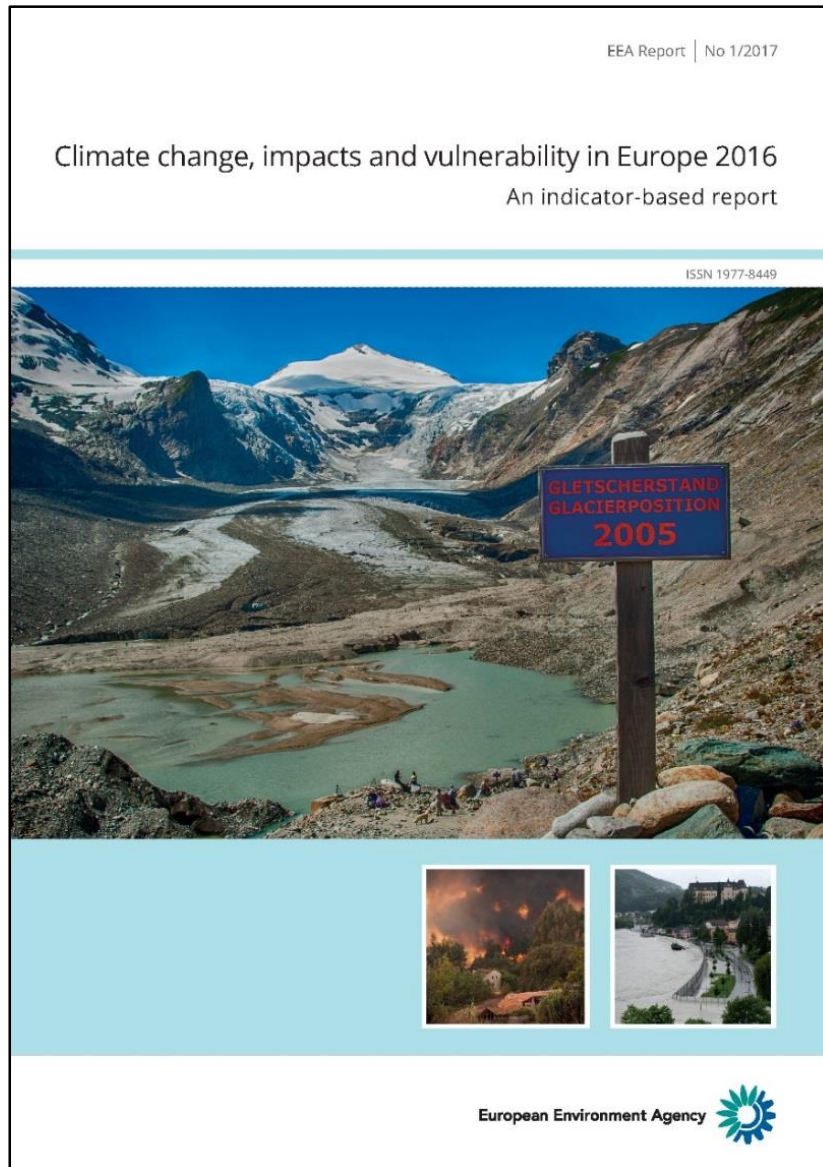


Launch of the report

Climate change, impacts and vulnerability in Europe 2016



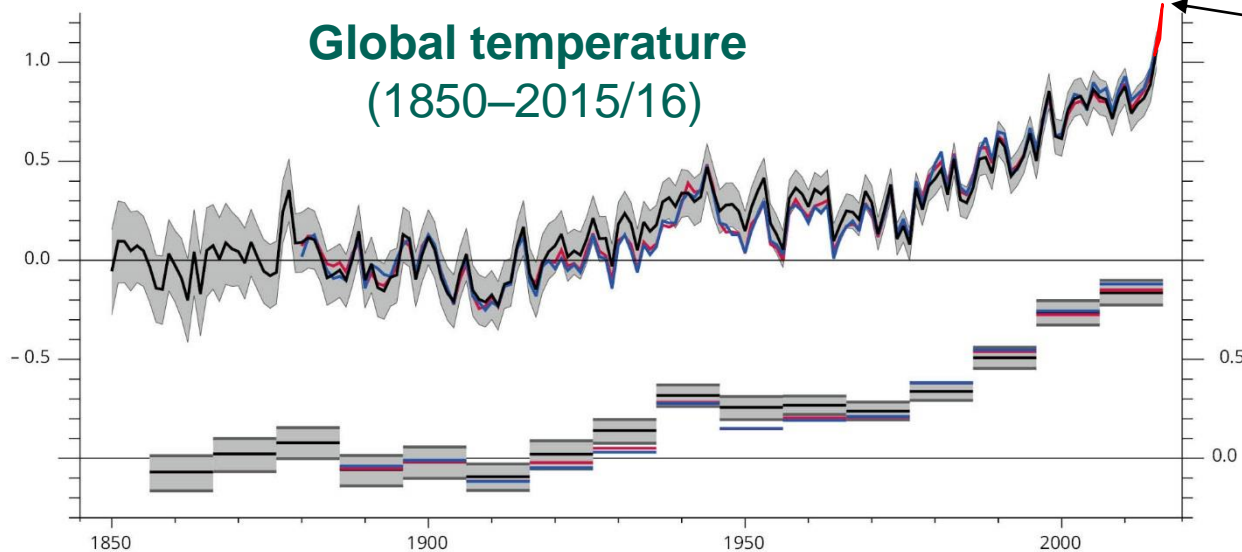
2016 EEA report on climate change, impacts and vulnerability



- **Previous reports:**
2004, 2008 and 2012
- **More than 60 authors and contributors**
- **Content**
- **Data sources**
- **External advisory group**
- **External reviews**

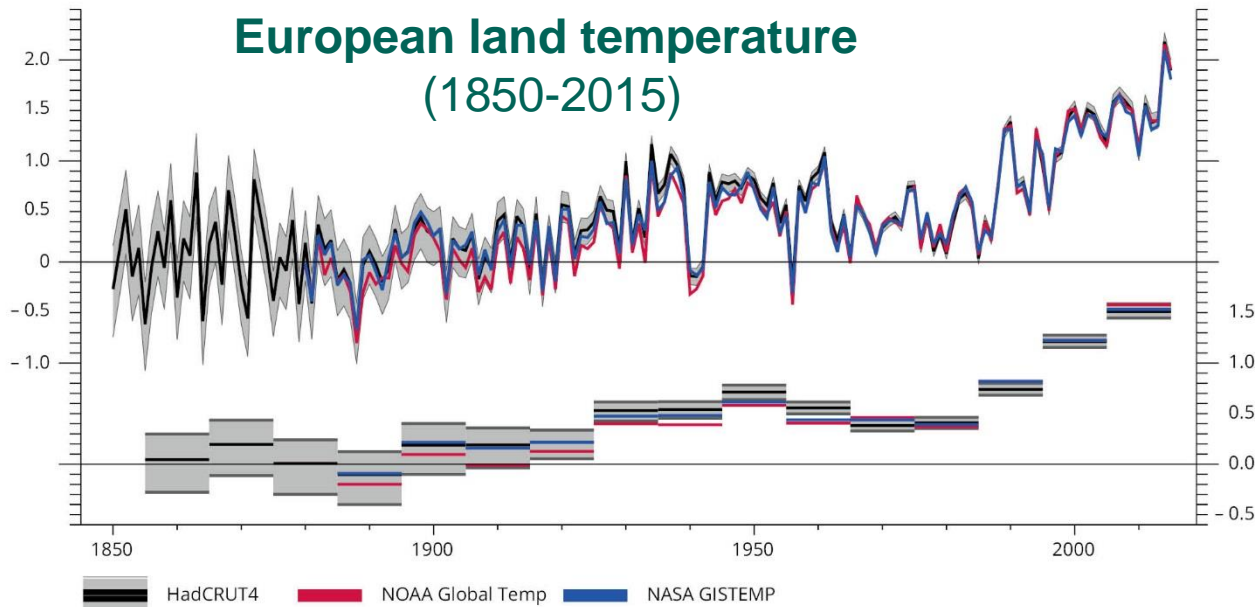
Climate warming is breaking records globally and in Europe

Temperature anomaly (°C) relative to pre-industrial



2016: 1.1–1.3 °C above pre-industrial level

Temperature anomaly (°C) relative to pre-industrial

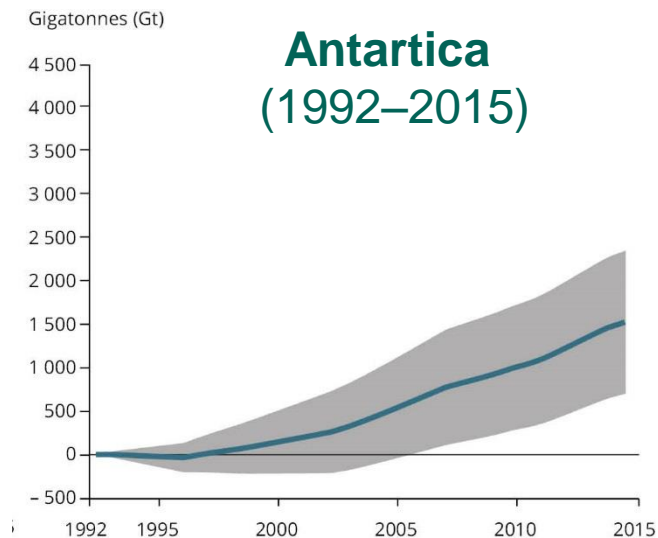
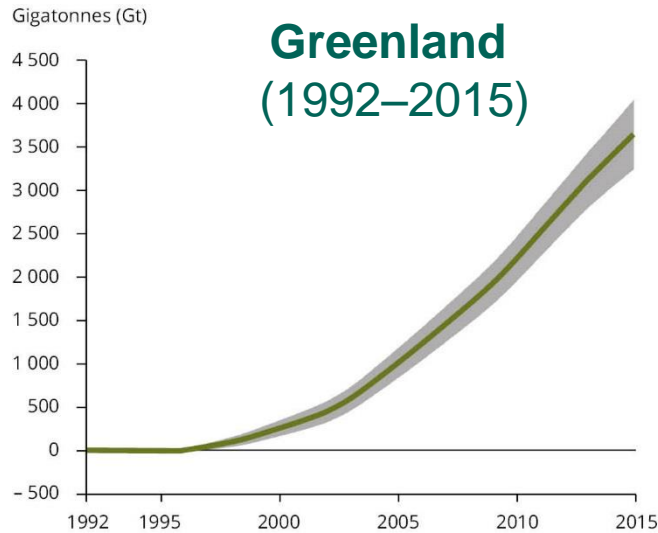


Sources:
HadCRUT4 (Met Office),
NOAA Global Temp,
NASA GISTEMP

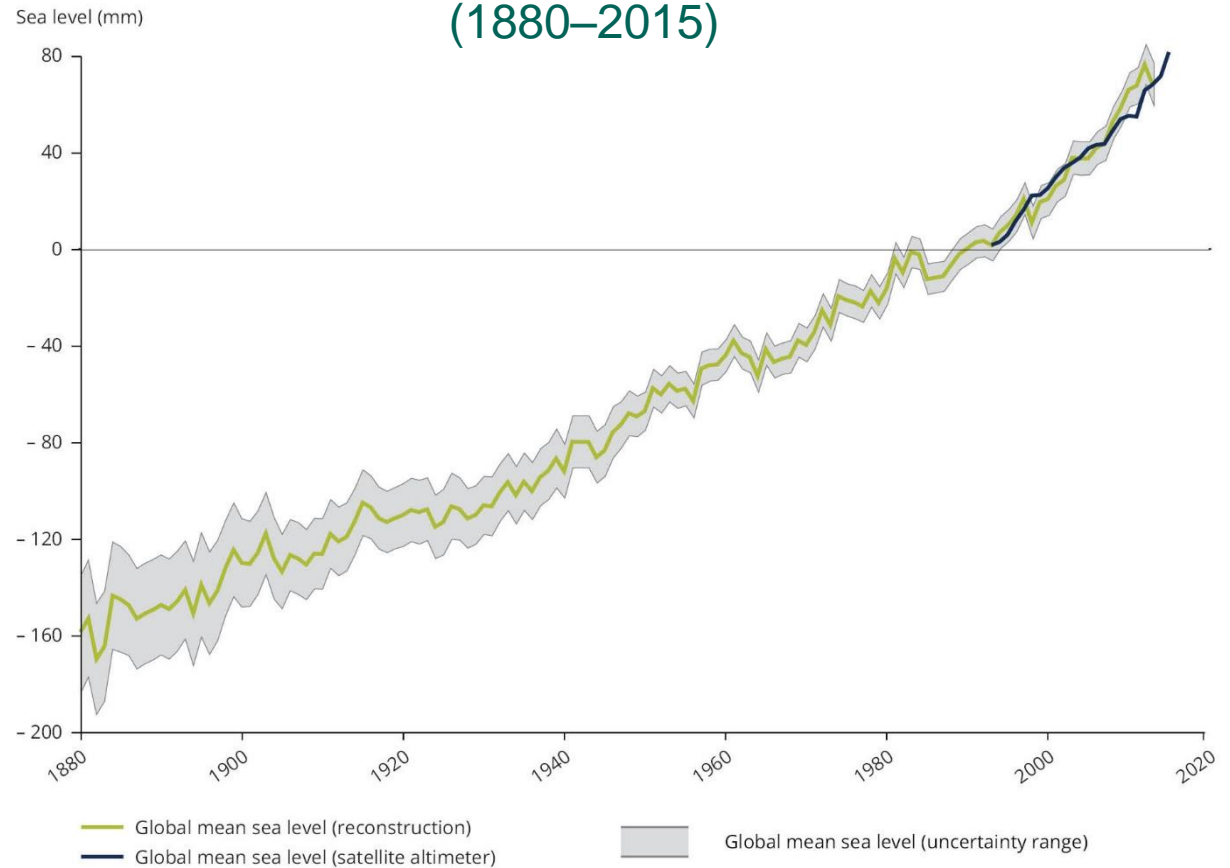


Changes in polar regions are speeding up sea level rise

Cumulative ice loss



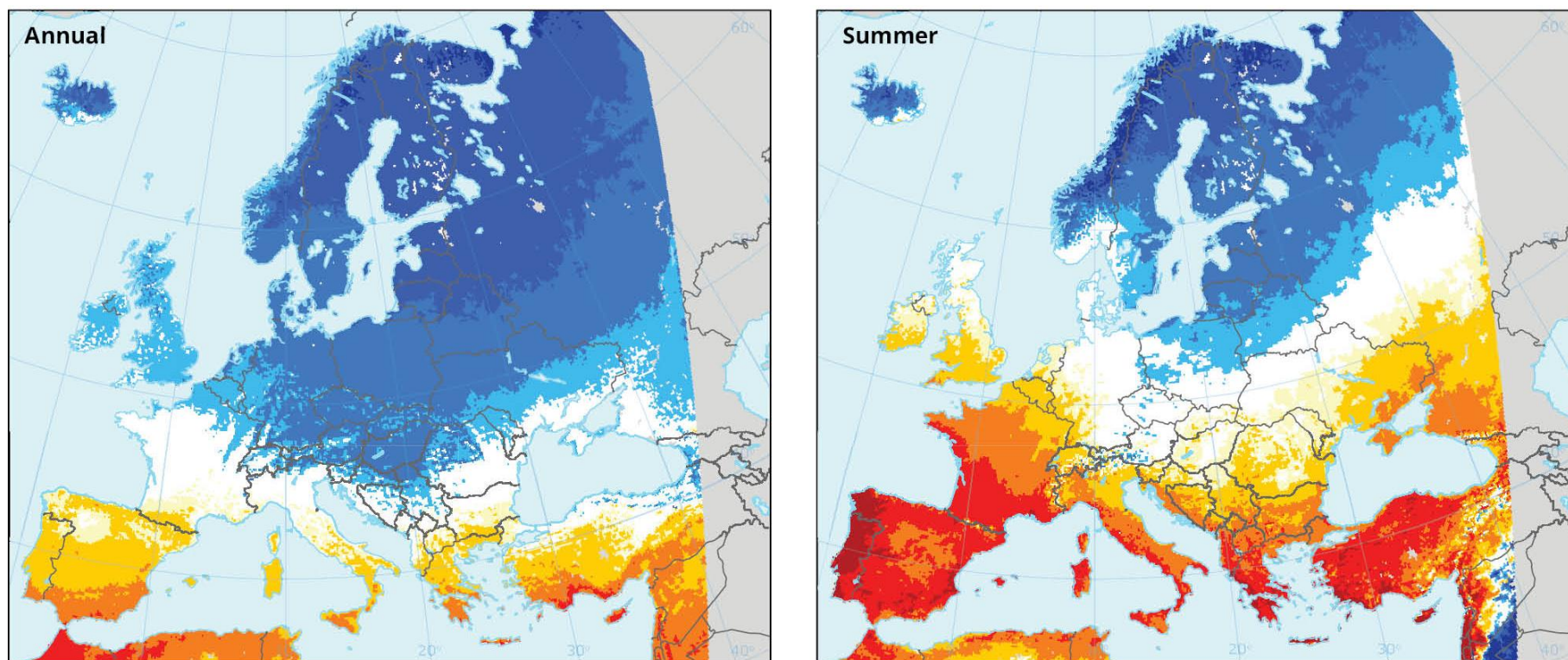
Global mean sea level (1880–2015)



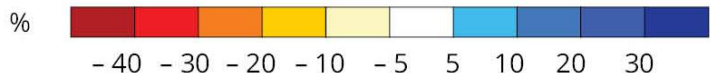
Sources:
Shepherd et al. (2015),
Church and White (2011),
Masters et al. (2012)

Differences between wet and dry regions will further increase

Precipitation (projected change for 2071–2100)



Projected change in annual (left) and summer (right) precipitation



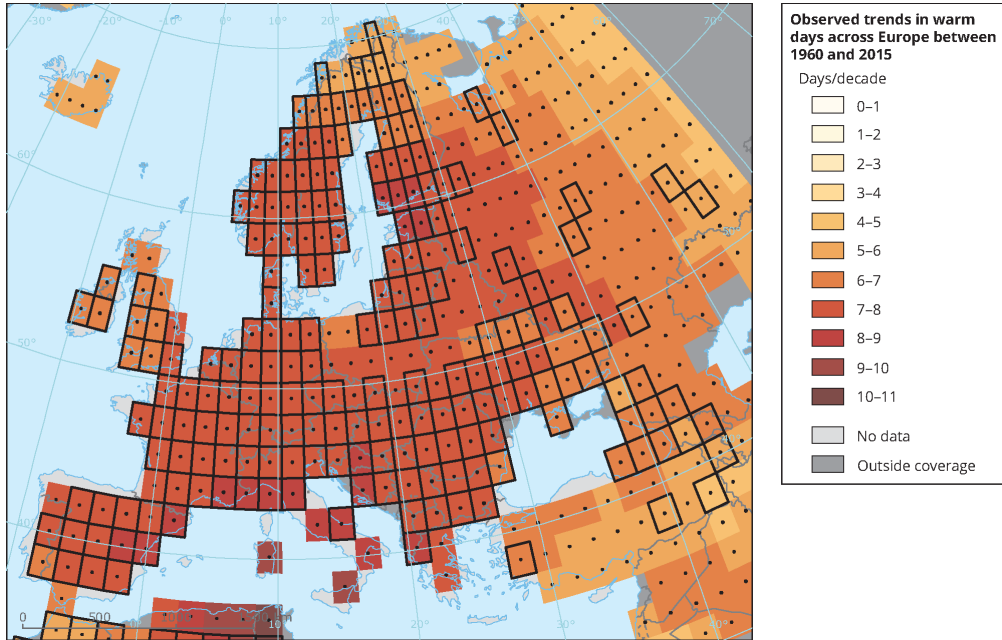
Outside coverage

0 500 1 000 1 500 km



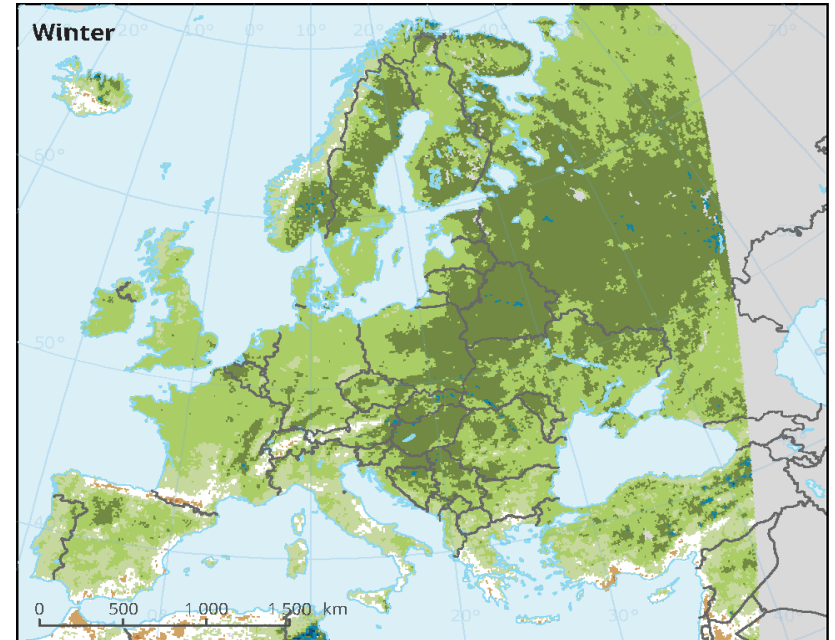
Many extreme weather events are getting stronger

Warm days (trend for 1960–2015)



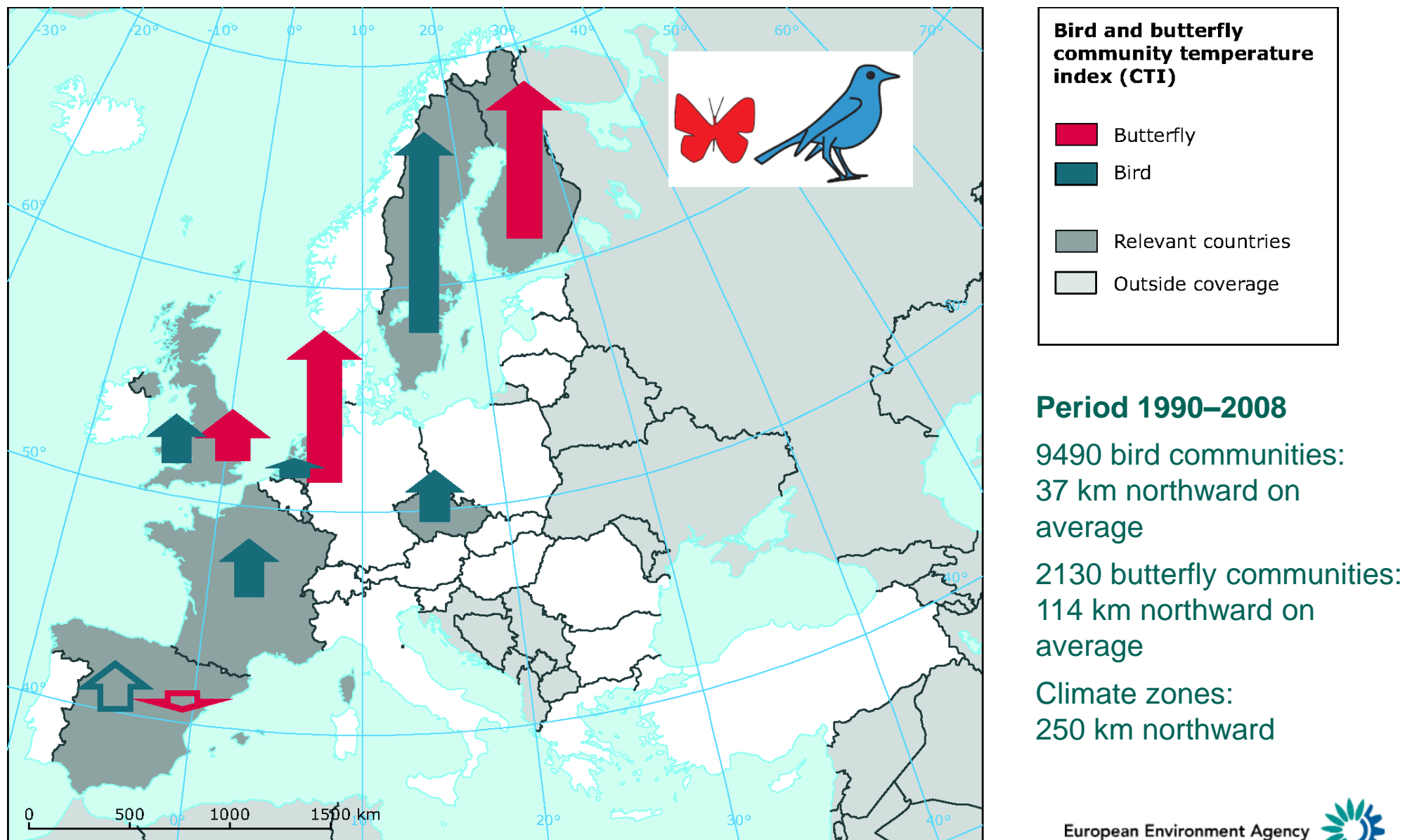
Source: HadEX2 (Donat et al. 2013)

Heavy daily precipitation (projected change for 2071–2100)



Source: EURO-CORDEX (Jacob et al., 2014)

Ecosystems are changing in response to climate change – but most species cannot follow the pace of climate change

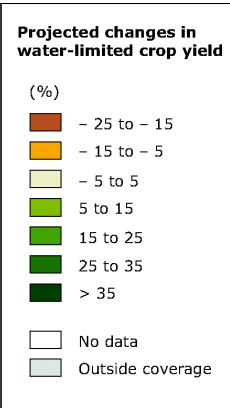
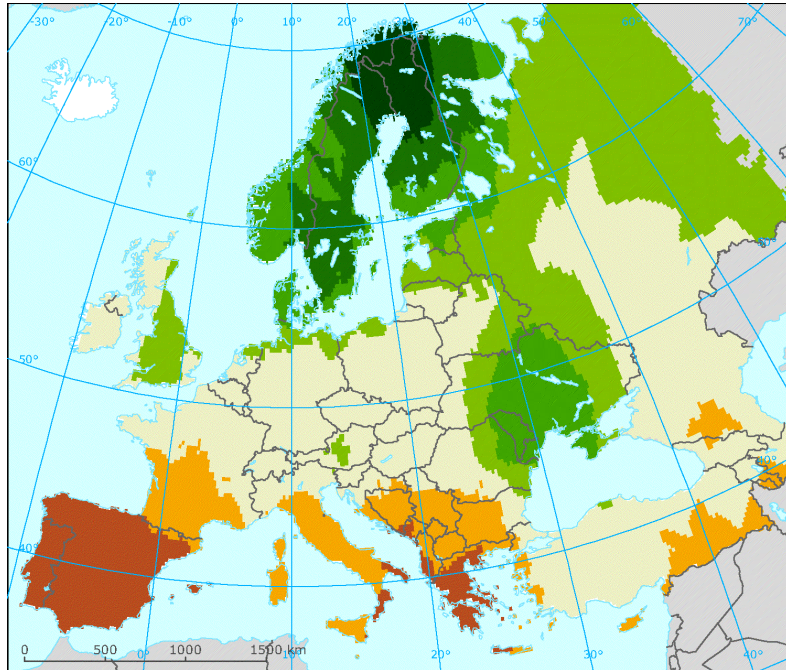


Source: Devictor et al. (2012)



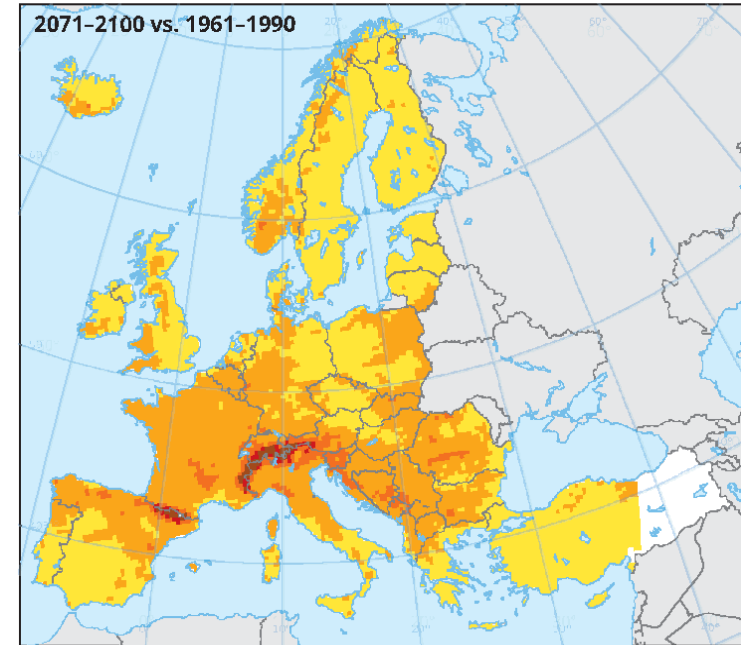
Increasing droughts are threatening agriculture and forests – Southern Europe is most affected

Yield of three staple crops (projected change for 2050)



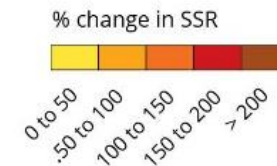
Source: Iglesias et al. (2012), Ciscar et al. (2011)

Forest fire risk (projected change for 2071–2100)



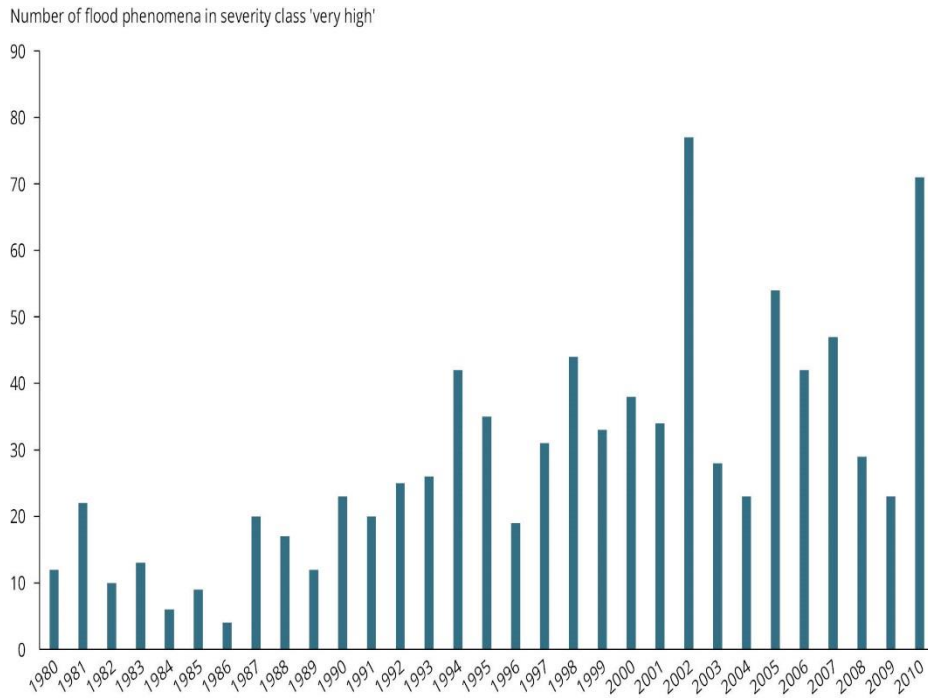
Projected change in forest fire danger

Source: JRC
(Camia, 2012)



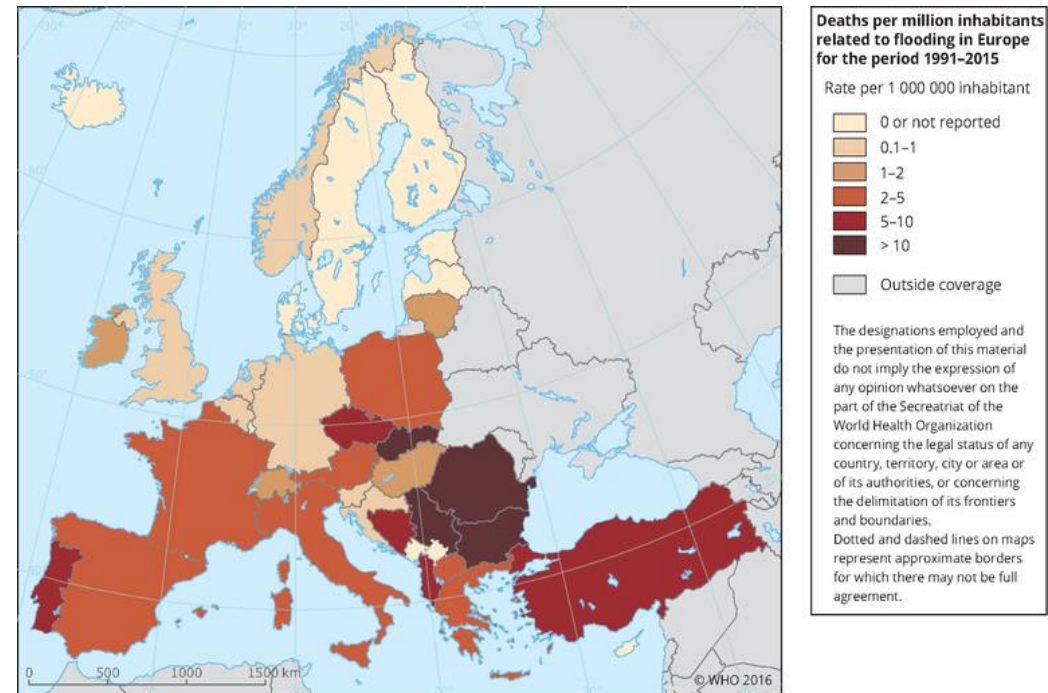
Increasing floods are threatening human lives

'Very severe' inland floods in Europe (1980–2010)



Source: EEA (2016), ETC/ICM (2015)

Deaths from flooding (1991–2015)



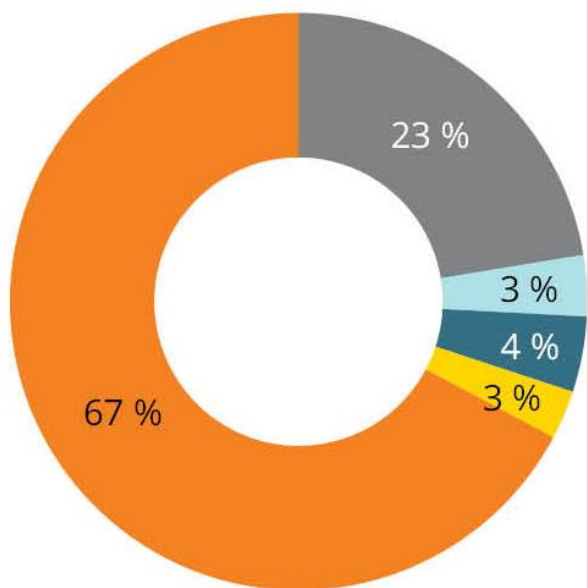
Source: WHO (2016), EMDAT (2016)

Extreme weather and climate events are costly and life-threatening

Impacts of extreme events in EEA member countries (1980–2013)

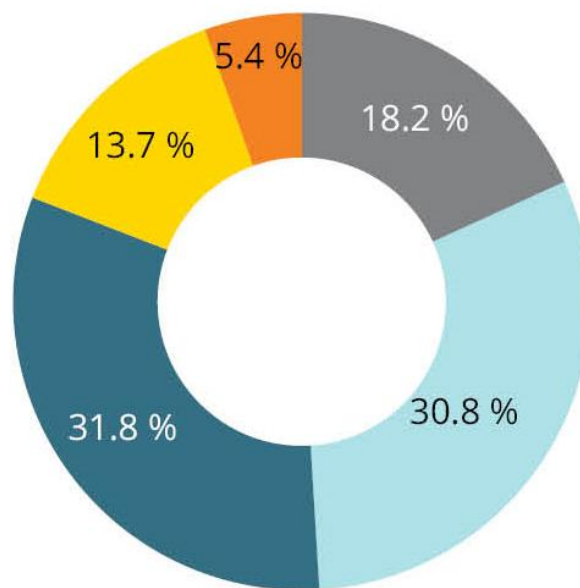
Fatalities

111 211



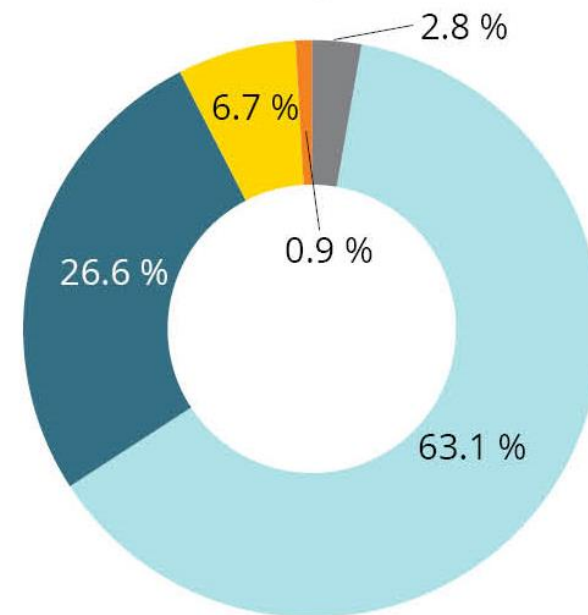
Total losses

EUR 480 billion (2013 prices)



Insured losses

EUR 132 billion (2013 prices)



■ Geophysical events (earthquakes, tsunamis, volcanic eruptions)

■ Hydrological events (floods, mass movements)

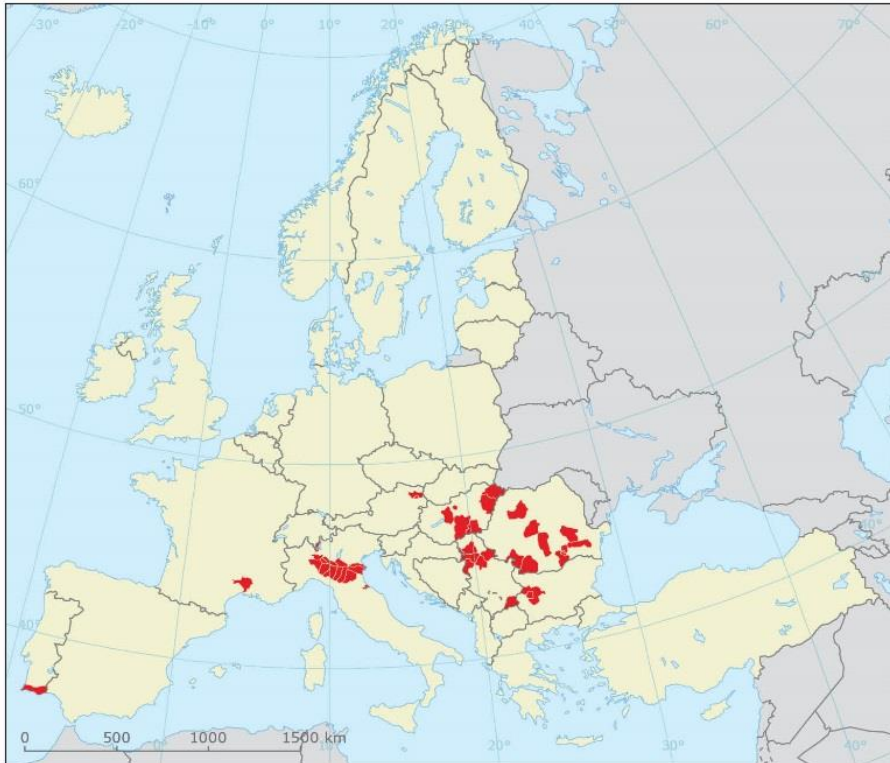
■ Climatological event (heat waves)

■ Meteorological events (storms)

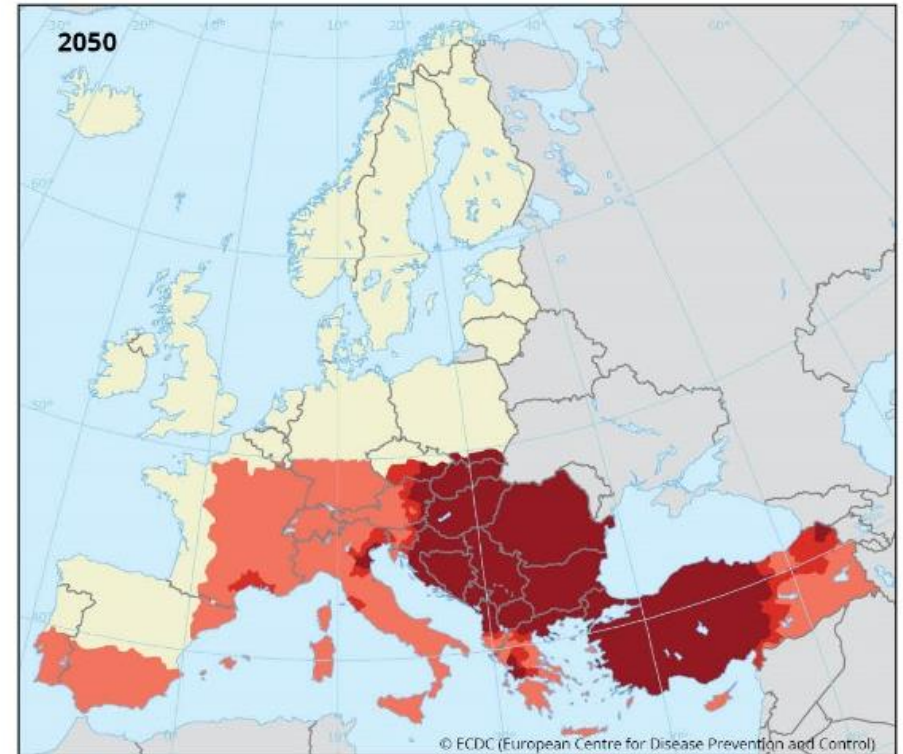
■ Climatological events (cold waves, droughts, forest fires)

Climate change is facilitating the spread of infectious diseases

**West Nile fever
(2014)**



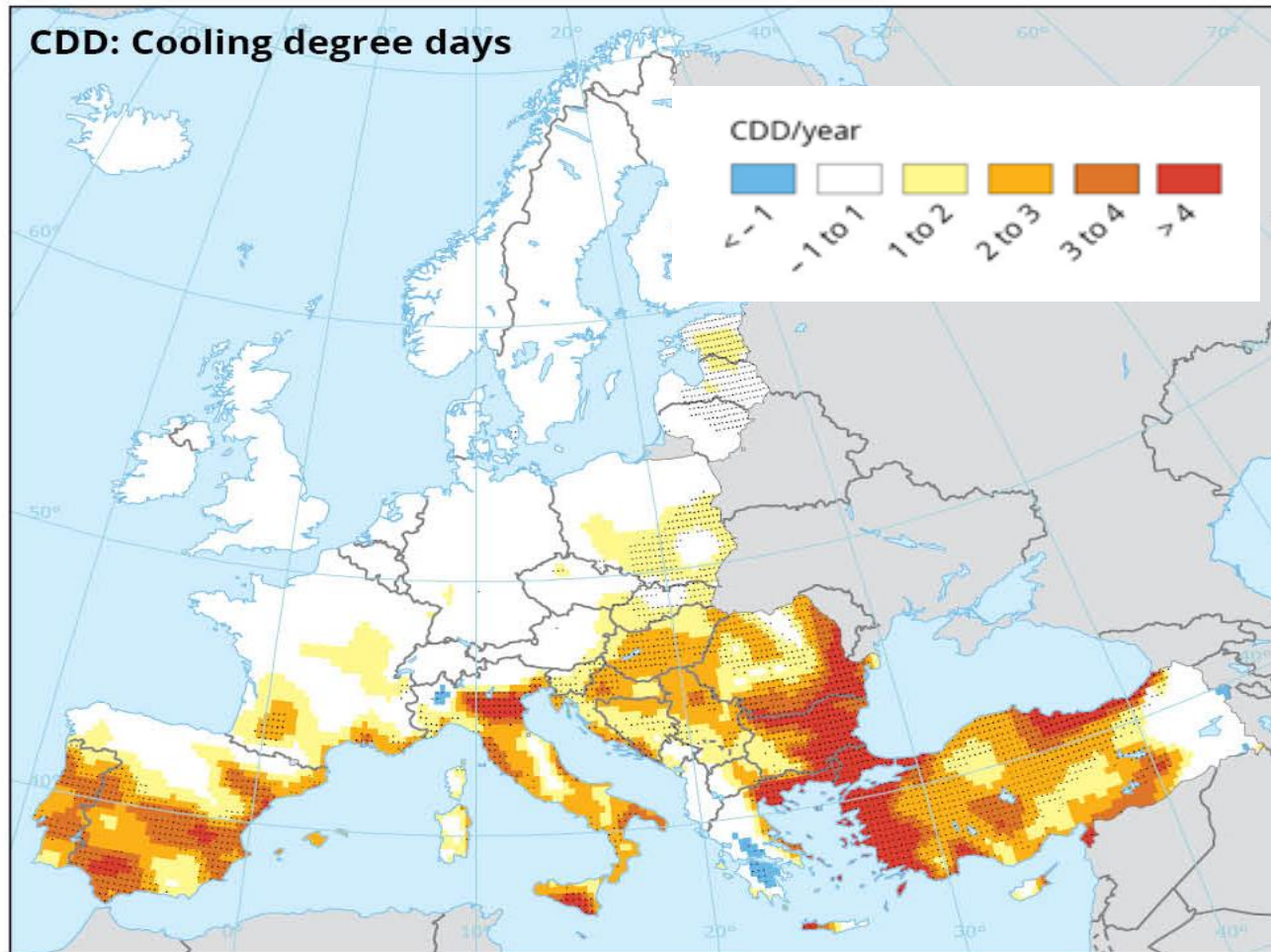
**West Nile fever
(projections for 2050)**



Source: ECDC (Semenza et al. 2014)

The energy sector is crucial for climate change mitigation – but it also needs to adapt to climate change

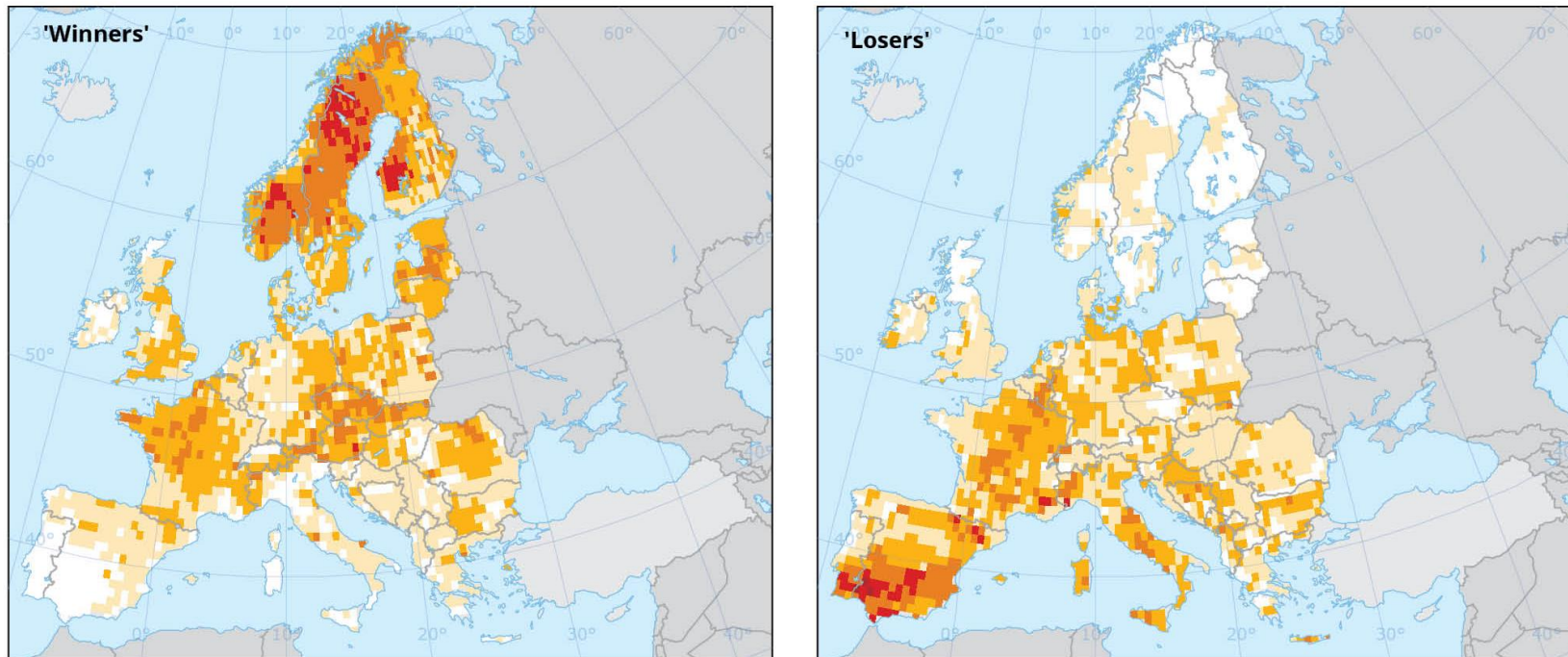
Cooling degree days (trend for 1981–2014)



Source: JRC (Spinoni et al. 2015)

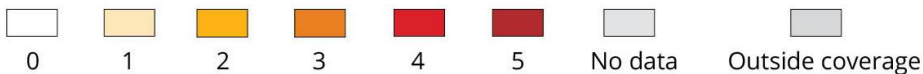
Climate change can aggravate existing disparities in Europe

Projected 'winners' and 'losers' from climate change
(number of sectors positively and negatively affected by climate change)



Multi-sectoral hotspots of climate change under a global warming of 2 °C

Number of hotspots



Climate change is affecting all European regions – but adaptation needs differ across regions

Arctic region

- Temperature rise much larger than global average
- Decrease in Arctic sea ice coverage
- Decrease in Greenland ice sheet
- Decrease in permafrost areas
- Increasing risk of biodiversity loss
- Some new opportunities for the exploitation of natural resources and for sea transportation
- Risks to the livelihoods of indigenous peoples

Atlantic region

- Increase in heavy precipitation events
- Increase in river flow
- Increasing risk of river and coastal flooding
- Increasing damage risk from winter storms
- Decrease in energy demand for heating
- Increase in multiple climatic hazards

Mountain regions

- Temperature rise larger than European average
- Decrease in glacier extent and volume
- Upward shift of plant and animal species
- High risk of species extinctions
- Increasing risk of forest pests
- Increasing risk from rock falls and landslides
- Changes in hydropower potential
- Decrease in ski tourism

Coastal zones and regional seas

- Sea level rise
- Increase in sea surface temperatures
- Increase in ocean acidity
- Northward migration of marine species
- Risks and some opportunities for fisheries
- Changes in phytoplankton communities
- Increasing number of marine dead zones
- Increasing risk of water-borne diseases

Boreal region

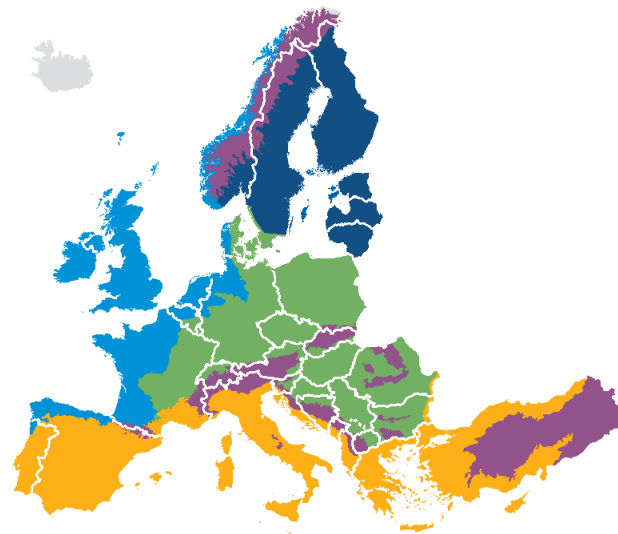
- Increase in heavy precipitation events
- Decrease in snow, lake and river ice cover
- Increase in precipitation and river flows
- Increasing potential for forest growth and increasing risk of forest pests
- Increasing damage risk from winter storms
- Increase in crop yields
- Decrease in energy demand for heating
- Increase in hydropower potential
- Increase in summer tourism

Continental region

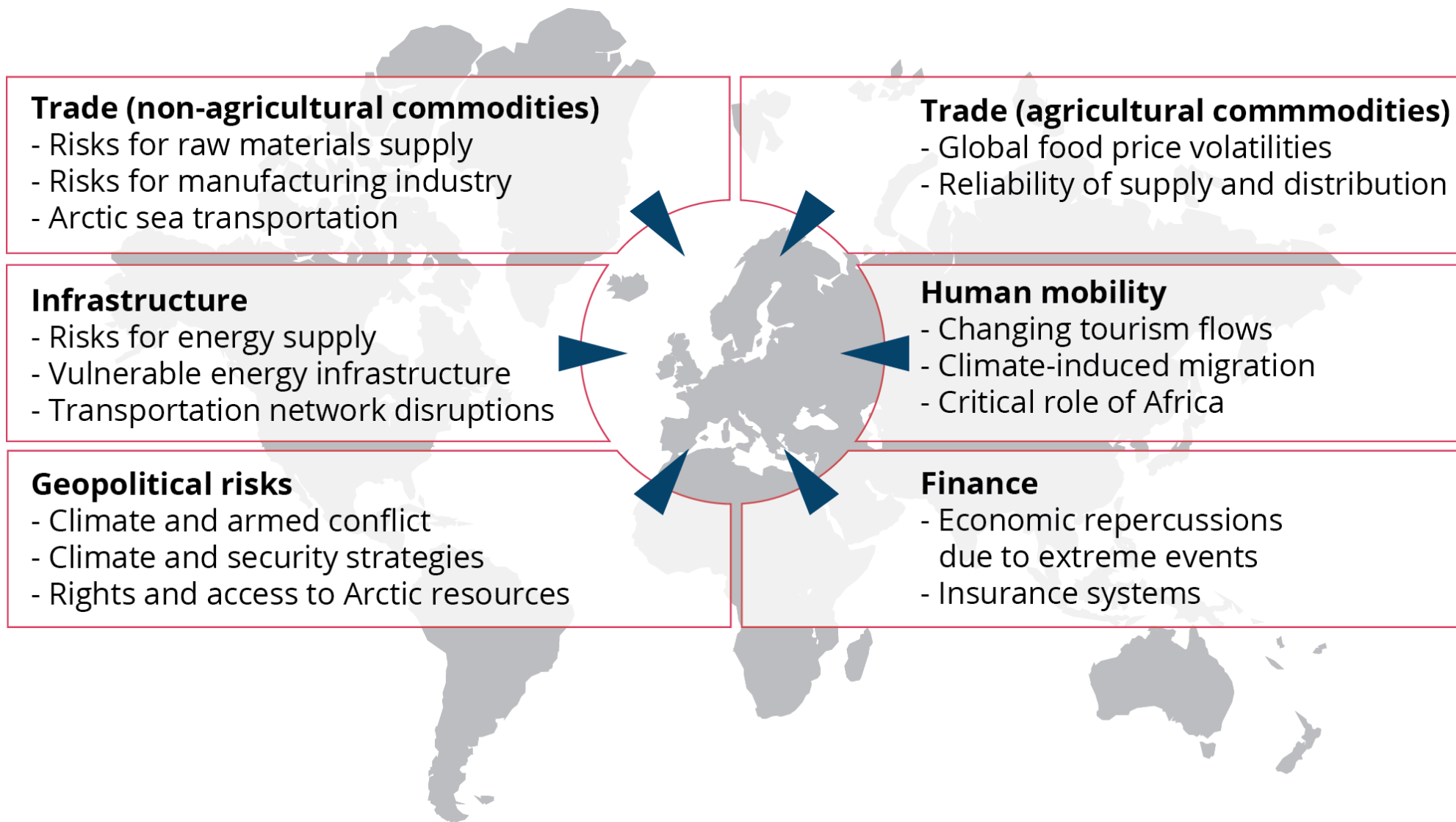
- Increase in heat extremes
- Decrease in summer precipitation
- Increasing risk of river floods
- Increasing risk of forest fires
- Decrease in economic value of forests
- Increase in energy demand for cooling

Mediterranean region

- Large increase in heat extremes
- Decrease in precipitation and river flow
- Increasing risk of droughts
- Increasing risk of biodiversity loss
- Increasing risk of forest fires
- Increased competition between different water users
- Increasing water demand for agriculture
- Decrease in crop yields
- Increasing risks for livestock production
- Increase in mortality from heat waves
- Expansion of habitats for southern disease vectors
- Decreasing potential for energy production
- Increase in energy demand for cooling
- Decrease in summer tourism and potential increase in other seasons
- Increase in multiple climatic hazards
- Most economic sectors negatively affected
- High vulnerability to spillover effects of climate change from outside Europe

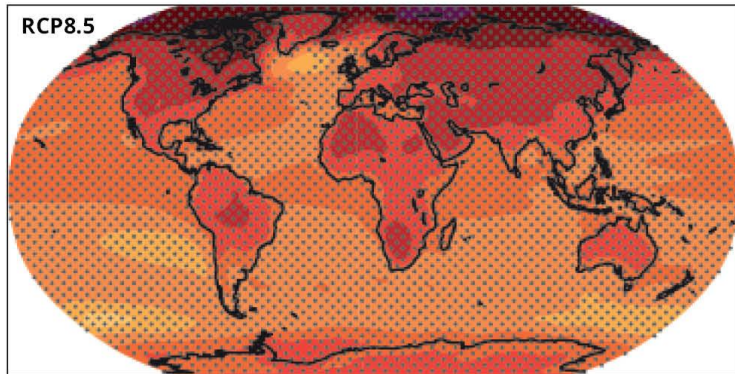
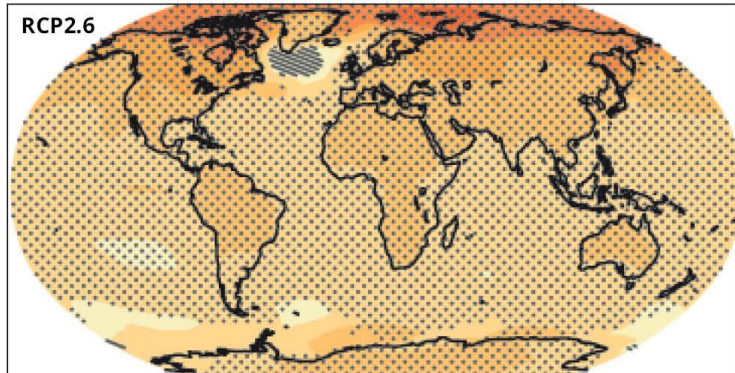


Europe is also vulnerable to climate change impacts outside Europe

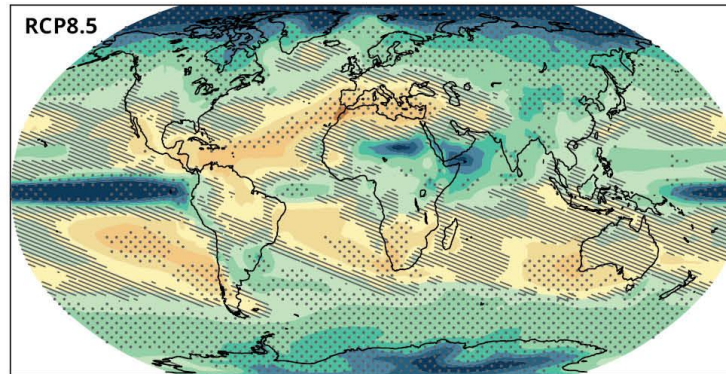
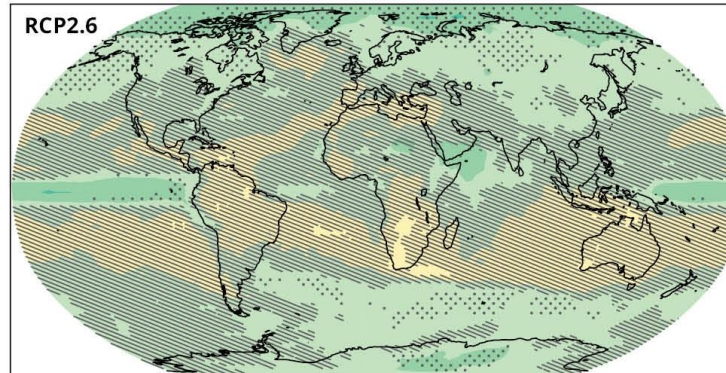


Climate change will continue throughout the century – ambitious mitigation is required to limit the long-term risks

Increase in temperature



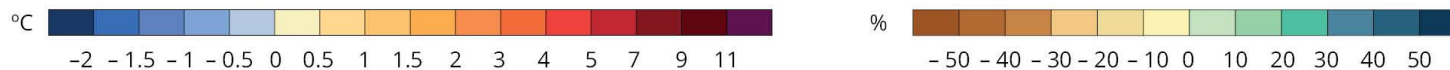
Change in precipitation




Ambitious mitigation scenario

High emissions scenario

Changes in global average surface temperature (left) and precipitation (right) in 2081-2100 relative to 1986-2005 under RCP2.6 (upper panel) and RCP8.5 (lower panel)

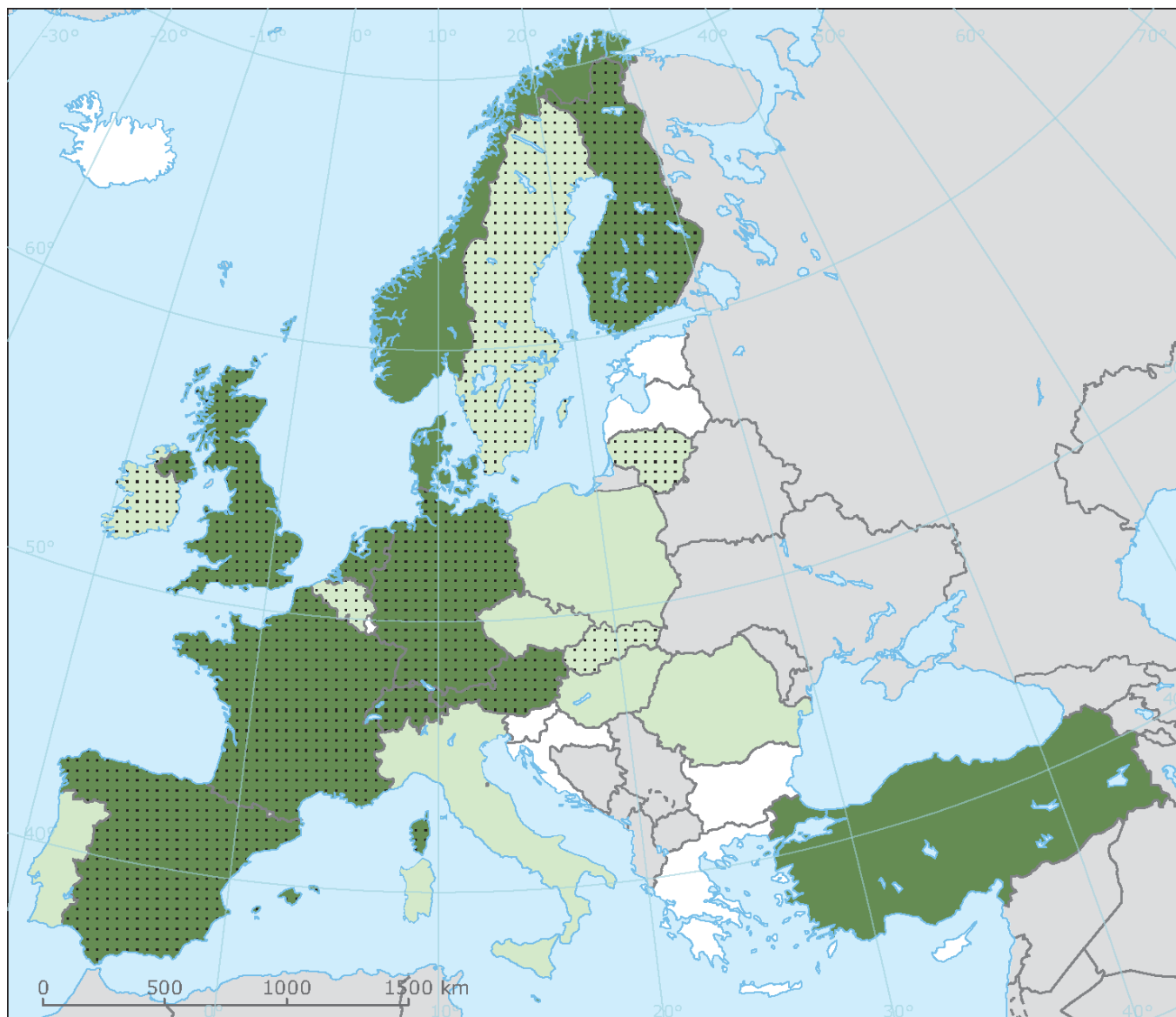


 Regions where the multi-model mean signal is less than 1 standard deviation of internal variability

 Regions where the multi-model mean signal is greater than 2 standard deviations of internal variability and where 90 % of models agree on the sign of change






Source: IPCC (2013)

Most European countries have developed national adaptation strategies and/or action plans



Overview of national adaptation strategies and plans and monitoring, reporting and evaluation systems (MRE) in Europe

Adaptation policy

-  National adaptation strategy (NAS) and national and/or sectoral adaptation plans (NAP/SAP)
-  National adaptation strategy (NAS)
-  MRE system of adaptation at national level or implemented under development
-  No policy
-  Outside coverage

Source: EEA (2016)



Thank you

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The online indicators underlying this report are available at
eea.europa.eu/data-and-maps/indicators/#c5=climate-change-adaptation