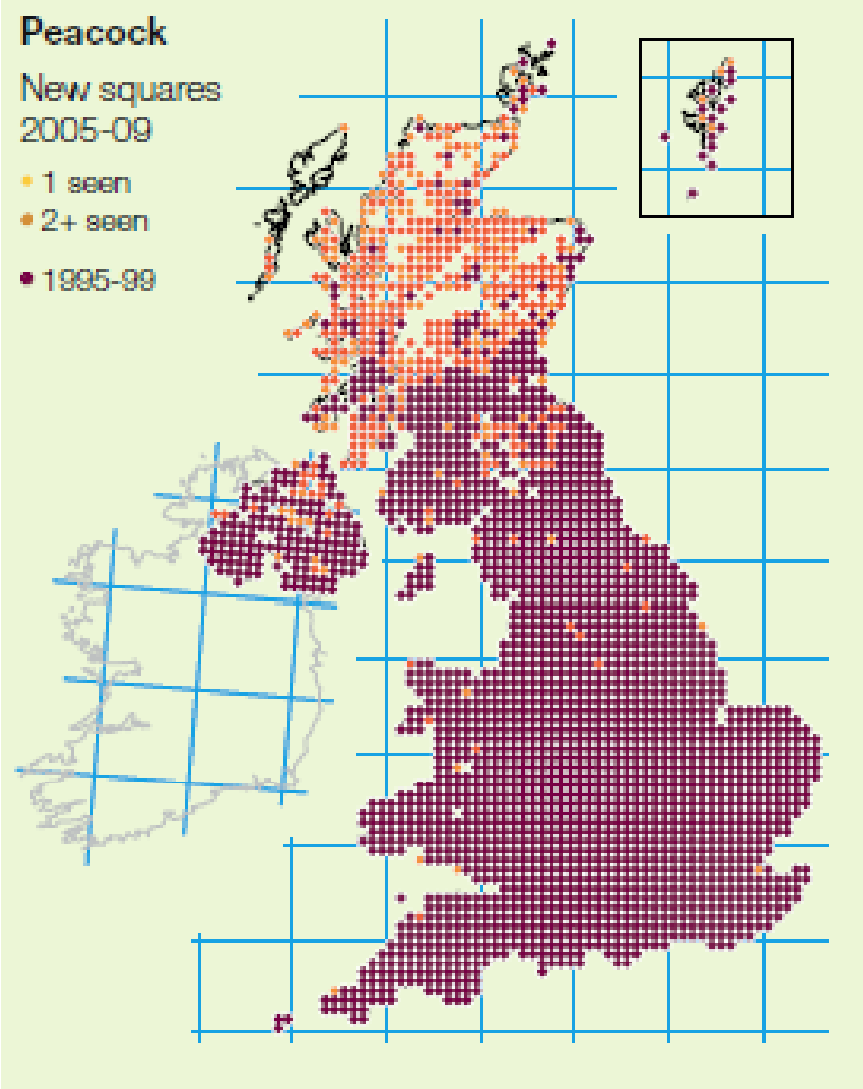
Modelling and Projections
Climate system and impacts

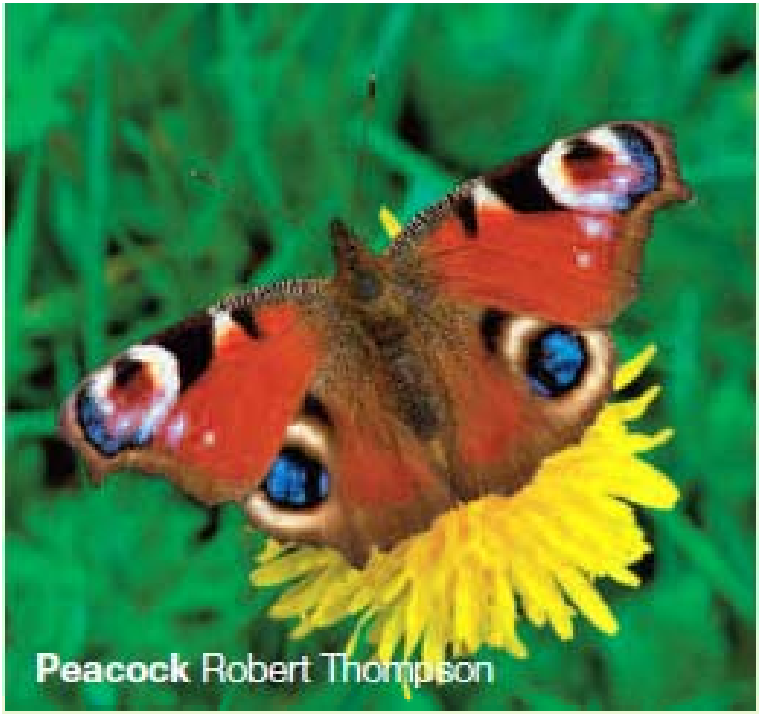
- Started work on climate change
- Still an important area of work

- Uncertainty inevitable but better understood

→ Must **adapt to uncertainty** as well as change

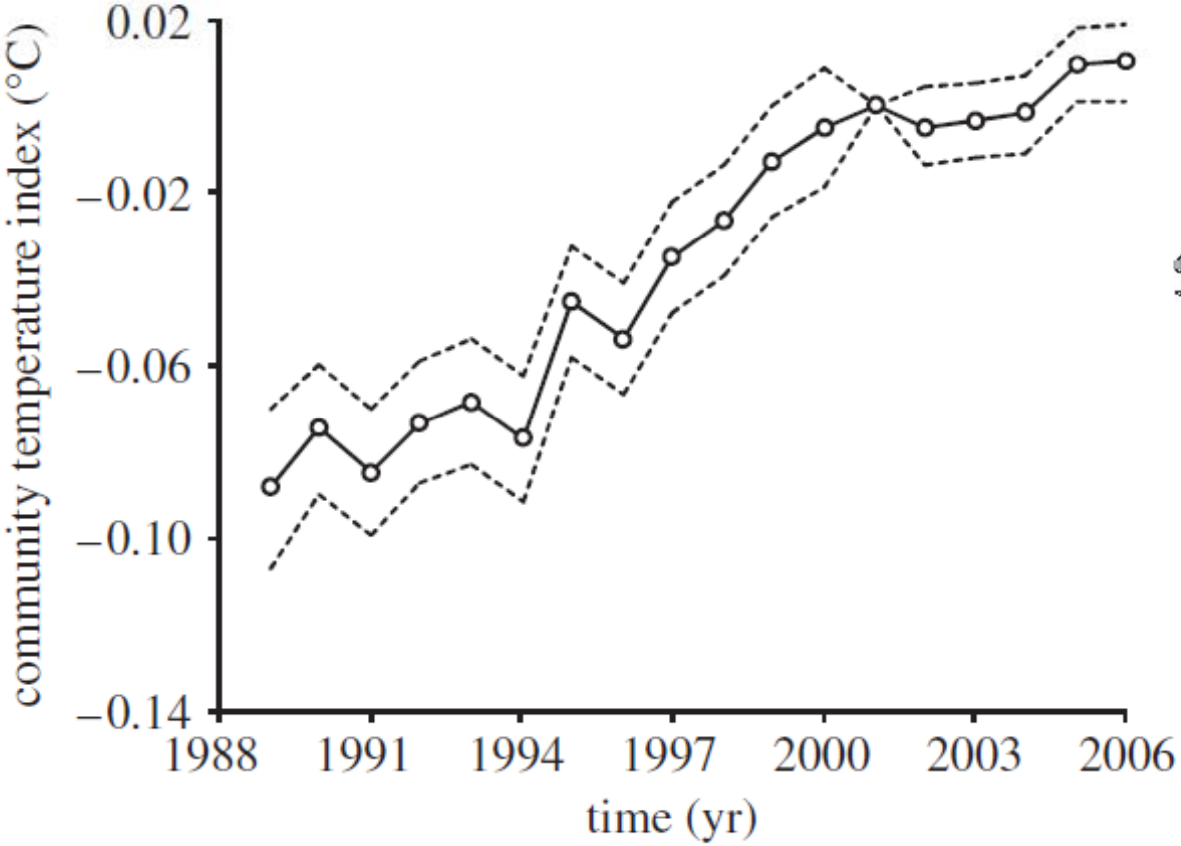
From projection to detection: Distributions are changing

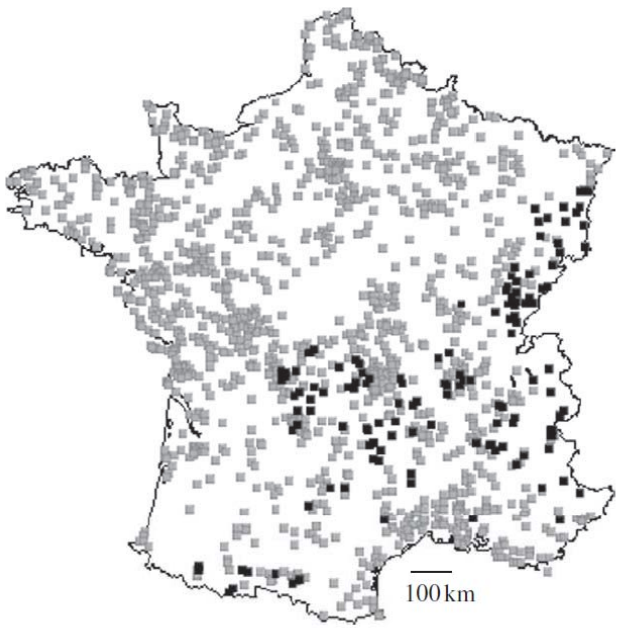




The state of the UK's butterflies 2011. Butterfly Conservation.

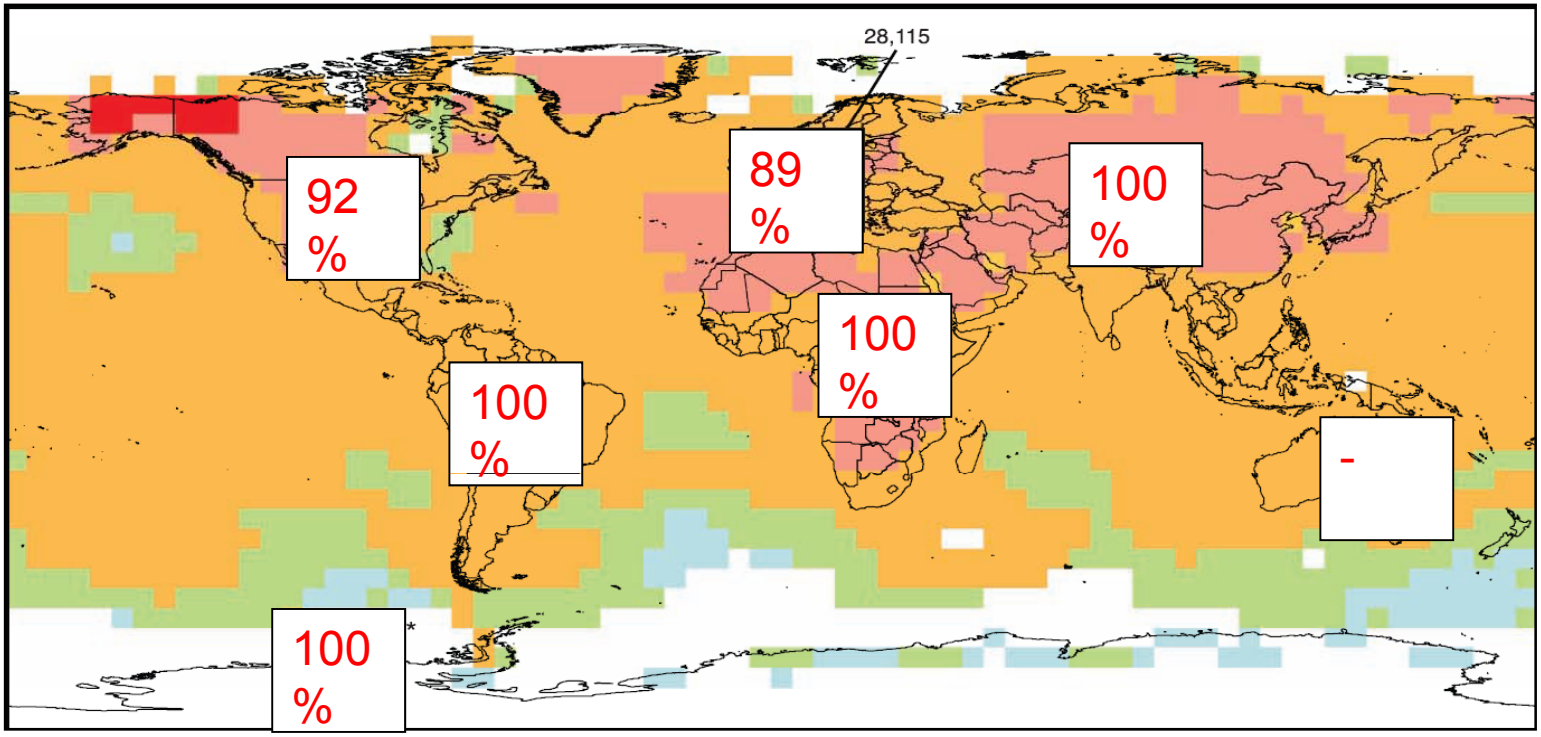
Communities are changing: Bird community temperature index in France





Devictor et al., 2008

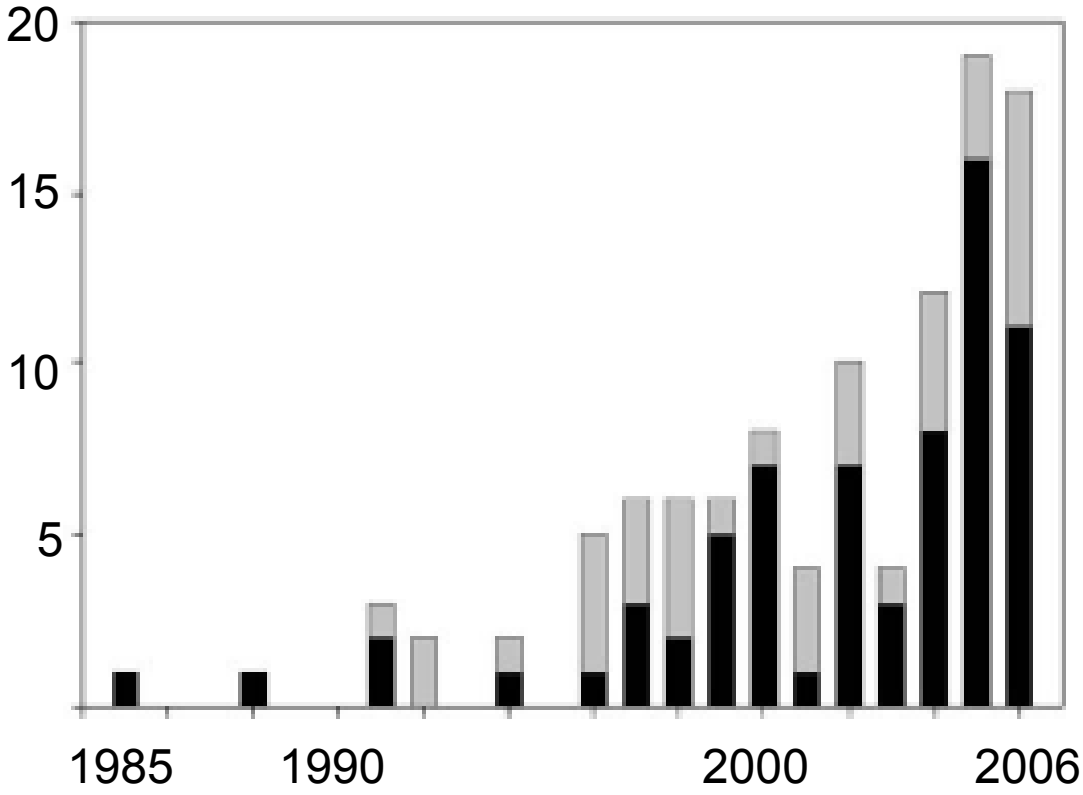
Ecological Impacts are becoming apparent: IPCC 2007



90% of significant long term biological changes consistent with warming

Adaptation has become a topic in its own right

Papers and reports 1984-2006



Heller & Zaveleta (2009) *Biol. Conservation*

Top 10 adaptation measures to 2006

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Proposed changes

- Increase connectivity
- Mitigate other threats
- Intensive management to secure populations
- Translocate species
- Increase number of reserves

Building capacity

- Integrate climate change into planning
- Study response of species to climate
- Improve predictive capacity
- Improve coordination
- Monitoring programmes

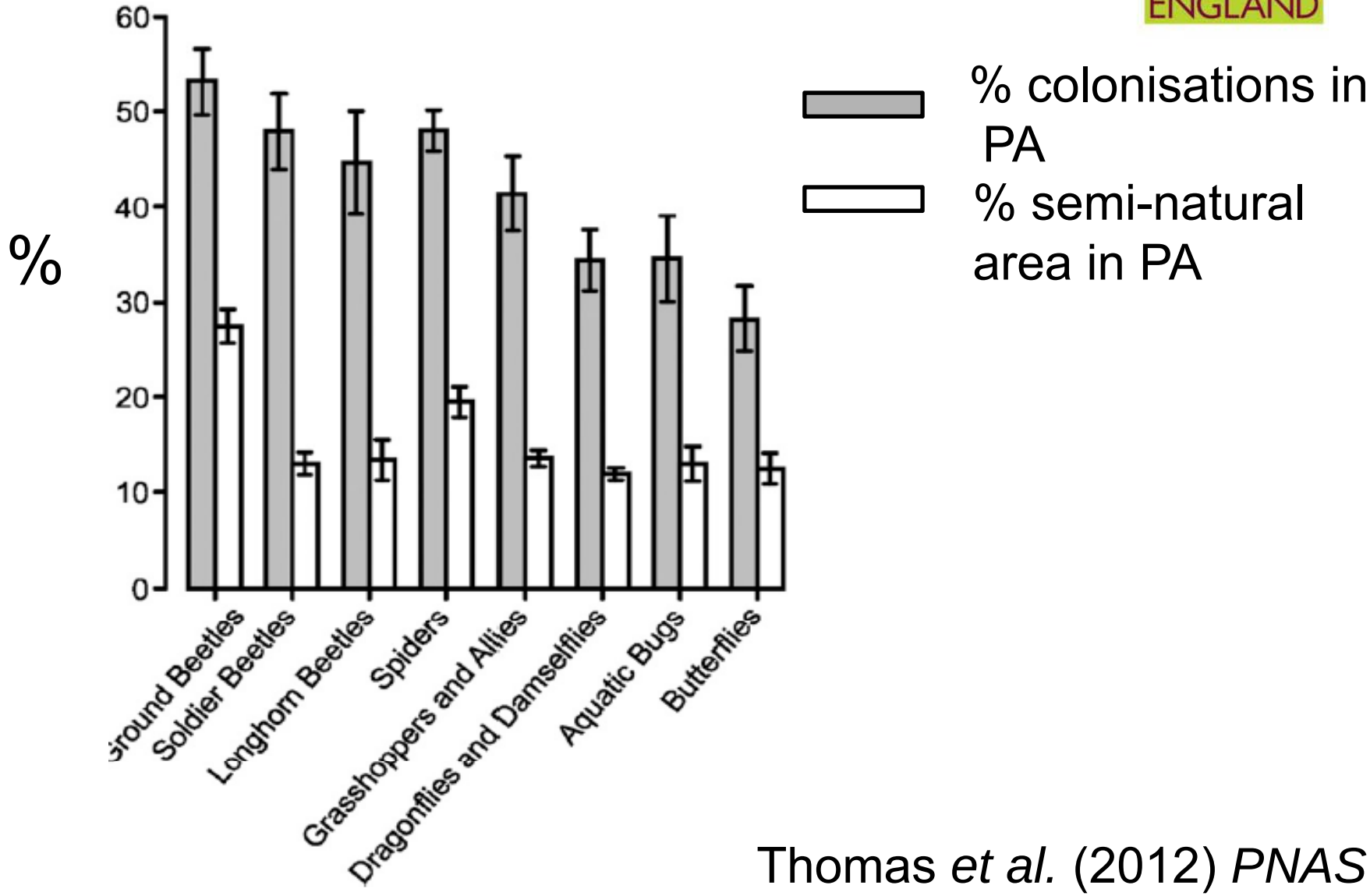
Heller & Zaveleta (2009) *Biol. Conservation*

Topical adaptation issues

- Limitations of connectivity
  - Poor dispersers
  - Invasive species
- Role of landscape heterogeneity
  - Potential for refugia

- **Need to test which measures work best in which circumstances**

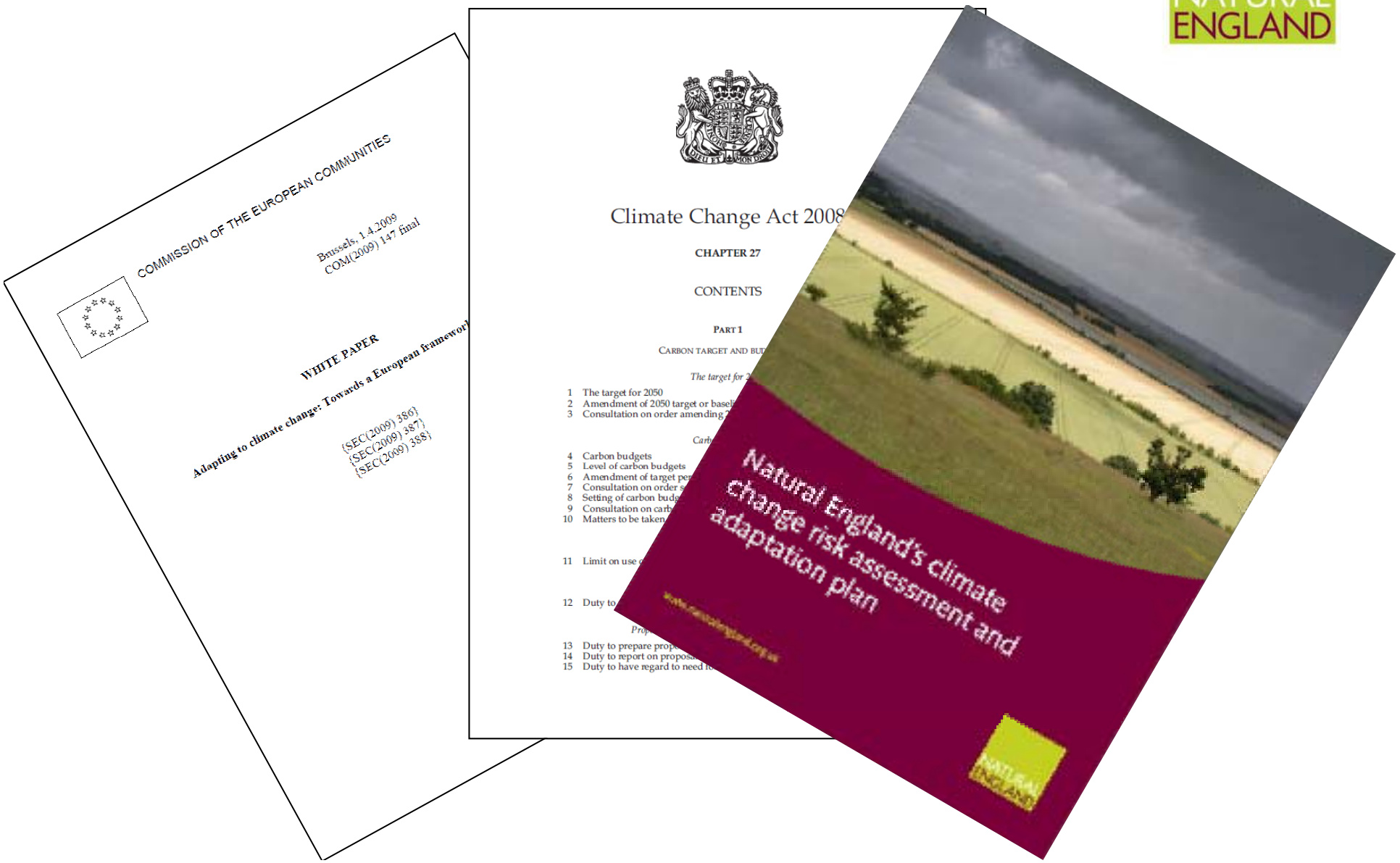
Protected areas are preferentially colonised during range expansion



Thomas *et al.* (2012) *PNAS*

Society

Policies, legislation, strategies and plans - at all levels



2008

HM Government
Adapting to climate change in England
A FRAMEWORK FOR ACTION
defra
Maak ruimte voor klimaat!
Observatoire national sur les effets du réchauffement climatique
Stratégie nationale d'adaptation au changement climatique
La documentation Française
Ministry of Agriculture and Forestry
Finland's National Strategy for Adaptation to Climate Change
Publication 1a/2005
Strategi for tilpasning til klimaændringer i Danmark
Marts 2008
Regeringen
PLAN NACIONAL DE ADAPTACIÓN AL CAMBIO CLIMÁTICO
Deutsche Anpassungsstrategie an den Klimawandel
vom Bundeskabinett am 17. Dezember 2008 beschlossen
NEMZETI ÉGHAJLATVÁLTOZÁSI STRATÉGIA
2008-2025
NÉS

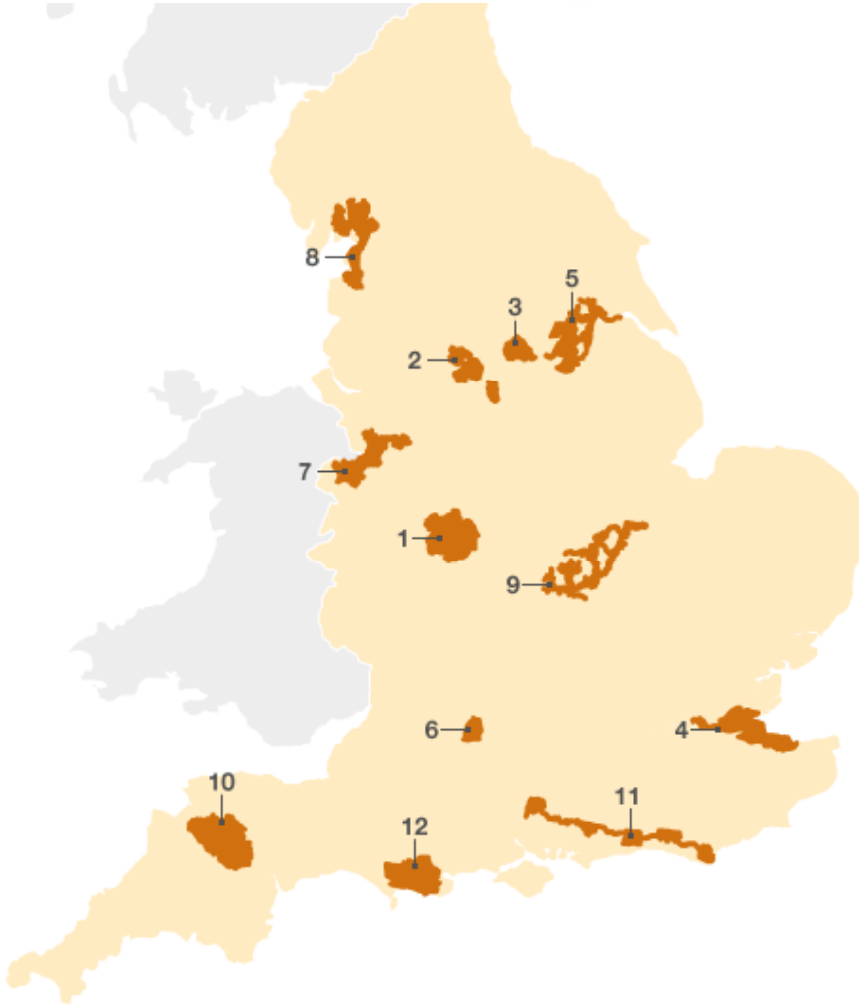
Relevant European institutions and initiatives

- European Commission
- Regional Development Fund
- European Environment Agency
- Agency networks: ENCA and EPA
- EUROPARC, Eurosite
- Networks of NGOs: e.g. Birdlife
- Projects: Interreg, LIFE, FP7 etc.
- e.g. HABIT-CHANGE
- Etc.

Beyond conservation: threats from maladaptation

Beyond conservation: Opportunities from ecosystem based adaptation

Partnership working is essential



Nature Improvement Areas

Natural England

Government conservation agency for England

- Designate protected areas and species
- Advise government and stakeholders
- Manage National Nature Reserves
- Operate Agri-environment schemes
- Develop science and evidence

Developing adaptation strategies

Natural England's approach to adaptation

- Partnership working through
  - National Adaptation Programme
  - Biodiversity 2020 Strategy
- Embed in all our work e.g.
  - Agri-environment schemes
  - Protected site designations
- Train our staff
- Develop the evidence base
- Develop advice and tools

Resilience, accommodation or transformation?

Changing approach as the climate changes

1°C > 2°C > 3°C > 4°C

resilience accommodation transformation

enable persistence → accept change → promote change

Morecroft *et al.* (2012) *Journal of Applied Ecology*

Species change may increase ecosystem resilience

/wEWCQI

Porlock Bay: Transformation accommodation or resilience?

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Key Challenges for European Conservation in adapting to climate change

- Multiple scales: Europe vs. national vs. local
- Integration with CAP, WFD etc.
- Complexity of the European processes and institutions

Conclusions

- Fast moving science
  - Evidence of impacts are becoming apparent from long-term monitoring
  - There is increasing emphasis on adaptation research
- Knowledge exchange is critical
- Need to test effectiveness of different adaptation measures
- Policy initiatives at all levels – opportunities and threats
- Need to build partnerships
- Adapt to uncertainty
- Build resilience, be prepared to accommodate change; consider possible transformation.