Danida fellowship course, training on climate change for journalists from Africa, Asia and Latin America

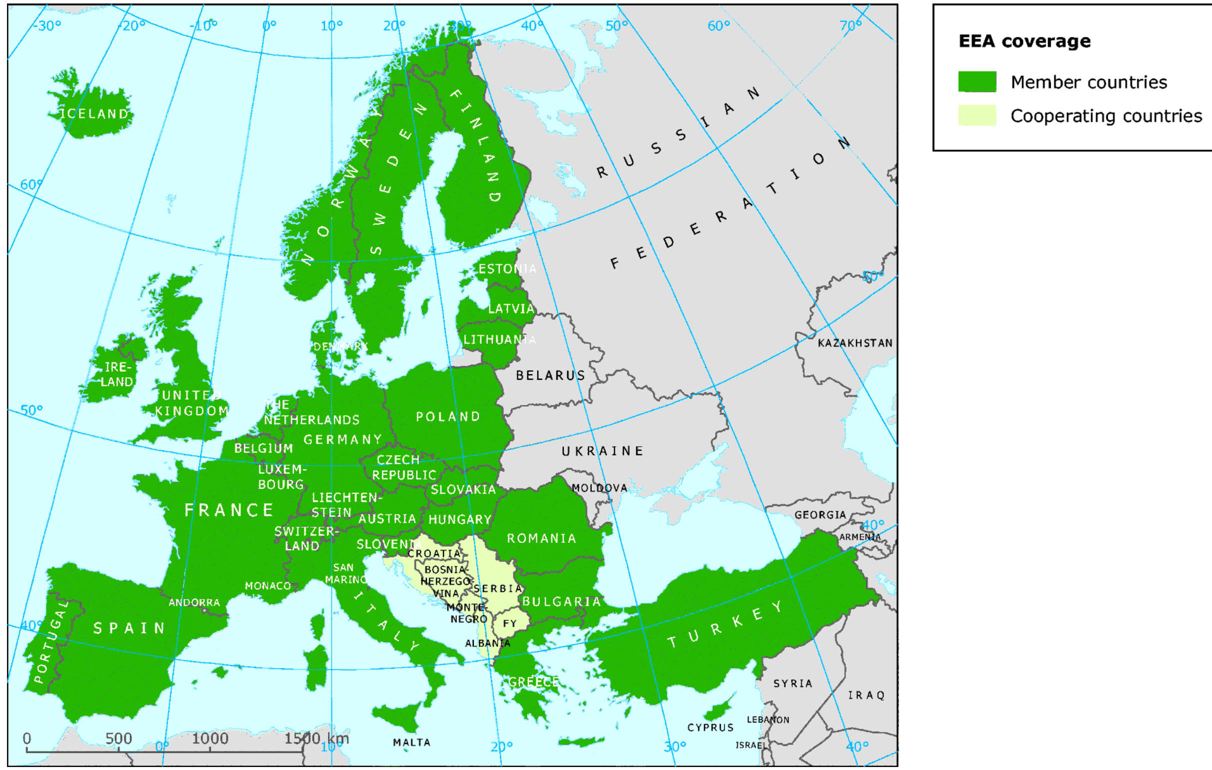
Overview of climate change impacts, vulnerability and adaptation in Europe

André Jol

European Environment Agency

EEA and member/collaborating countries

- The EU body dedicated to providing timely, targeted, relevant and reliable information on the environment
- To help the EU and member countries make informed decisions about improving the environment
- 32 members + collaborating countries



www.eea.europa.eu

Impacts of Europe's changing climate

- Jointly by EEA, JRC and WHO Europe
  - Observed and projected trends by 40 indicators
  - Vulnerable regions and sectors
  - Summary of national adaptation plans
  - Overview of main data gaps
- Based on existing EU and national research (different scenarios)
- Regular updates foreseen (web publication)

Above +2ºC impacts will be large

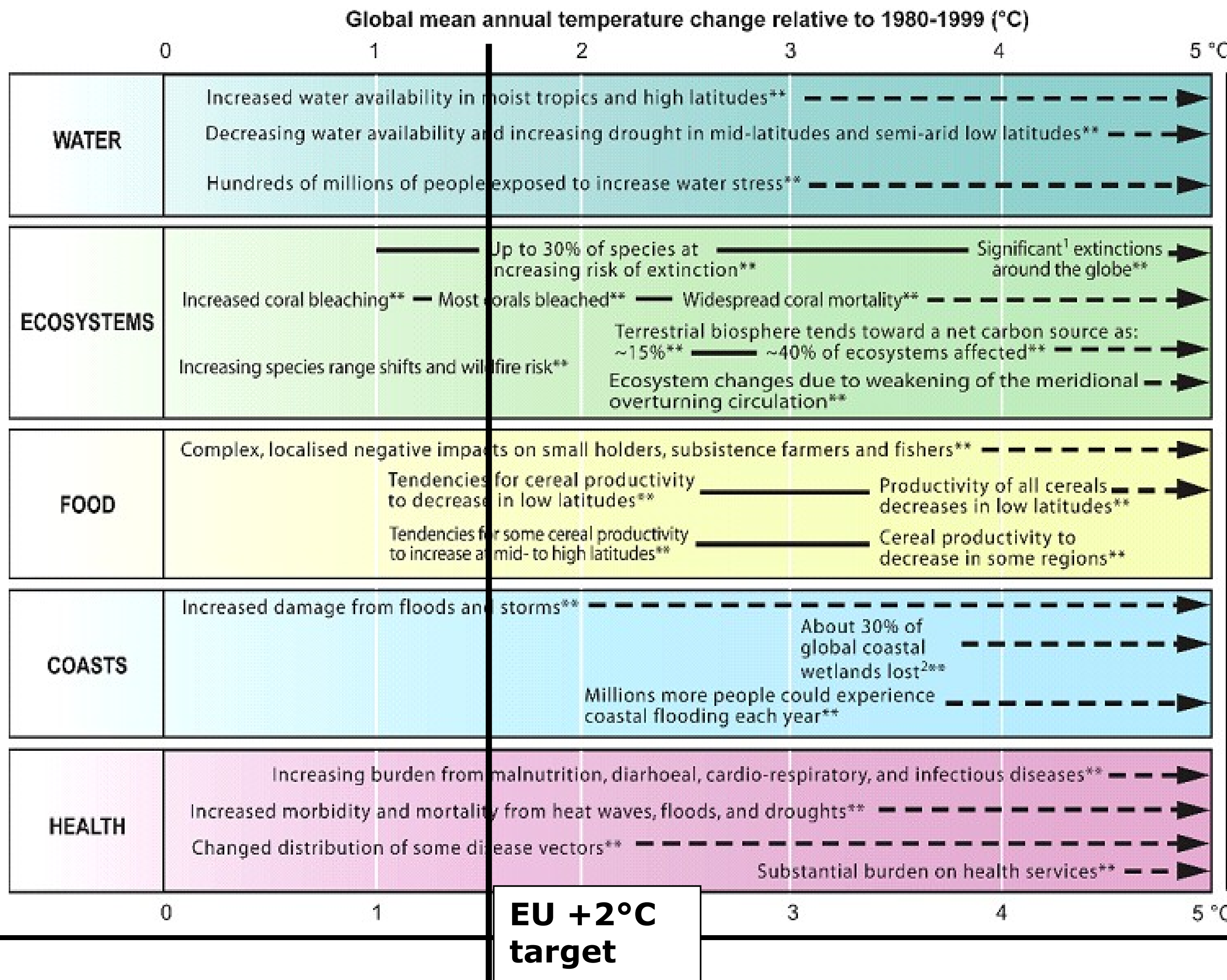
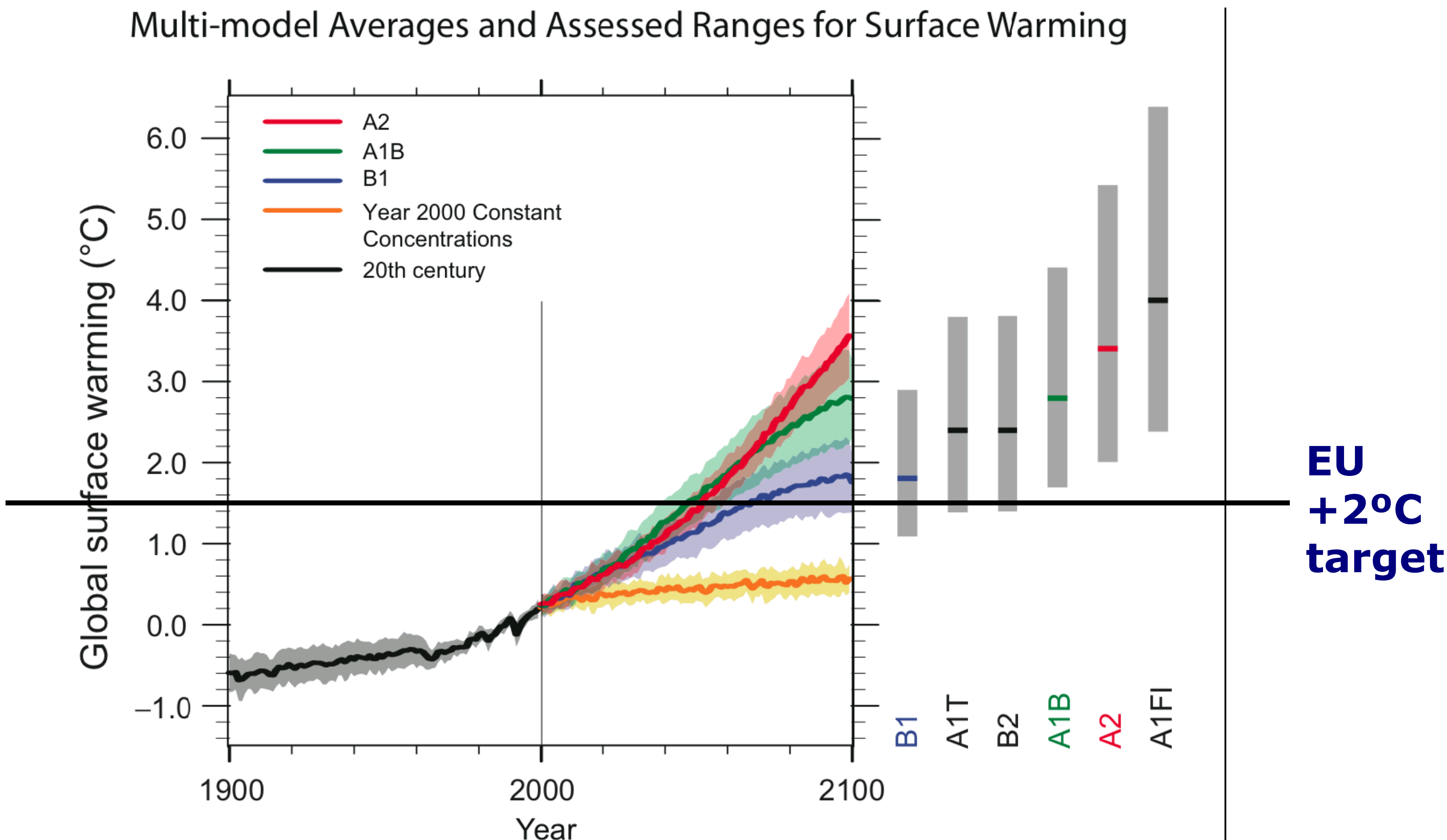


Figure 3 : Key impacts as a function of increa sing global average temperature change[1]

1Above 1980 - 1999 levels. To e xpress the cha nge relative to the period 1850 - 1899, IPCC WG II adds 0.5 degrees C

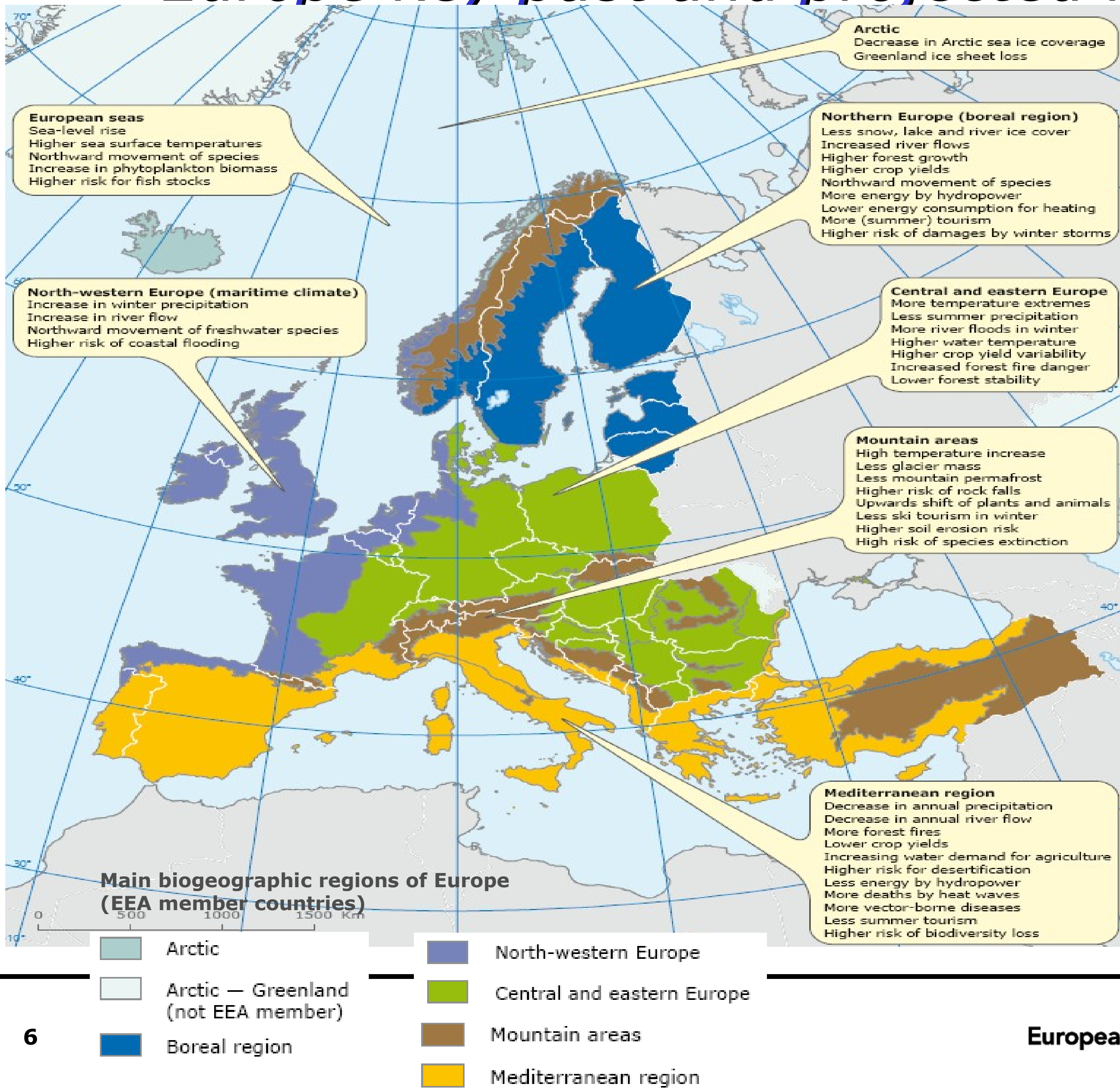
Substantial global GHG emission reduction is needed as well as adaptation



Source: IPCC, 2007(full uncertainty range for temperature increase is 1.1-6.4ºC)

European Environment Agency

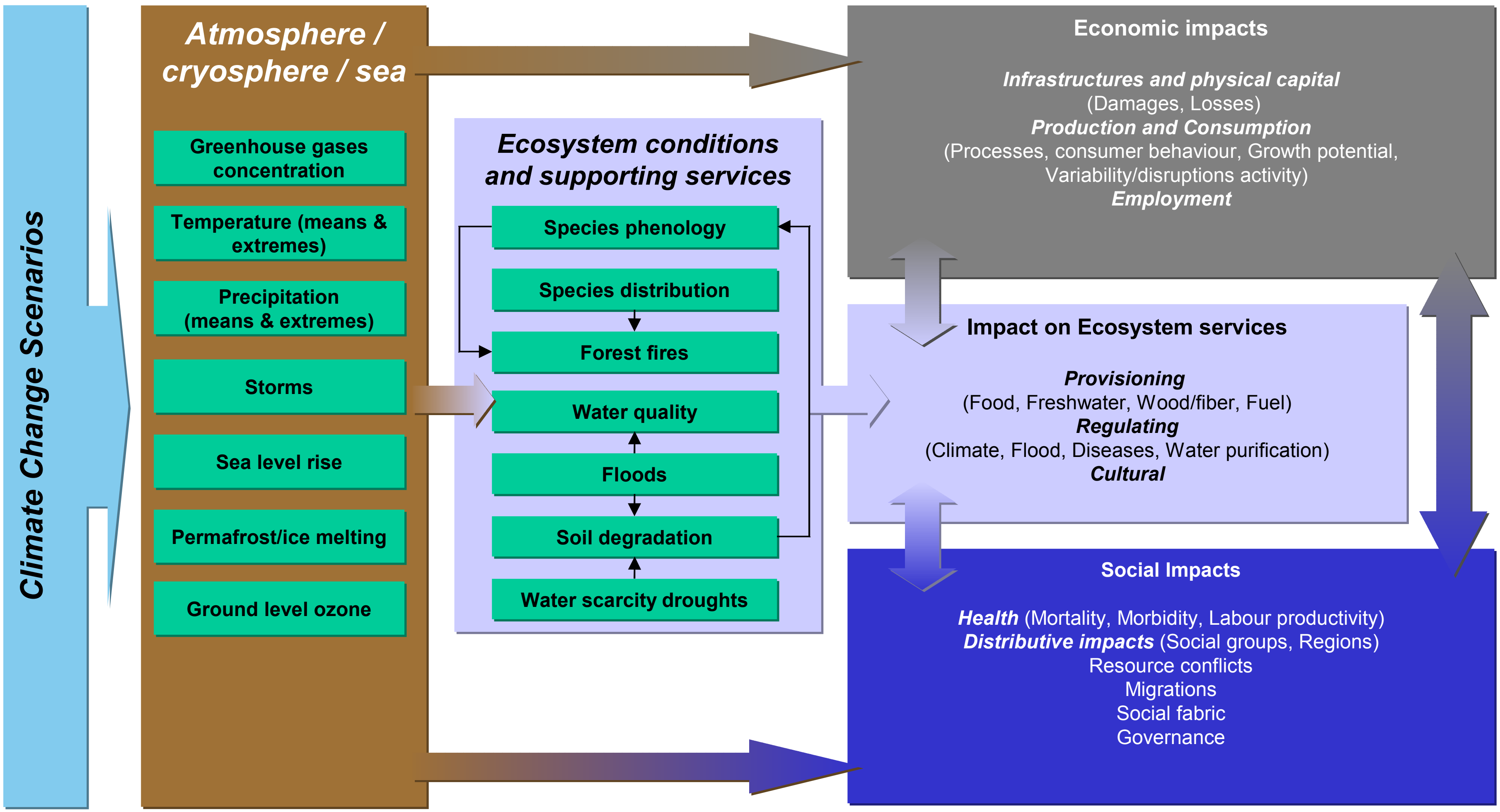
Europe key past and projected impacts



Most vulnerable areas

- Southern Europe
- Mountain areas (Alps, etc)
- Coastal zones
- River floodplains
- Arctic region

Impacts of Climate Change

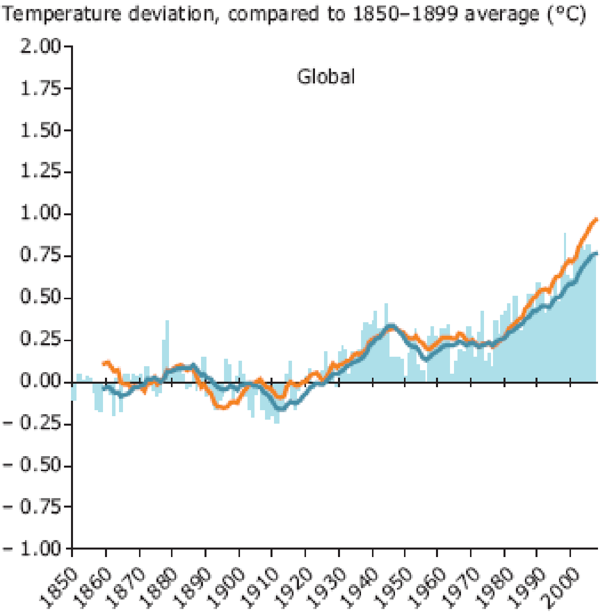


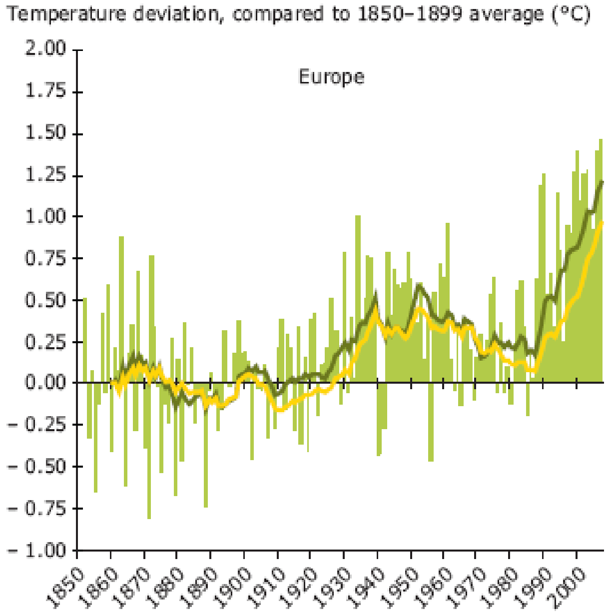
Source: Environment DG based on (EEA, 2008) , OECD 2008 and TEEB. **Potential impacts are** all impacts that may occur given a projected change in climate, without considering adaptation.

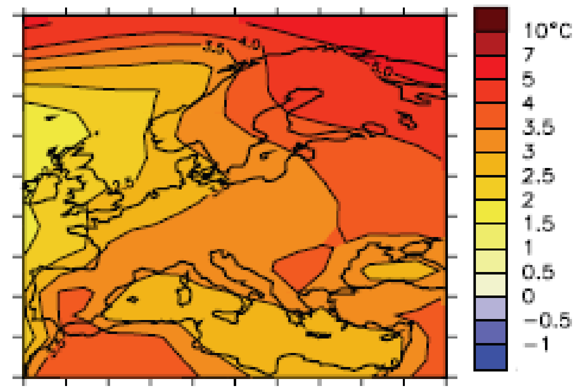
Global and European temperature

- Global temperature (2007) : + 0.8 °C (above 1850-1899 average)
- European temperature (2007) : + 1.0 °C (above 1850-1899 average)

past







Modelled change in annual mean temperature over Europe between 1980-1999 and 2080-2099

Observed global and European annual average temperature deviations 1850-2007

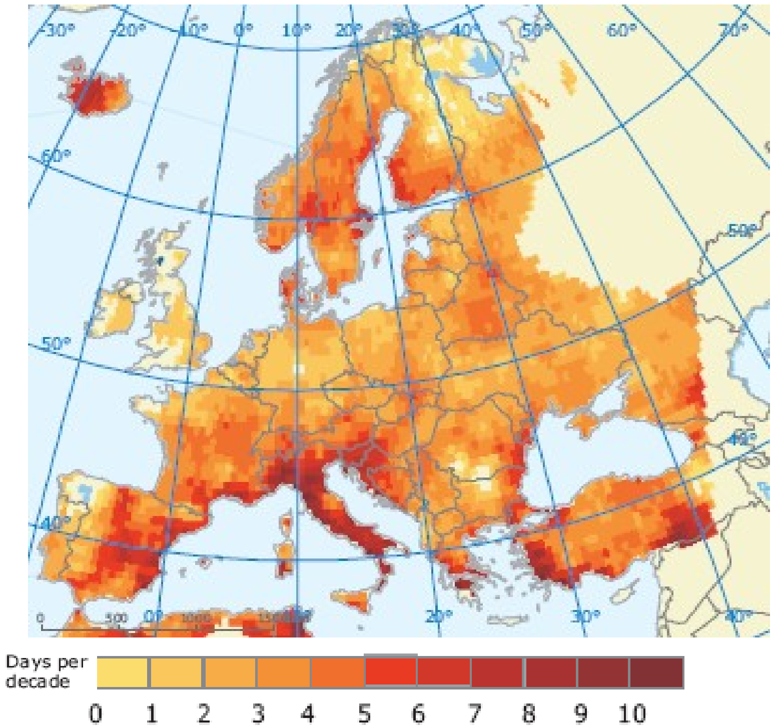
- Global projection (1980-1999 to 2080-2100) : + 1.1-6.4 °C
- Europe (1961-1990 to 2080-2100) : + 1.0–5.5 °C

future

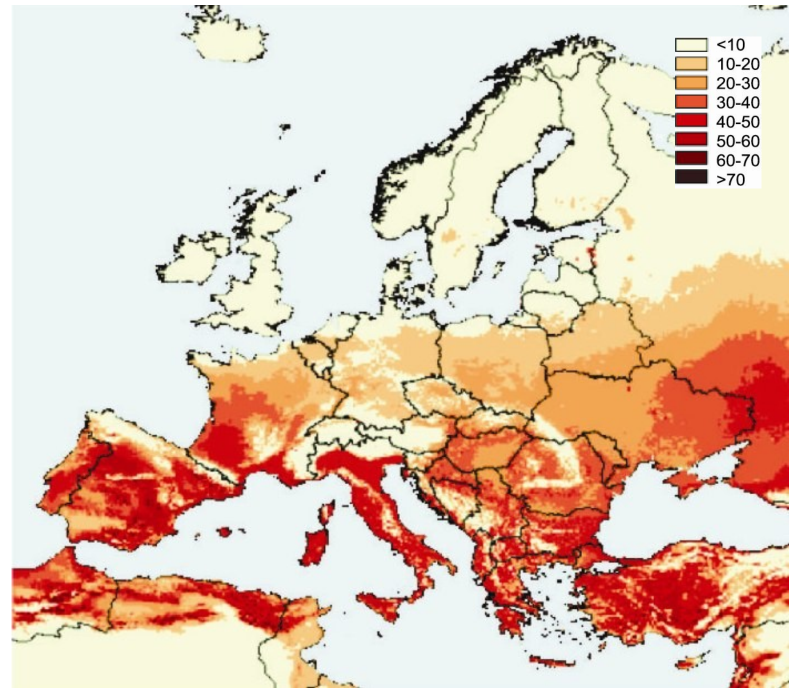
Temperature extremes in Europe

- Extremes of cold became less frequent and warm extremes more frequent
- Number of hot days almost tripled between 1880 and 2005

past



Observed changes in duration of warm spells in summer in the period 1976 - 2006



Projected changes in number of tropical nights between periods 1961-1990 and 2071-2100

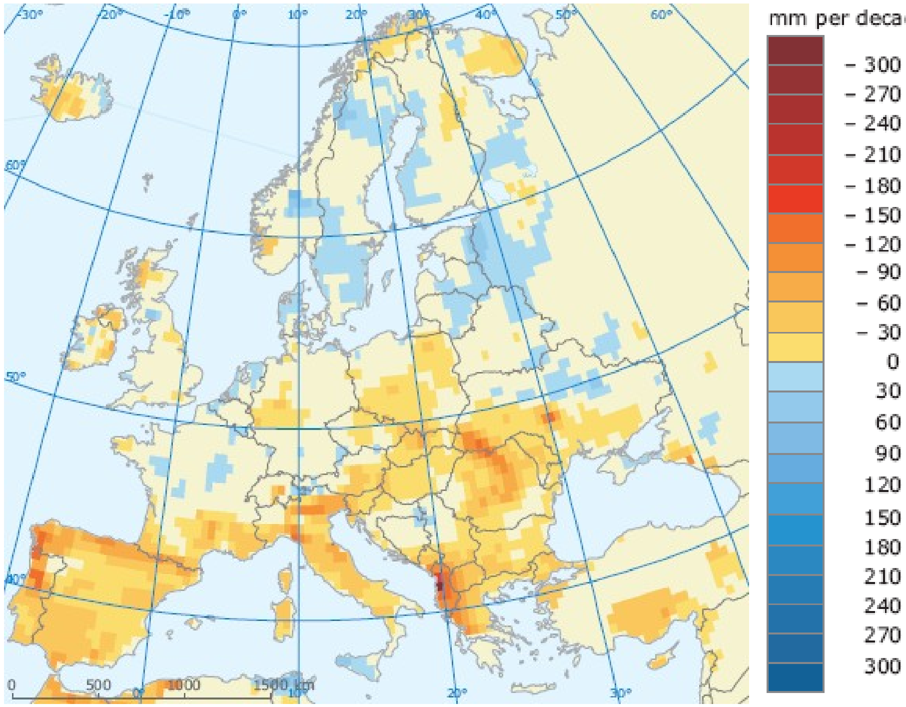
- Increase in frequency, intensity and duration of heat-waves
- Further decrease of number of cold days and frost extremes

future

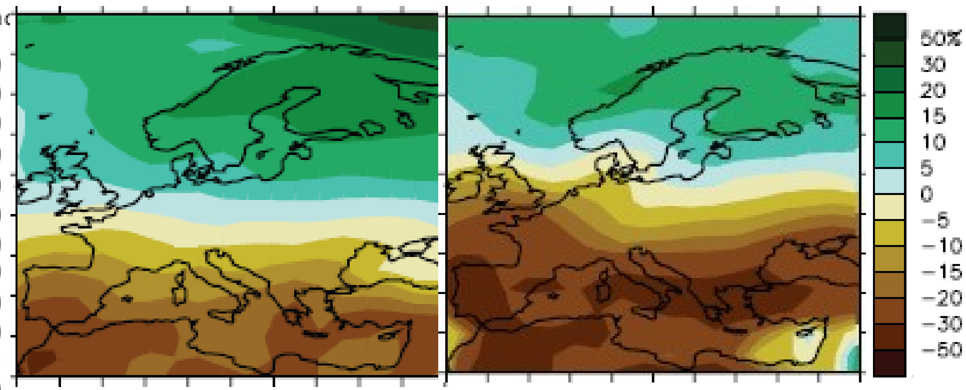
European precipitation

- northern Europe 10-40 % wetter, southern Europe up to 20 % drier (1900–2000)

past



Observed changes in annual precipitation between 1961-2006



annual **summer**

Modelled precipitation change between 1980-1999 and 2080-2099

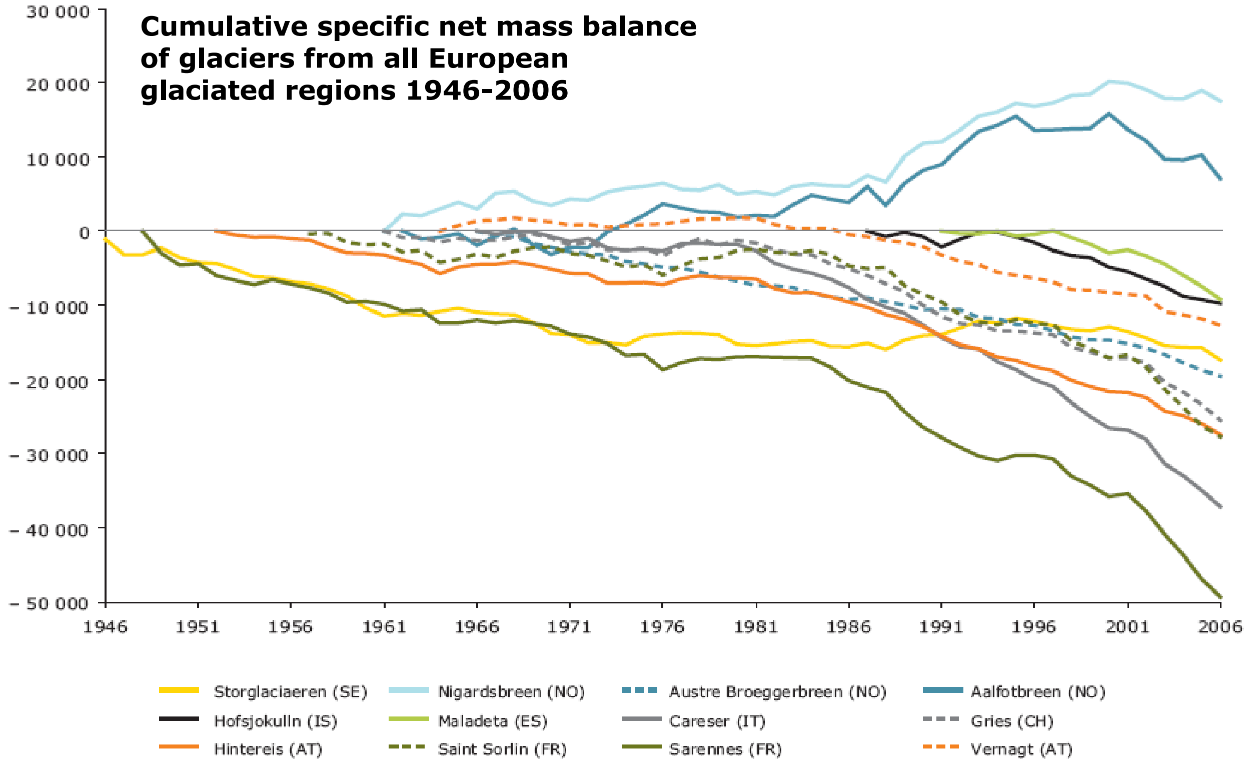
- Projection (1980-1999) to (2080-2099) : 5-20% increase for northern Europe and 5-30% decrease in southern Europe

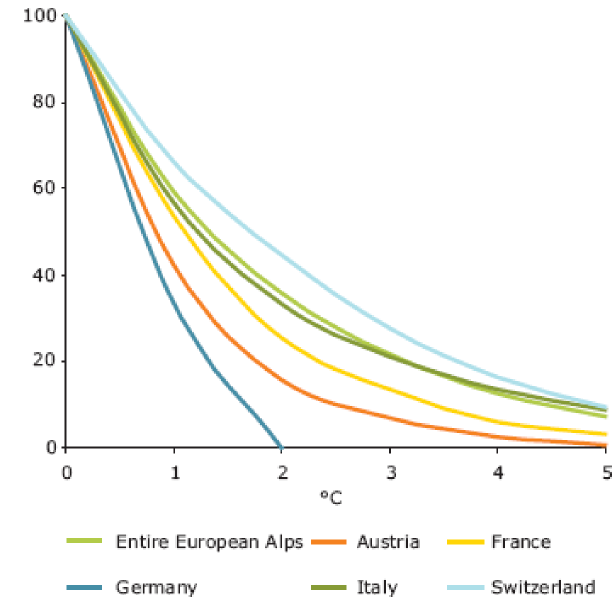
future

Glaciers

- The vast majority of European glaciers is in retreat (accelerated since 1980s)
- Since 1850 the glaciers in the Alps lost about two thirds of their volume

past





Modelled remains of the glacier cover in the European Alps for an increase in average summer air temperature of 1 to 5ºC

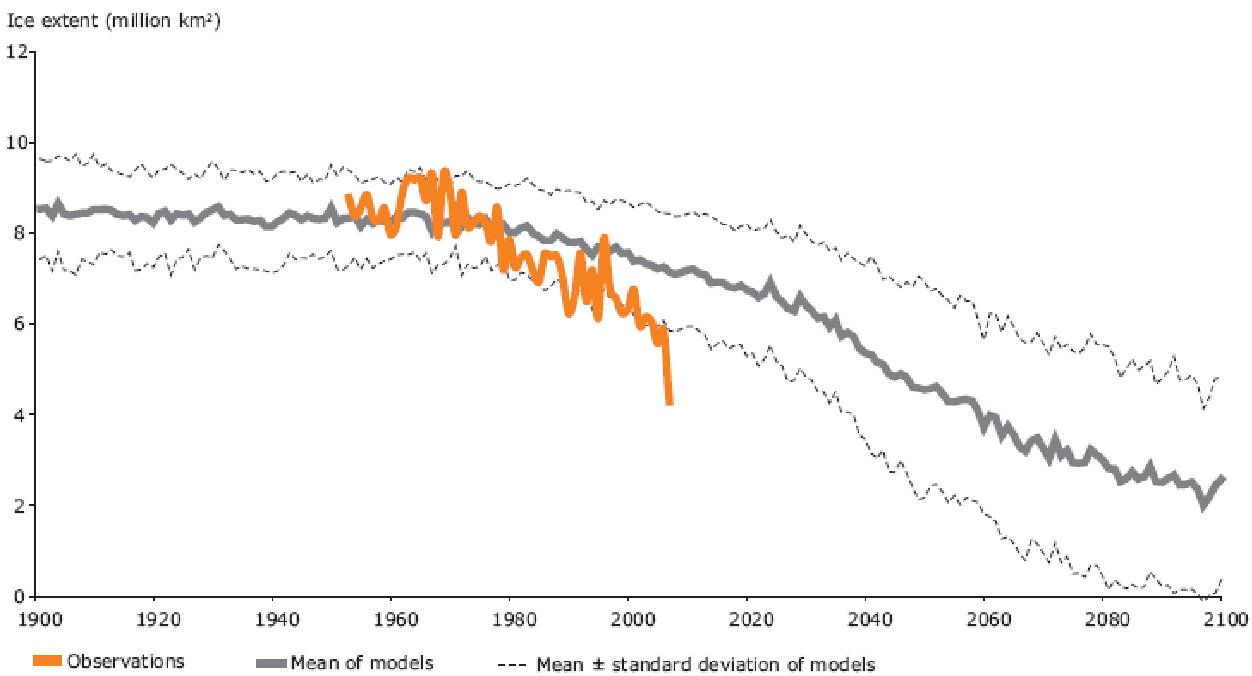
- A 3°C increase in average summer temperature could reduce the existing glacier cover of the Alps by 80%
- With continuing climate change nearly all smaller glaciers and one third of glacier area in Norway could disappear by 2100

future

Arctic sea ice

- Arctic sea ice extent has declined at an accelerating rate, especially in summer
- The record low ice cover in September 2007 was half of the size of a normal minimum extent in the 1950s

past



Observed and projected Arctic September sea-ice extent 1900-2100

The 2007 minimum sea-ice extent

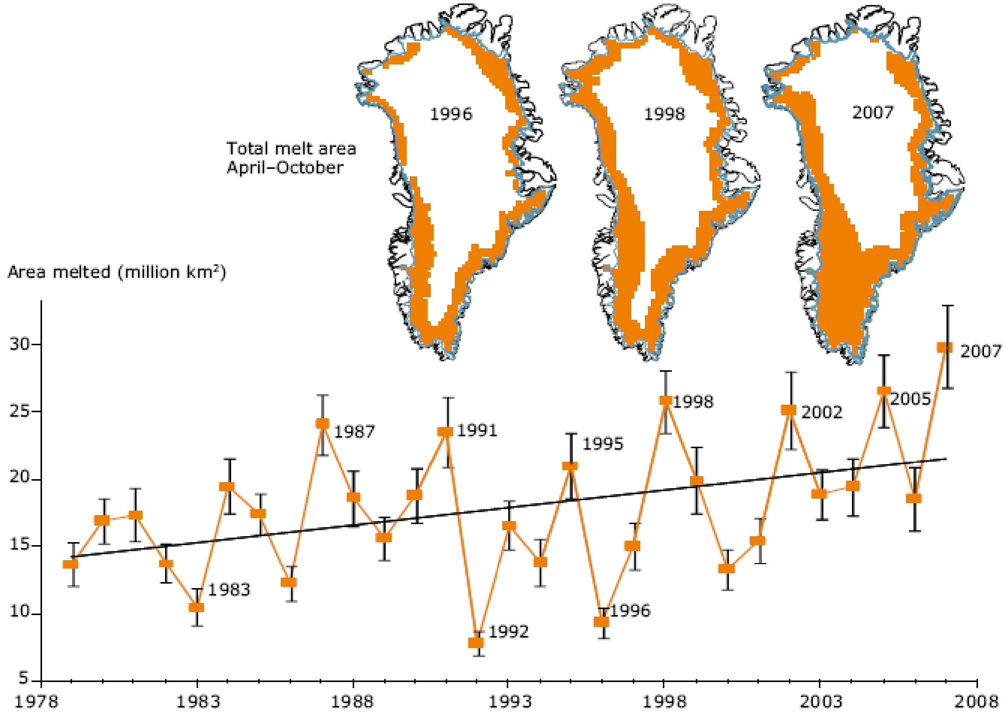
- Summer ice is projected to continue to shrink and may even disappear at the height of the summer melt season in the coming decades
- There will be still substantial ice in winter

future

Greenland ice sheet

- The Greenland ice sheet is losing 100 billion tons of ice per year since the 1990s
- The contribution of ice-loss from Greenland to global SLR is estimated at 0.14-0.28 mm/year for the period 1993-2003 and has since increased

past



Area of Greenland ice sheet melting 1979-2007

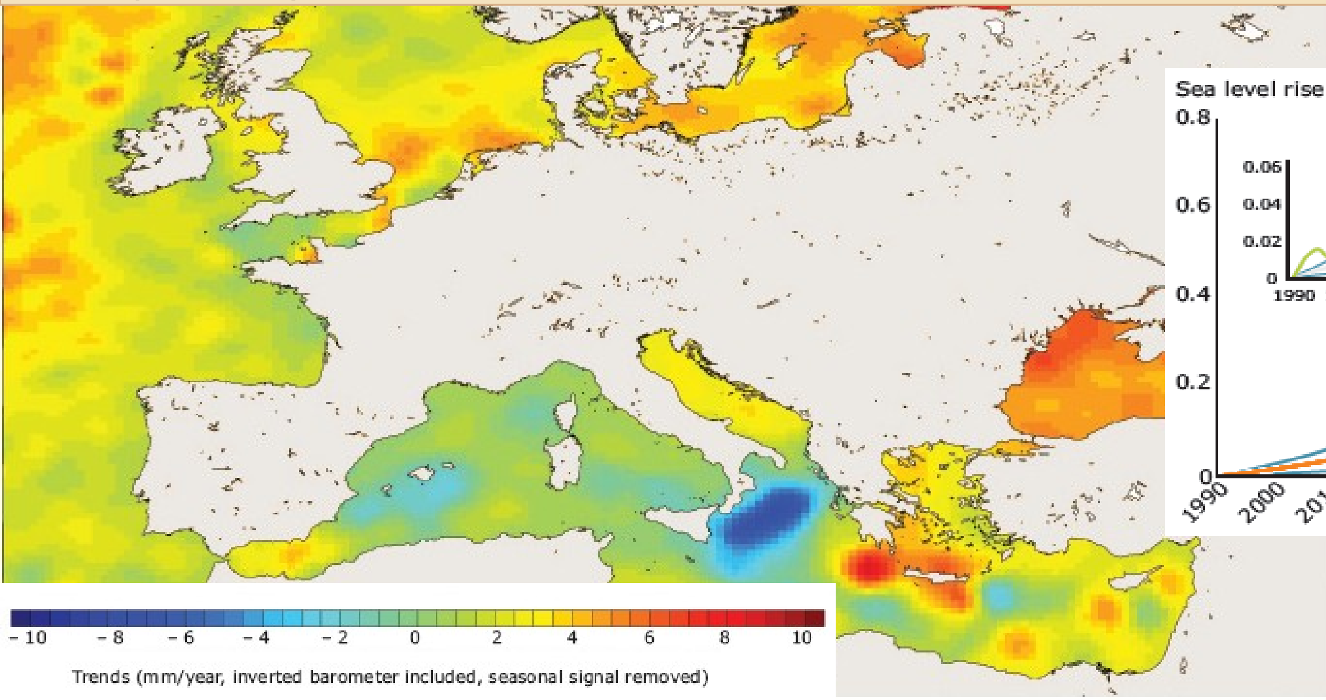
- No reliable prediction of the future of ice sheets can be made, since internal processes are poorly understood
- In the long term, melting ice sheets have the largest potential to increase SLR

future

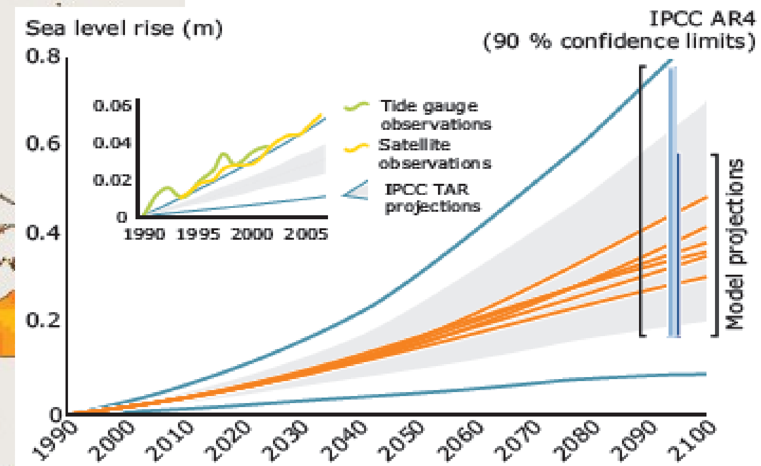
Sea level rise

- Global average SLR during the 20th century was about 1.7mm/year
- Recent satellite and tide-gauge data indicate a higher average rate of about 3.1 mm/year in the past 15 years

past



Sea level changes in Europe 1992-2007



Projected global average sea-level rise 1990-2100

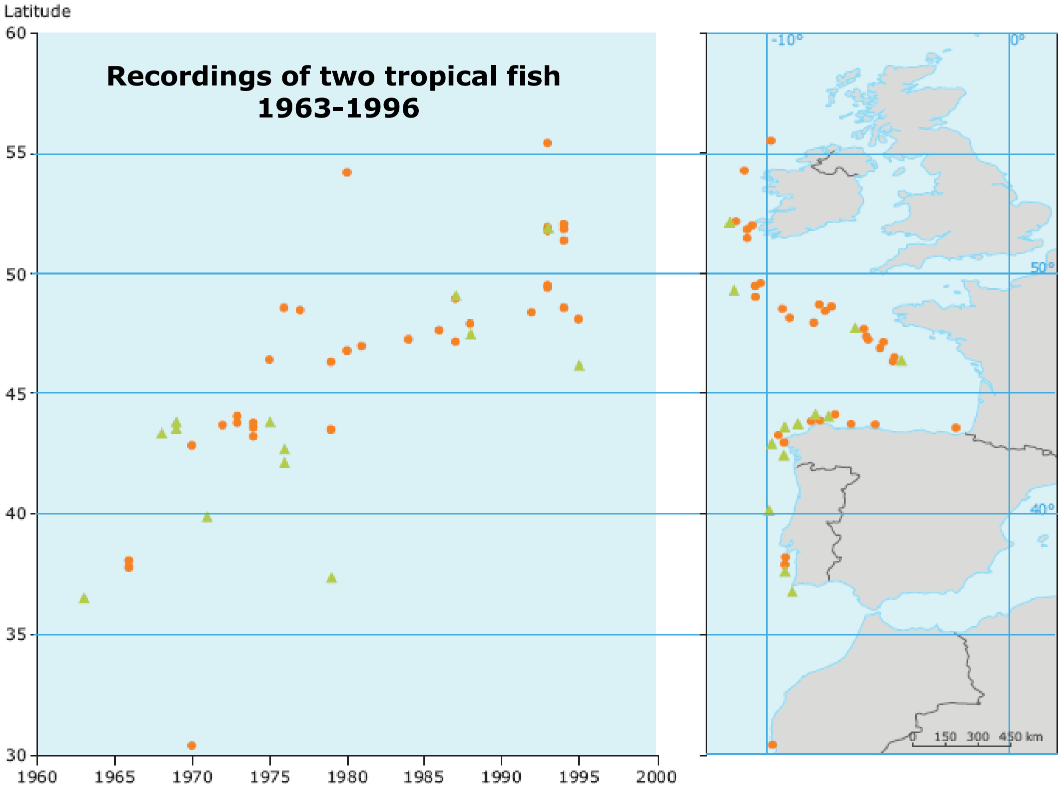
- Sea level will rise 0.18 to 0.59 m from 1980-2000 to 2100 (IPCC)
- Recent projections indicate a future SLR that may exceed the IPCC upper limit

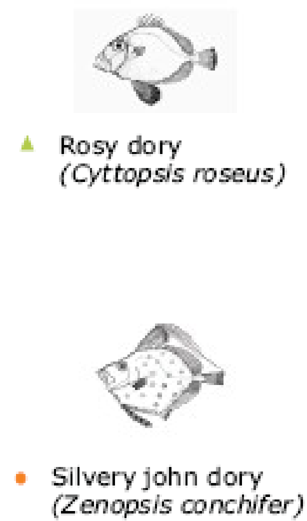
future

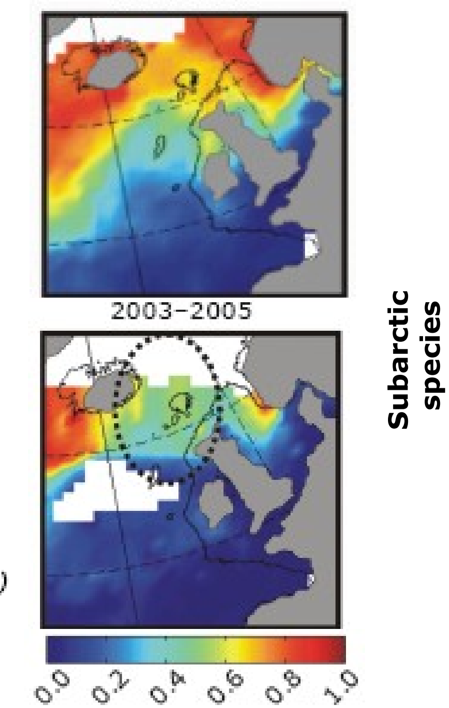
Northward movement of marine species

- Northward shift of warmer-water plankton species by up to 1 100 km over last 40 years, which seems to be accelerated since 2000
- Many fish species have shifted northward (e.g. silvery john dory by 50 km/y) and sub-tropical species are occurring increasingly in European waters

past







Northward movement of zooplankton between 1958-2005

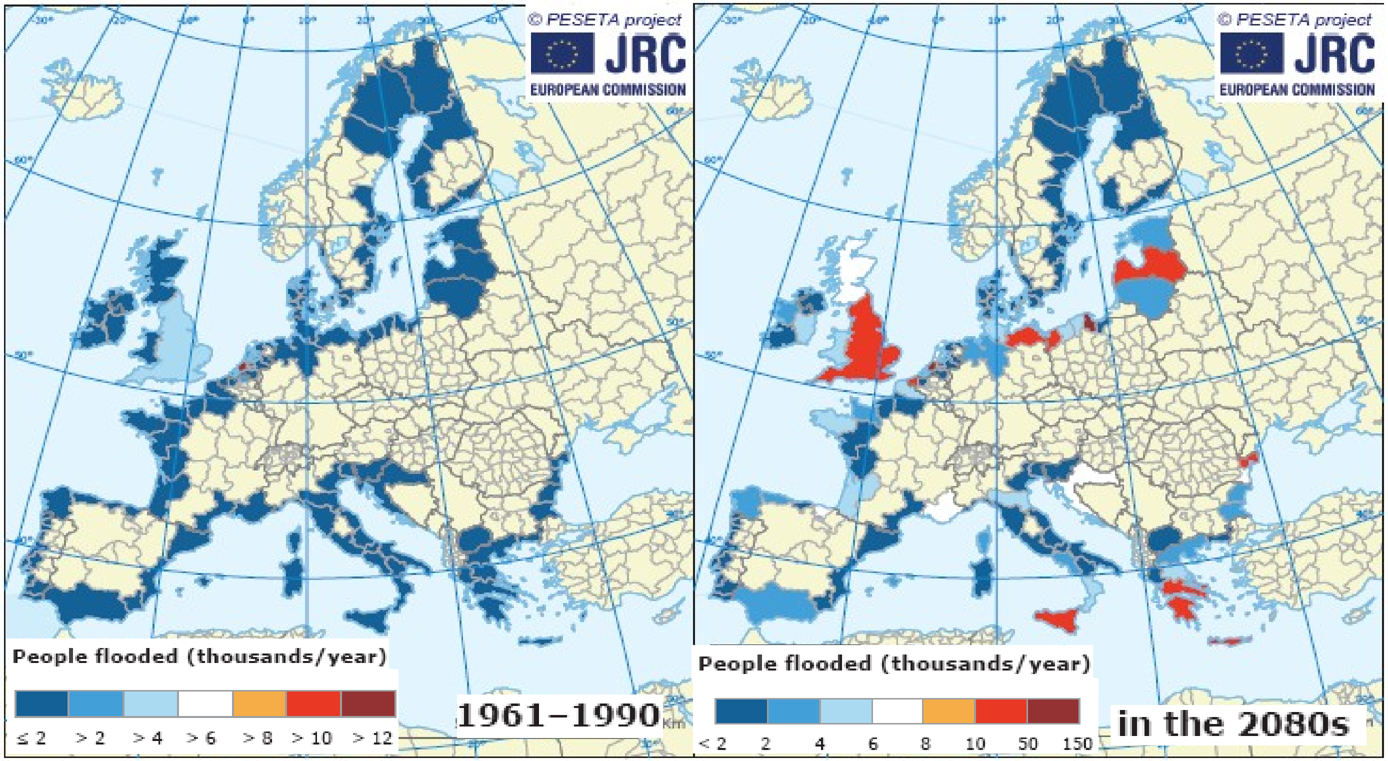
- Further northward shift is likely, but projections are not yet available

future

Coastal areas

- One third of the EU population is estimated to live within 50km of the coast and some 140,000 km² of land is currently within 1m of sea level.

past



Modelled number of people flooded across Europe's coastal areas in 1961-1990 and in the 2080s

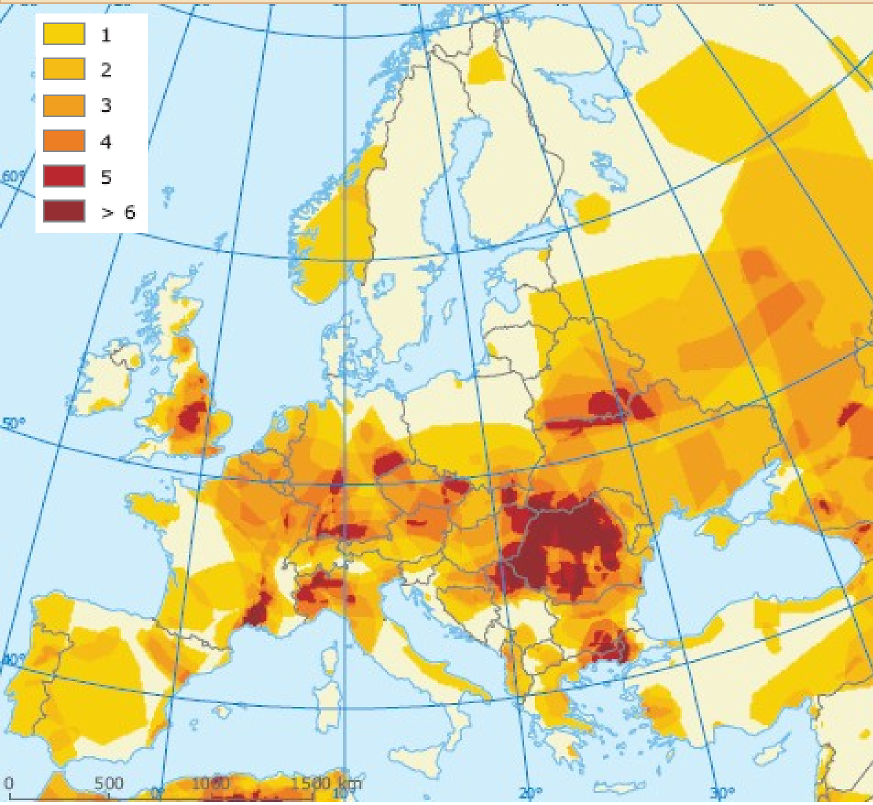
- 12-18 billion Euro/year economic damages in European coastal areas by 2080 (high emission scenario)
- Adaptation could significantly reduce the risk to around EUR 1 billion

future

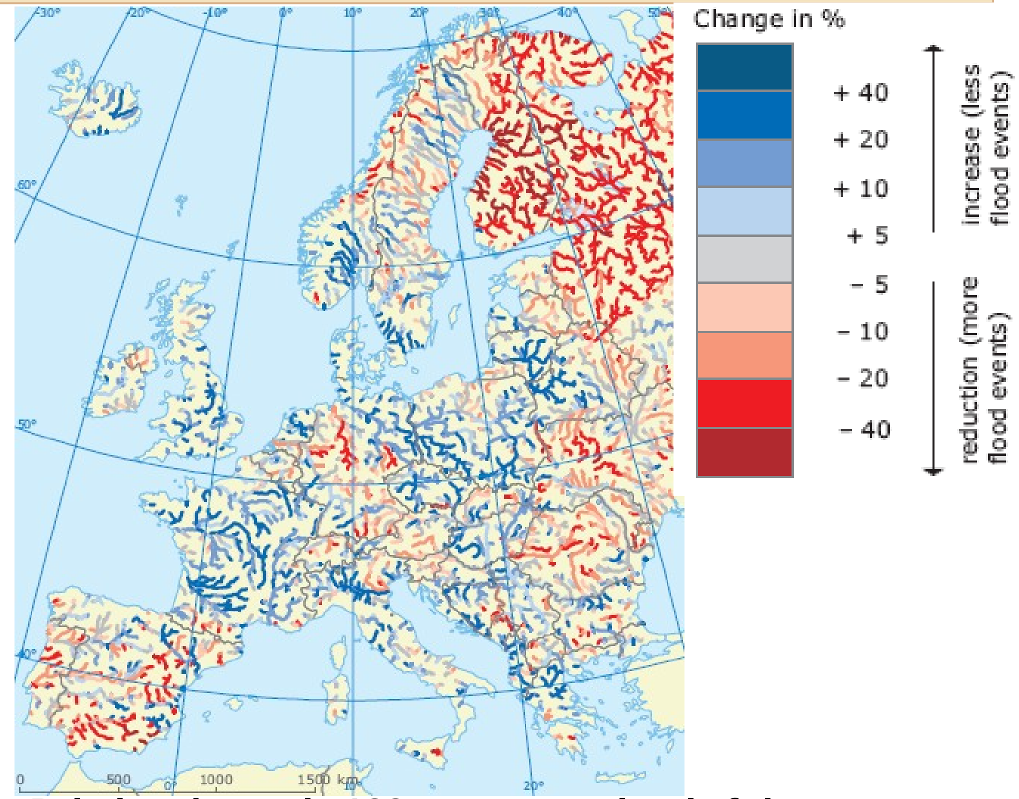
River floods

- Since 1990, 259 major river floods have been reported in Europe (165 since 2000), the increase is mainly because of better reporting and land-use changes

past



Occurrence of flood events 1998-2008



Relative change in 100-year return level of river discharge between 2071-2100 and 1961-1990

- Increase in the occurrence and frequency of flood events in large parts of Europe
- Less snow accumulation in winter and lower risk of early spring flooding

future

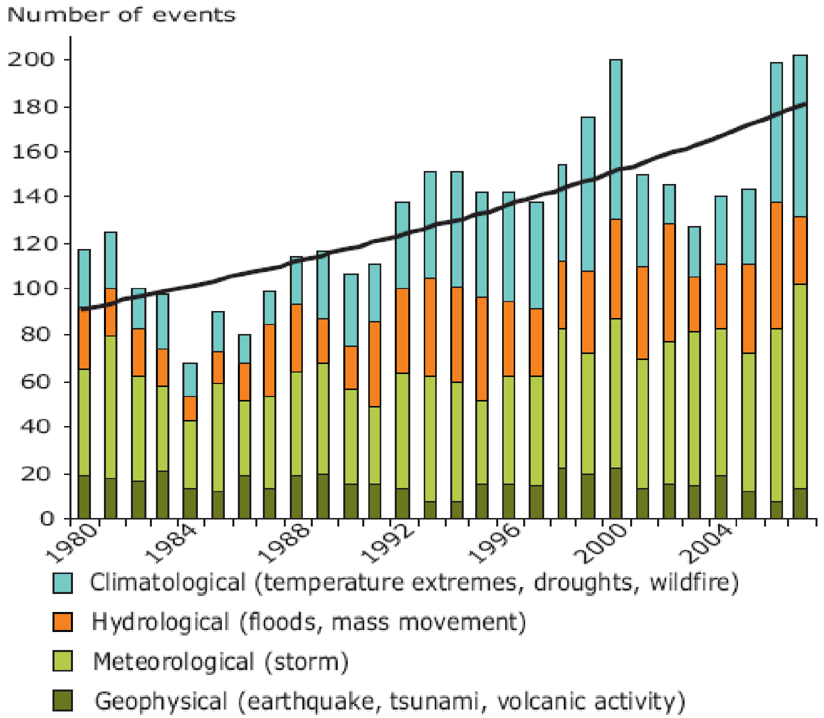
Water Stress has reached a critical level across much of Europe

- Caused by a combination of scarcity and drought
- Scarcity; Overexploitation of water resources
- Drought; has cost Europe EUR 100 billion over the last 30 years.

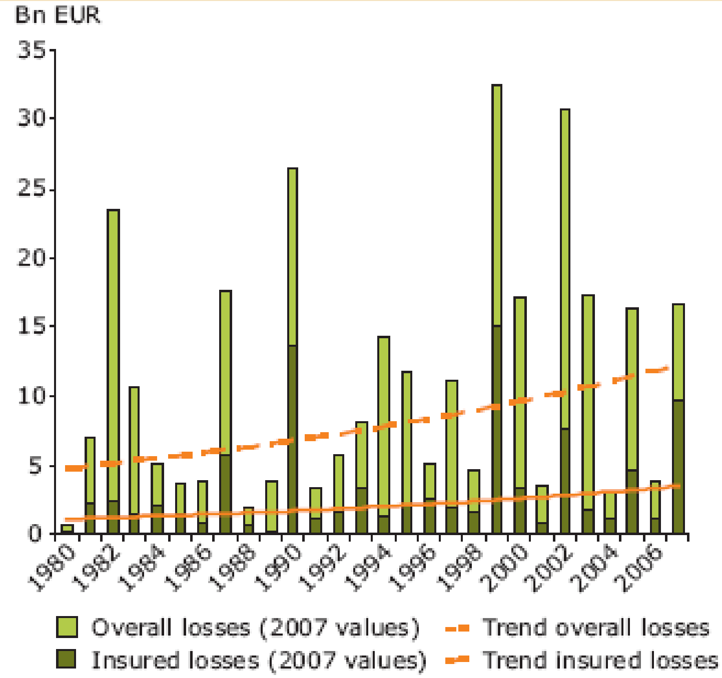
Direct losses from weather disasters

- The number of disastrous weather and climate related events in Europe increased by about 65% over 1998-2007 compared to the 1980s
- About 95% of economic losses caused by catastrophic events in Europe since 1980 are attributable to climate and weather. This is mainly due to socio-economic development but changing patterns of weather disasters are also drivers.

past



Natural disasters in Europe 1980-2007



Overall and insured losses from weather disasters in Europe 1980-2007

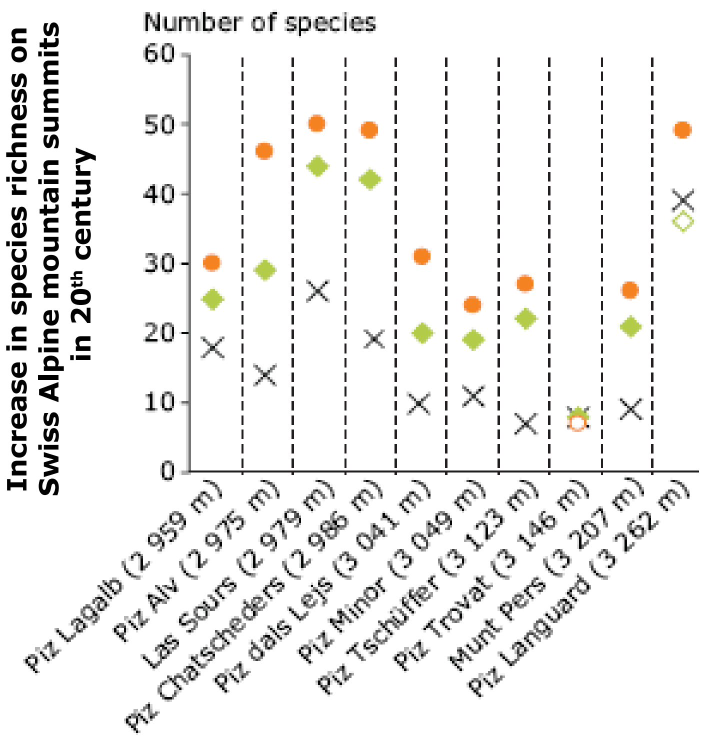
- In the immediate future increasing disaster losses mainly due to societal change and economic development
- In the second half of the century more severe effects of climate change on economic assets

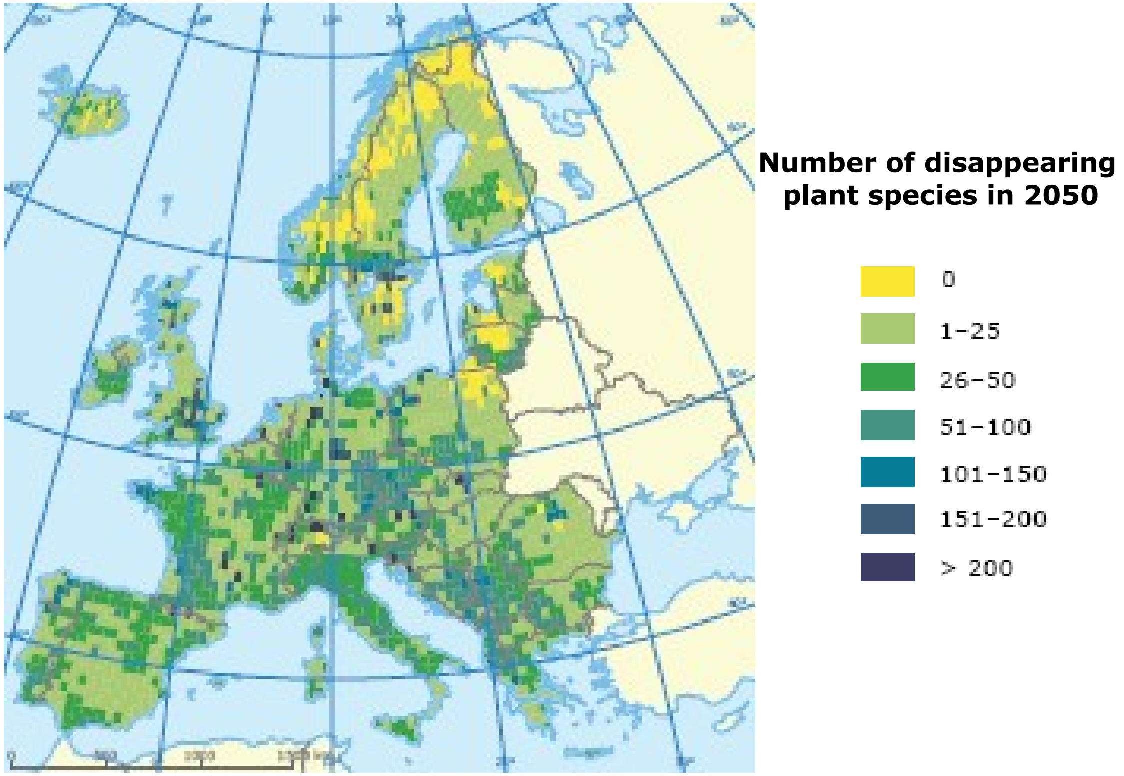
future

Distribution of plant species

- Climate change causes northward and uphill shift of many European plant species
- Mountain ecosystems are changing as pioneer species expand uphill and cold-adapted species are driven out of their ranges

past





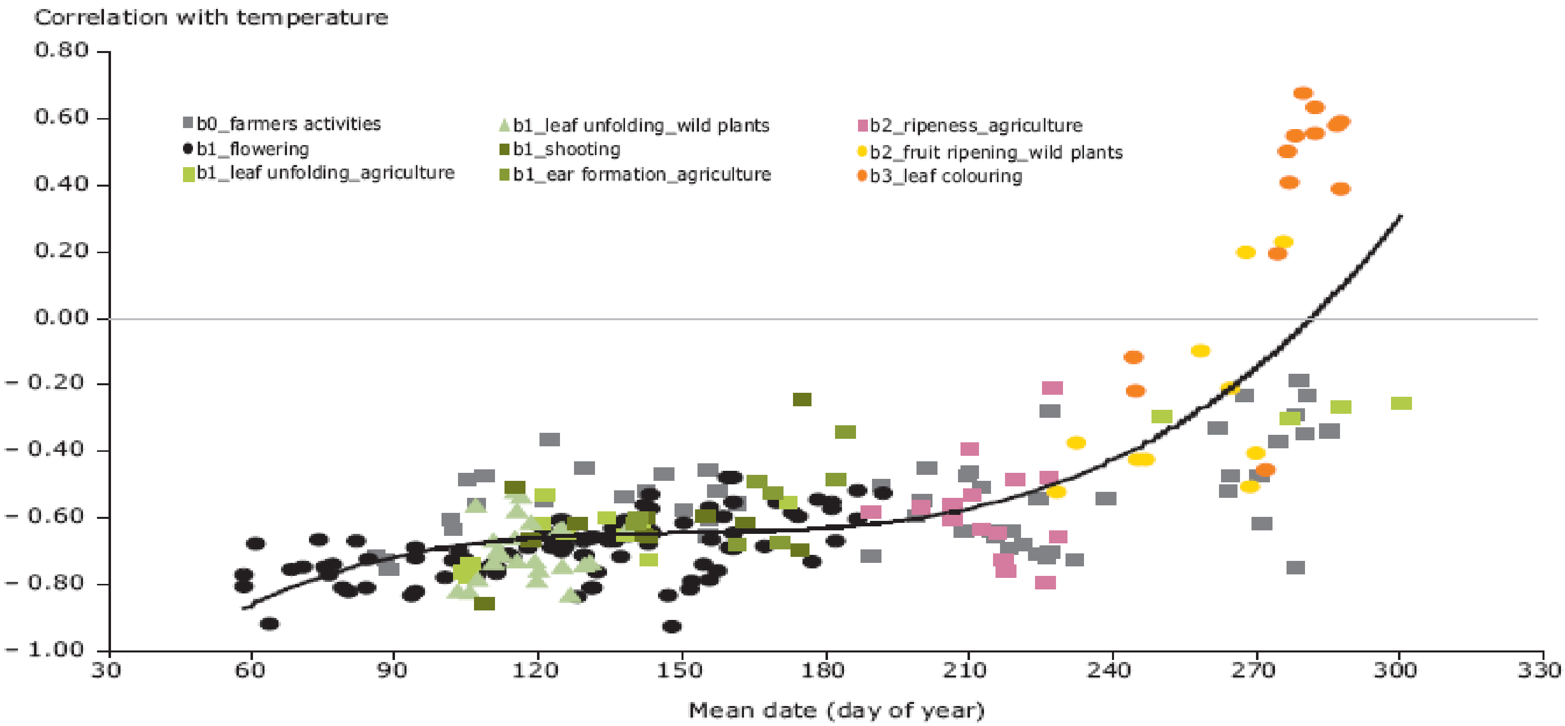
- Shift of European plant species by hundreds kilometres to the north (by the late 21st century)
- Forests are likely to have contracted in the south and expanded in the north
- 60 % of all mountain species may face extinction

future

Plant phenology

- 78% of leaf unfolding and flowering records show advancing trends and only 3% a significant delay
- Advance of spring and summer was 2.5 days per decade (1971 to 2000)
- The pollen season starts 10 days earlier and is longer than 50 years ago

past



Phenological sensitivity to temperature changes

- Trends in seasonal events will continue to advance due to climate change

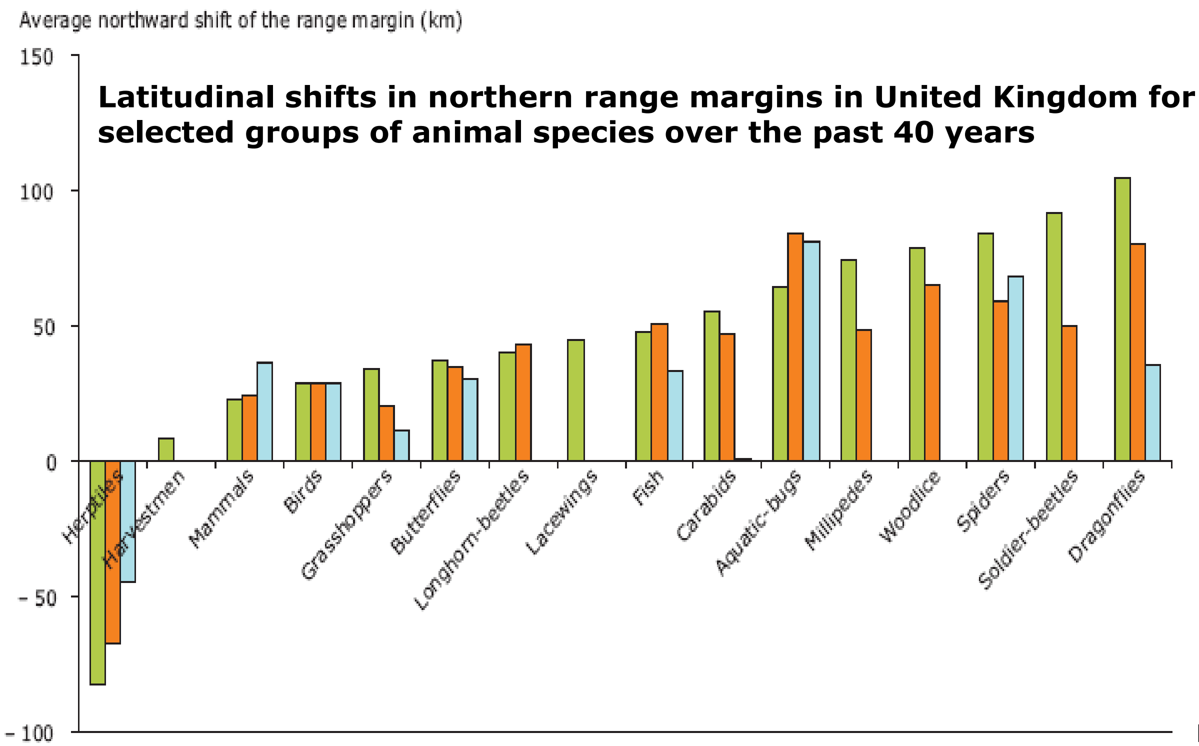
future

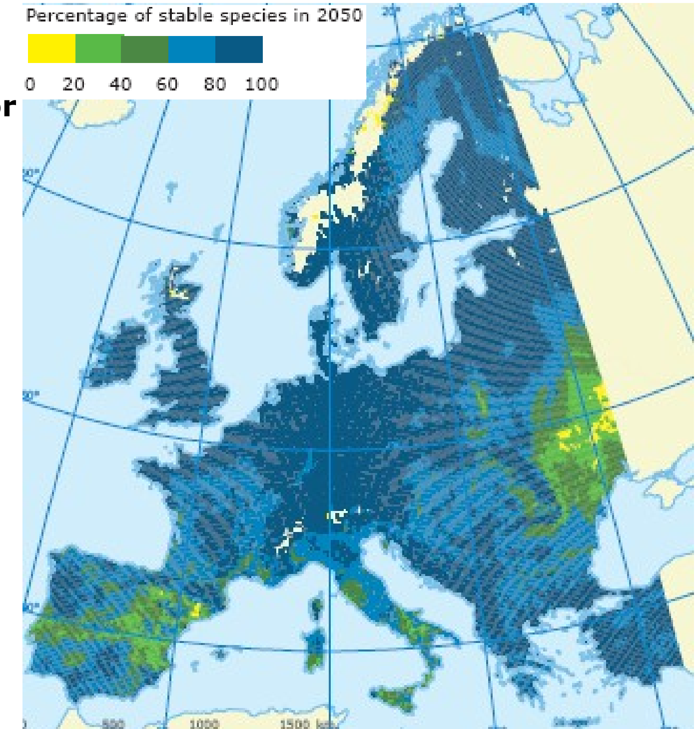
European Environment Agency

Distribution of animal species

- Birds, insects, mammals and other groups are moving northwards and uphill
- A combination of climate change, habitat fragmentation and other obstacles will impede the movement' possible leading to progressive decline of biodiversity

past





Projected impact of climate change on the potential distribution of reptiles and amphibians in 2050

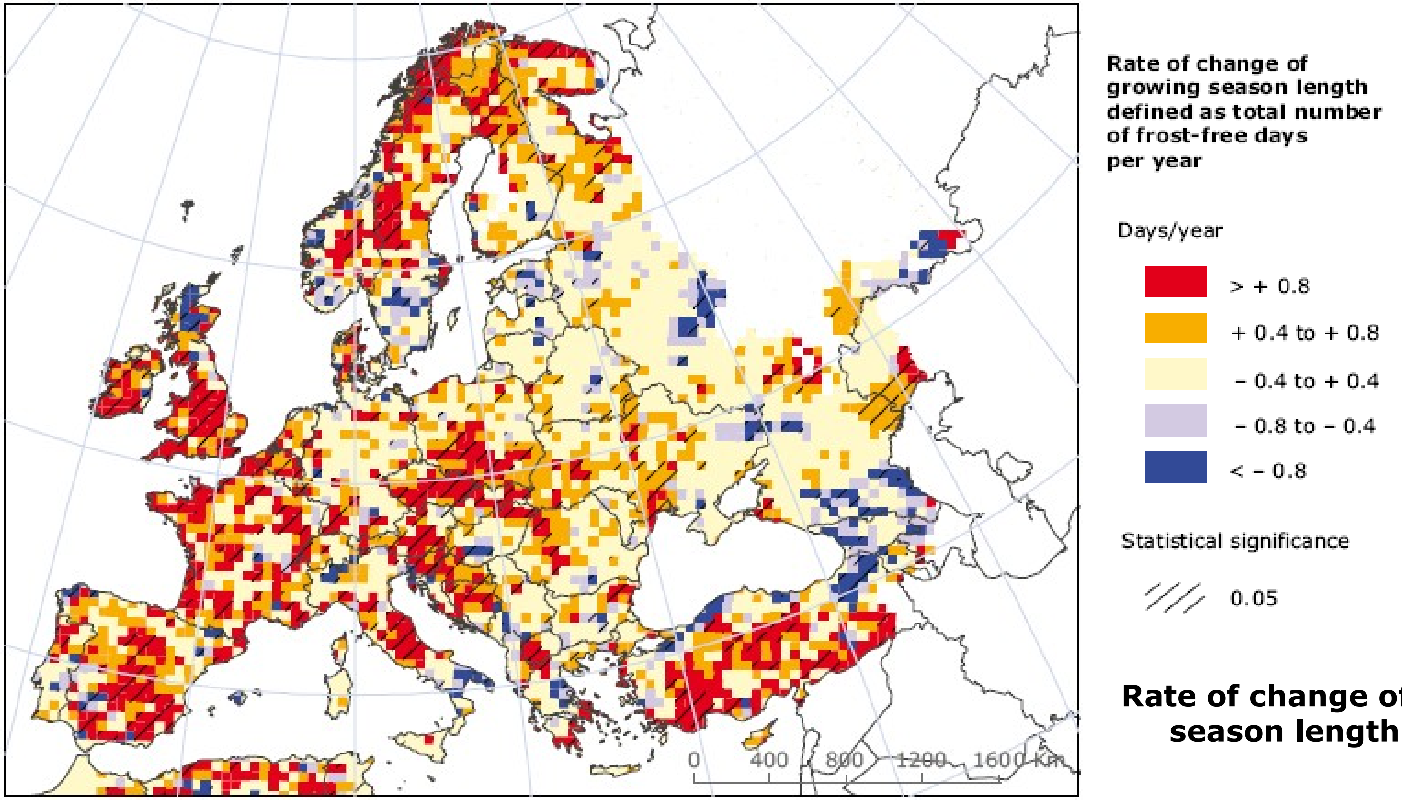
- Distribution changes are projected to continue
- Shift in suitable conditions for breeding birds nearly 550 km northeast (2100)
- Up to 9% of 120 native European mammals risk extinction during 21st century

future

Growing season for agricultural crops

- The lengths of the growing season of several agricultural crops has increased in the North, favouring the introduction of new species
- Locally in the south there is a shortening of growing season, with higher risk of damages from delayed spring frost

past



Rate of change of crop growing season length 1975-2007

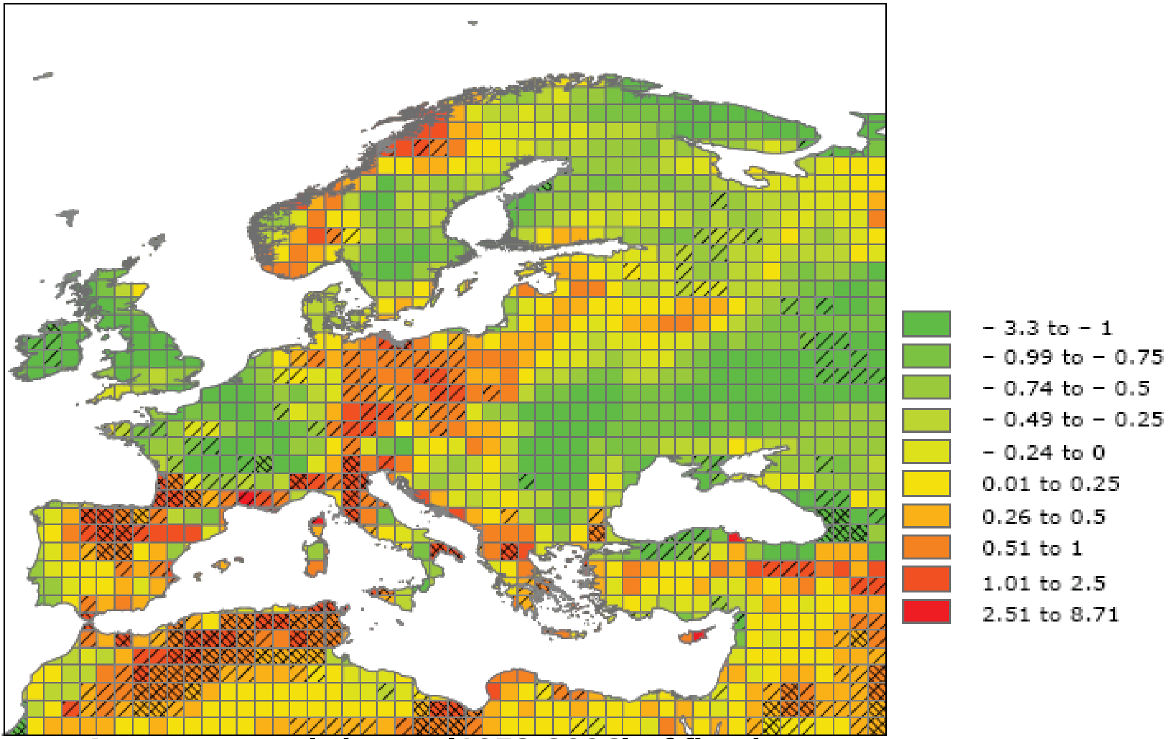
- A further lengthening of the growing season is projected
- In western and southern Europe the limited water availability and high temperature will hinder plant growth

future

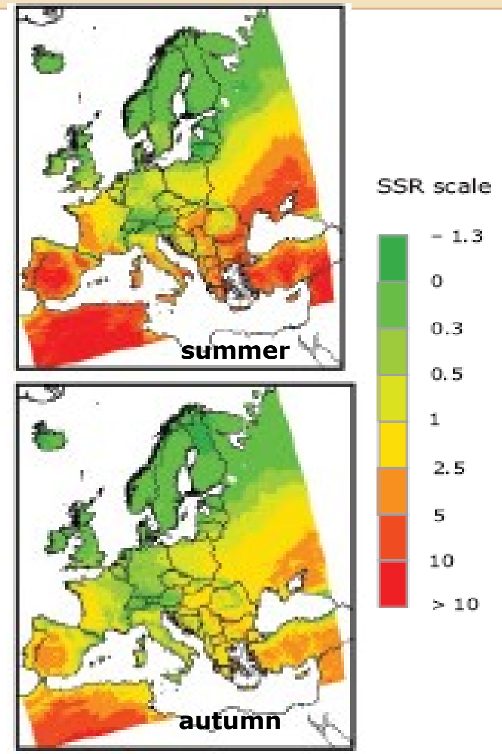
Forest fire danger

- Fire danger increased during the past 50 years particularly in the Mediterranean and central Europe

past



Average annual change (1958-2006) of fire danger level (SSR) in % per year



Projected changes in fire danger for 2071-2100

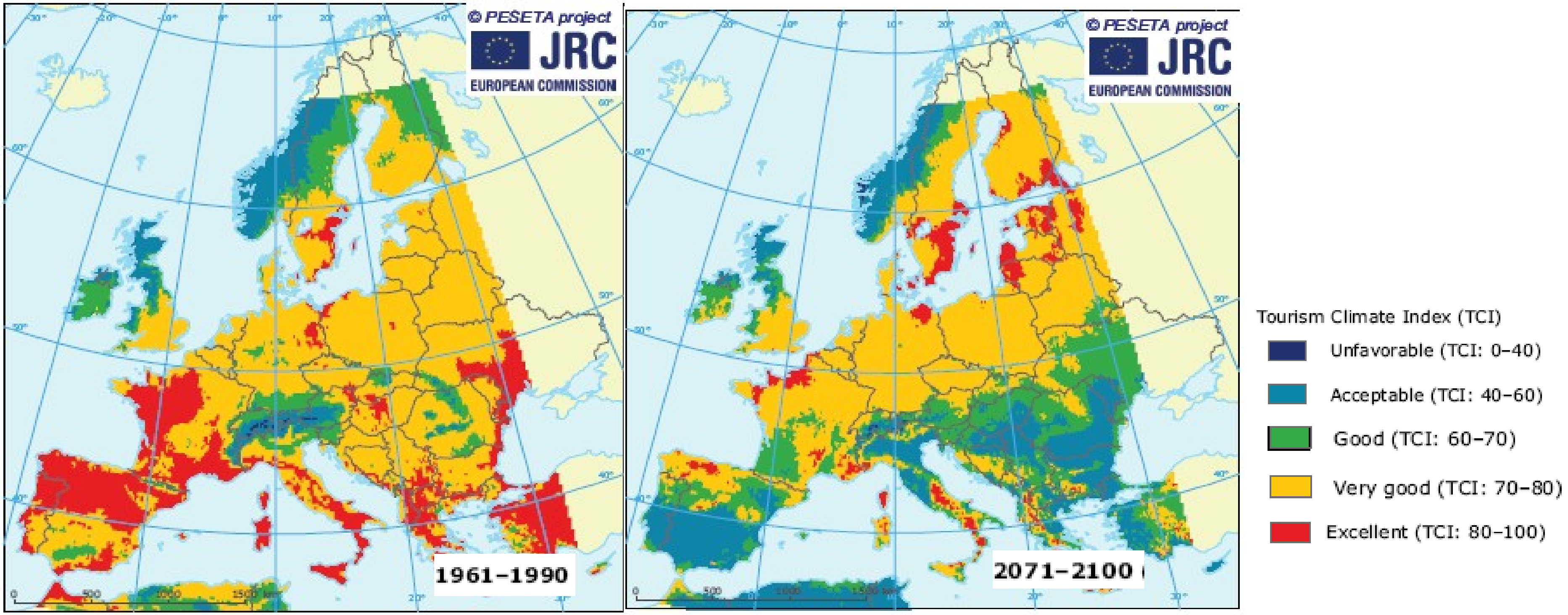
- More severe fire weather, more area burned, more ignitions and longer fire seasons
- Increases in the fire potential during summer month, especially in southern and central Europe
- Probably an increase in the frequency of extreme fire danger days in spring and autumn

future

Tourism and recreation

- Changes in climate reducing the attractiveness of many of the Mediterranean's major resorts, while improving it in other regions.

past



Simulated conditions for summer tourism in Europe (IPCC SRES A2 scenario)

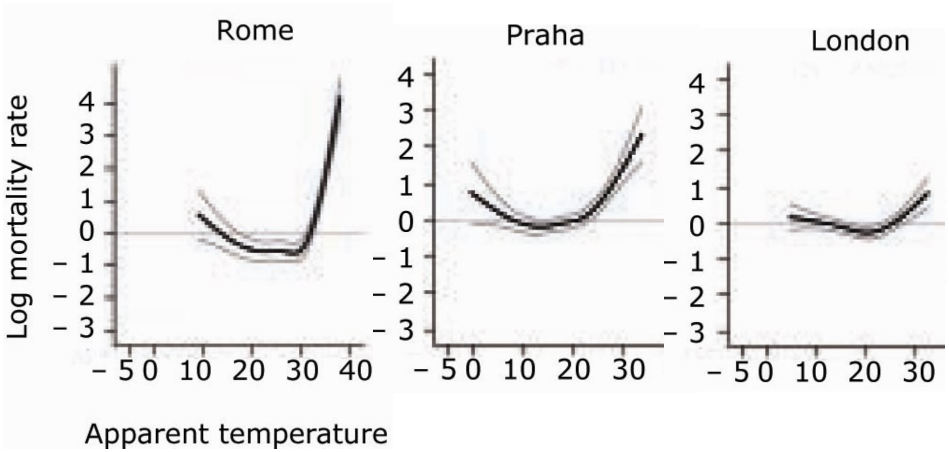
- The suitability of the Mediterranean for tourism will decline during summer, but increase during spring and autumn. This can lead to shifts in the major flows of tourism within the EU.
- Adaptation responses such as economic diversification will be critical to limit economic losses

future

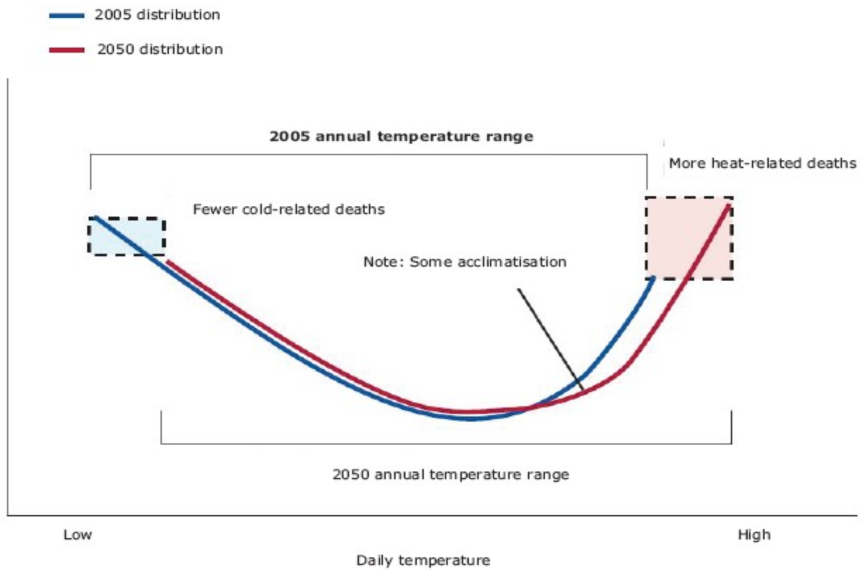
Heat and health

- More than 70,000 excess deaths were reported from 12 European countries in the hot summer of 2003
- Long heat waves (more than 5 days) have an impact 1.5-5 times greater than shorter events

past



Daily mortality rates in selected European cities by apparent temperature in summer time



Relationship between number of temperature-related daily deaths and daily temperature

- Increases in the number of heat-related death; mortality risk increases by between 0.2-5.5 % for every 1°C increase above a location-specific threshold
- 86,000 net extra deaths per year in the EU with a global mean temperature increase of 3°C in 2071-2100 relative to 1961-1990

future

White Paper Adapting to climate change: Towards a European framework for action (Phase 1, 2009-2012)

- Strengthen the Knowledge/Evidence Base (by 2011):
  - Clearing House Mechanism, a repository and platform for knowledge on impacts, vulnerability and adaptation
  - Research on data, methods, prediction tools, mapping, costs and effectiveness of adaptation measures
  - Monitoring of adaptation actions
- Mainstream climate adaptation into key policy areas:
  - Health
  - Agriculture and forests
  - Biodiversity, ecosystems and water
  - Coastal and marine areas
  - Physical infrastructure (transport, energy etc)
- Advance work internationally within UNFCCC and bilateral/regional (including mainstreaming and financing)
- Impact and Adaptation Steering Group (IASG) (e.g. development of national adaptation strategies)


Maak ruimte voor klimaat!
Working together with water
A living land builds for its future
Findings of the Deltacommissie 2008
HM Government
Adapting to climate change in England
A FRAMEWORK FOR ACTION
ACT ON CO2
defra
Ministry of Agriculture and Forestry
Finland's National Strategy for Adaptation to Climate Change
Publication 1a/2005
Observatoire national sur les effets du réchauffement climatique
Stratégie nationale d'adaptation au changement climatique
La documentation Française
Strategi for tilpasning til klimaændringer i Danmark
Marts 2008
Regeringen
PLAN NACIONAL DE ADAPTACIÓN AL CAMBIO CLIMÁTICO
MARCO PARA LA COORDINACIÓN ENTRE ADMINISTRACIONES PÚBLICAS PARA LAS ACTIVIDADES DE EVALUACIÓN DE IMPACTOS, VULNERABILIDAD Y ADAPTACIÓN AL CAMBIO CLIMÁTICO
OFICINA ESPAÑOLA DE CAMBIO CLIMÁTICO
S. G. PARA LA PREVENCIÓN DE LA CONTAMINACIÓN Y DEL CAMBIO CLIMÁTICO
MINISTERIO DE MEDIO AMBIENTE
Die Bundesregierung
Deutsche Anpassungsstrategie an den Klimawandel
vom Bundeskabinett am 17. Dezember 2008 beschlossen
„Jövő időben"
NEMZETI ÉGHAJLATVÁLTOZÁSI STRATÉGIA
2008-2025
NÉS
FINLAND
ESTONIA
LATVIA
LITHUANIA
BELARUS
POLAND
UNITED KINGDOM
THE NETHERLANDS
GERMANY
BELGIUM
LUXEMBOURG
CZECH REPUBLIC
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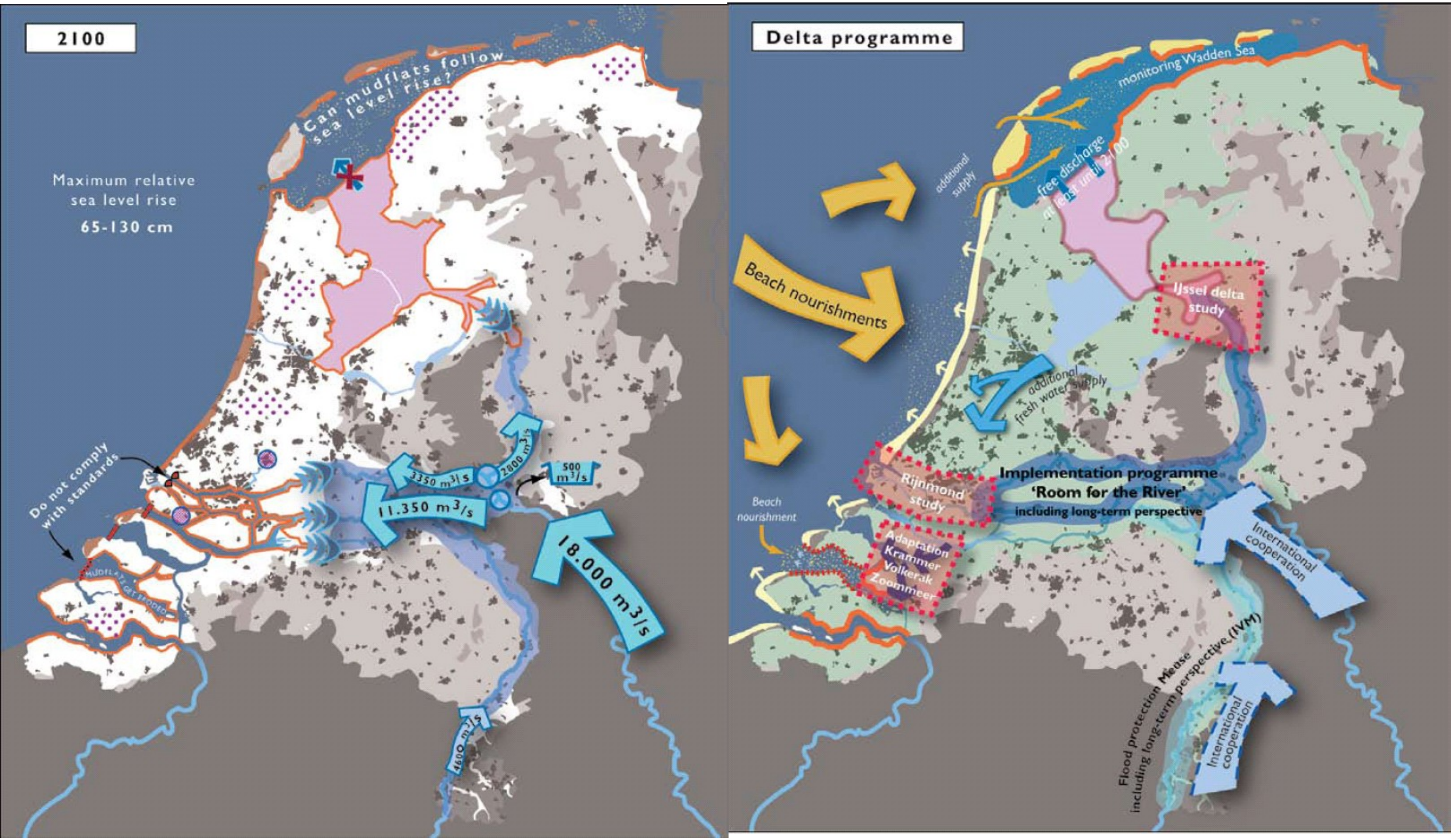
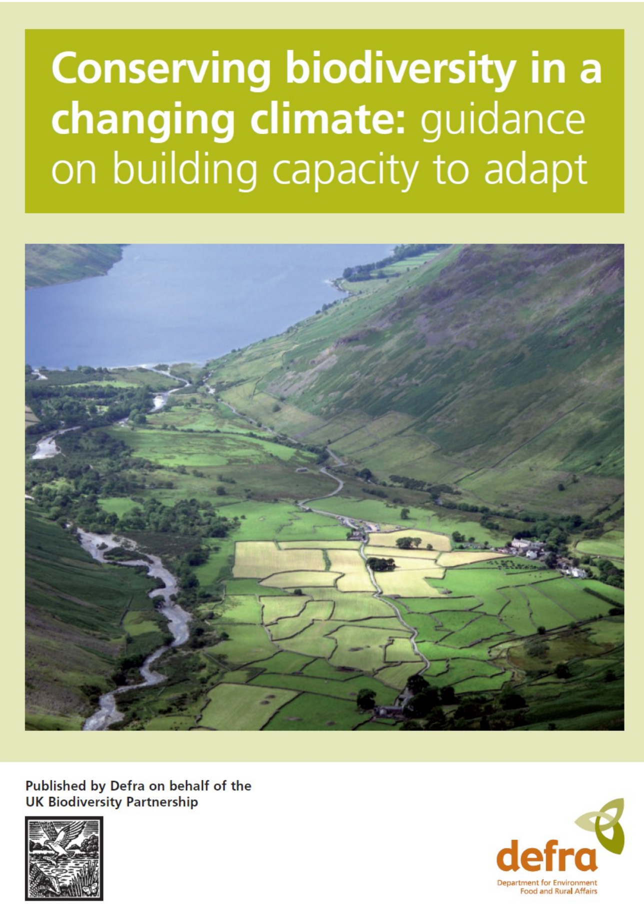
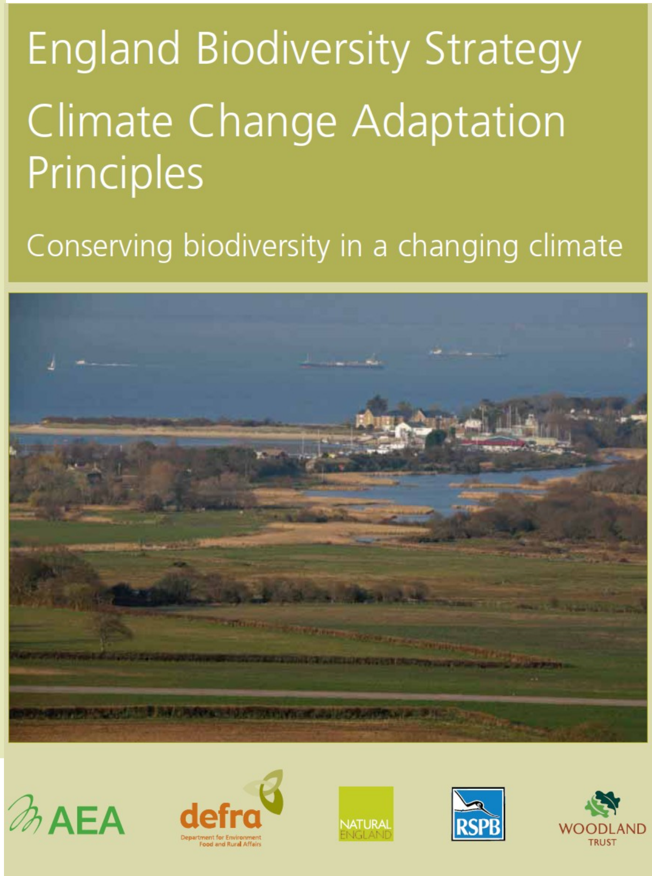
Delta committee plan for Netherlands (2008)



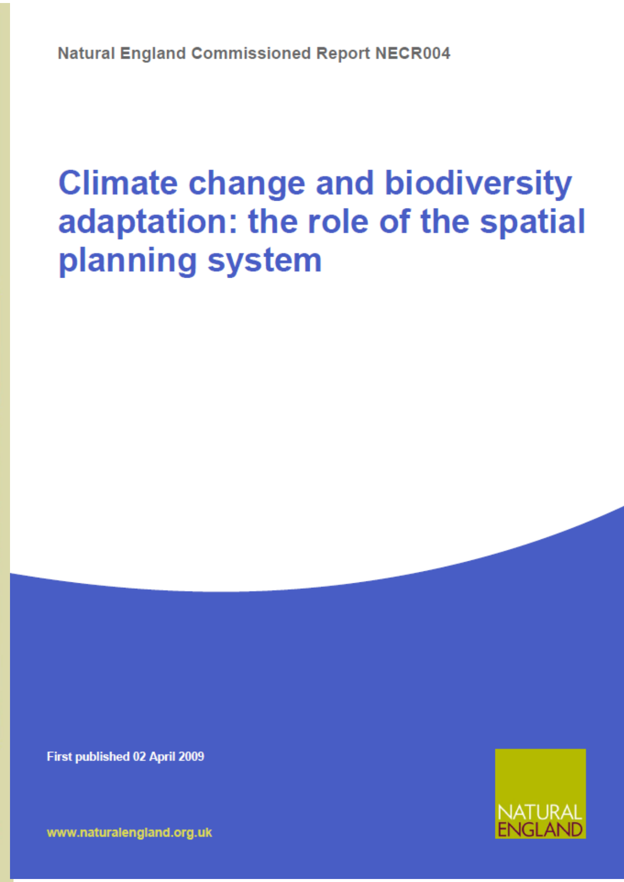
UK approaches to biodiversity and climate change adaptation



Defra, 2007

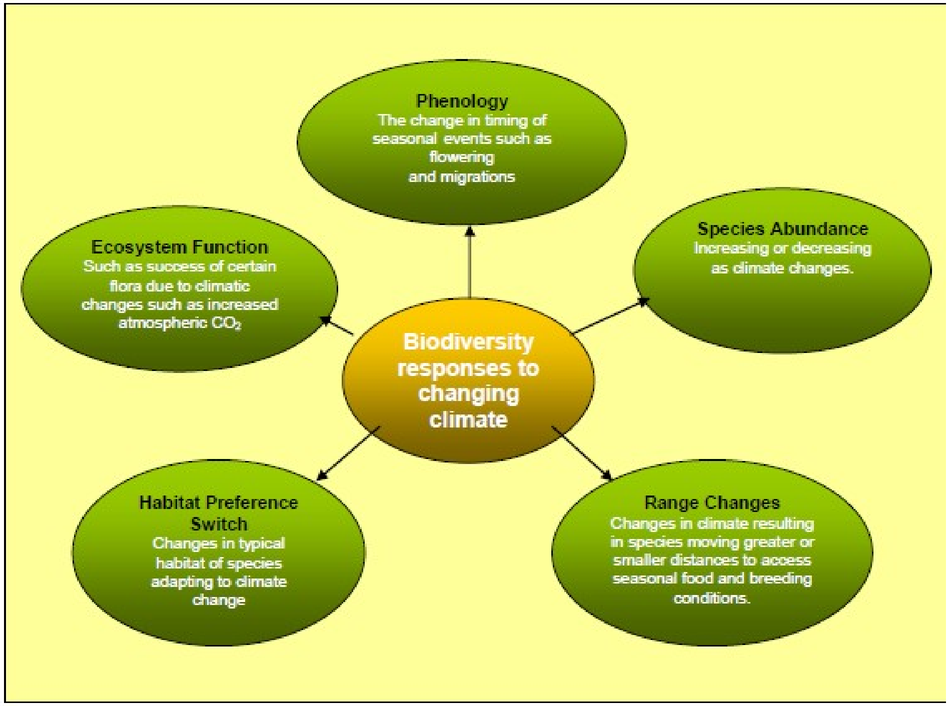


Defra, 2008



Natural England, 2009

Responses by biodiversity/ecosystems to climate change and main adaptation principles (UK)



Natural England, 2009

Defra, 2008

EU proposals for a COP15 climate agreement

Targets by developed countries

- IPCC: developed countries to reduce 25-40% by 2020 (from 1990)
- EU climate change and energy package for 2020 (-20% emissions; 20% renewables; 20% energy efficiency improvements)
- Max +2C from pre-industrial level; global emission to peak before 2020 and reduce by at least 50% reduction by 2050 (developed countries: - 80 to 95% by 2050)

Appropriate actions by developing countries

- Limit growth in their collective emissions to 15-30% below business as usual levels by 2020 (except LDCs)
- Include action on reduction of greenhouse gas emissions from deforestation

Address the financing of actions by developing countries

- To mitigate greenhouse gas emissions and adapt to climate change (if exceeding a country's domestic capabilities)
- Mainstream adaptation in other policies and support the least developed countries small island developing states

Build an effective global carbon market and reform the Kyoto's Clean Development Mechanism

Include emissions from international aviation and shipping