Use of climate data for EEA activities

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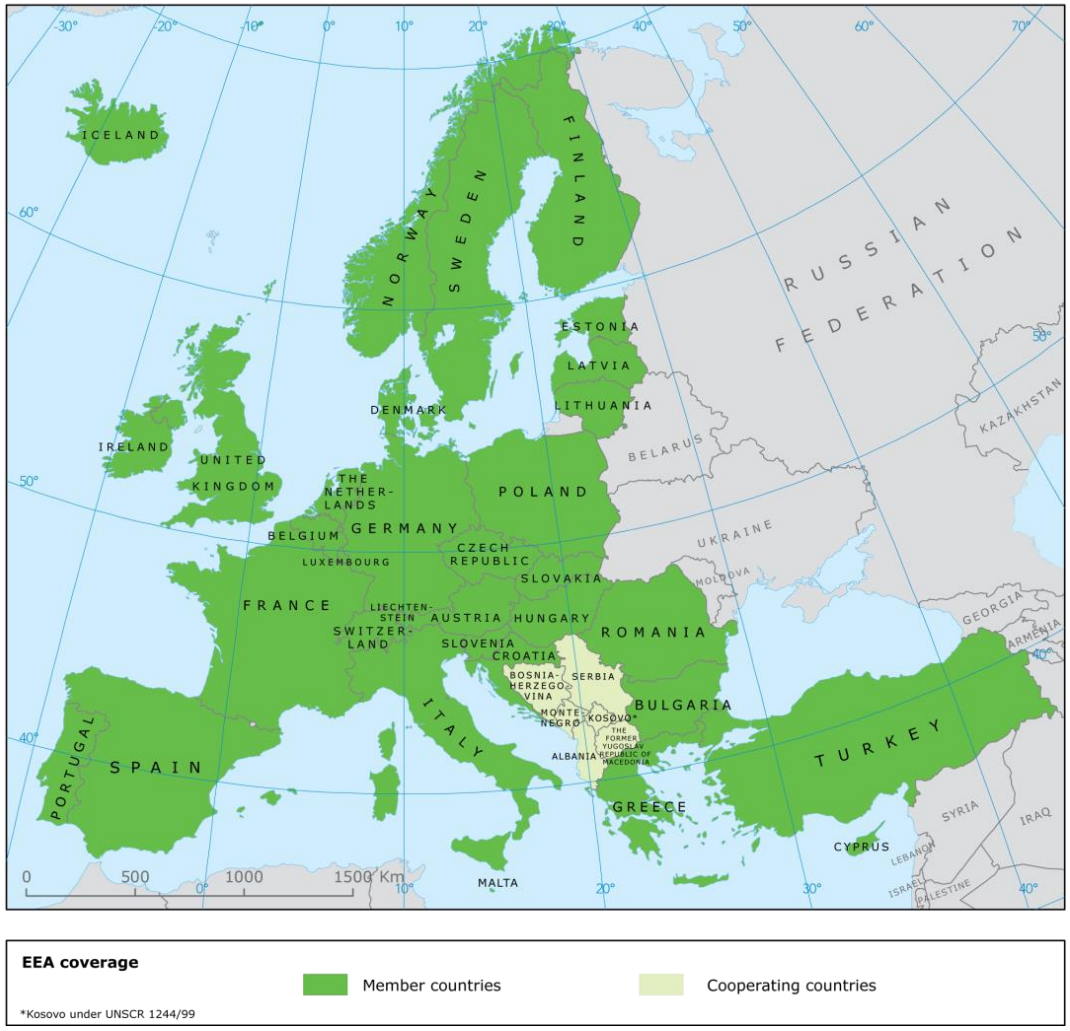
Climate change impacts, vulnerability and adaptation

Copernicus Climate Data Store Workshop,
3 March 2015, ECMWF, Reading, UK

European Environment Agency

EEA networking with member countries (Eionet)



- **33 member** and six collaborating **countries** (ministries and **environment agencies**)
- Main target audience: **policymakers** at European and national levels
- Supporting and informing policy development and implementation by **data, indicators and assessments** (e.g. on climate change impacts, vulnerability and adaptation)
- **Networking:** annual Eionet workshop, expert meetings, user/contributor meetings Climate-ADAPT, other conferences like ECCA2015
- Supported by a **European Topic Centre**, see: http://cca.eionet.europa.eu/

THE EUROPEAN ENVIRONMENT
STATE AND OUTLOOK 2015

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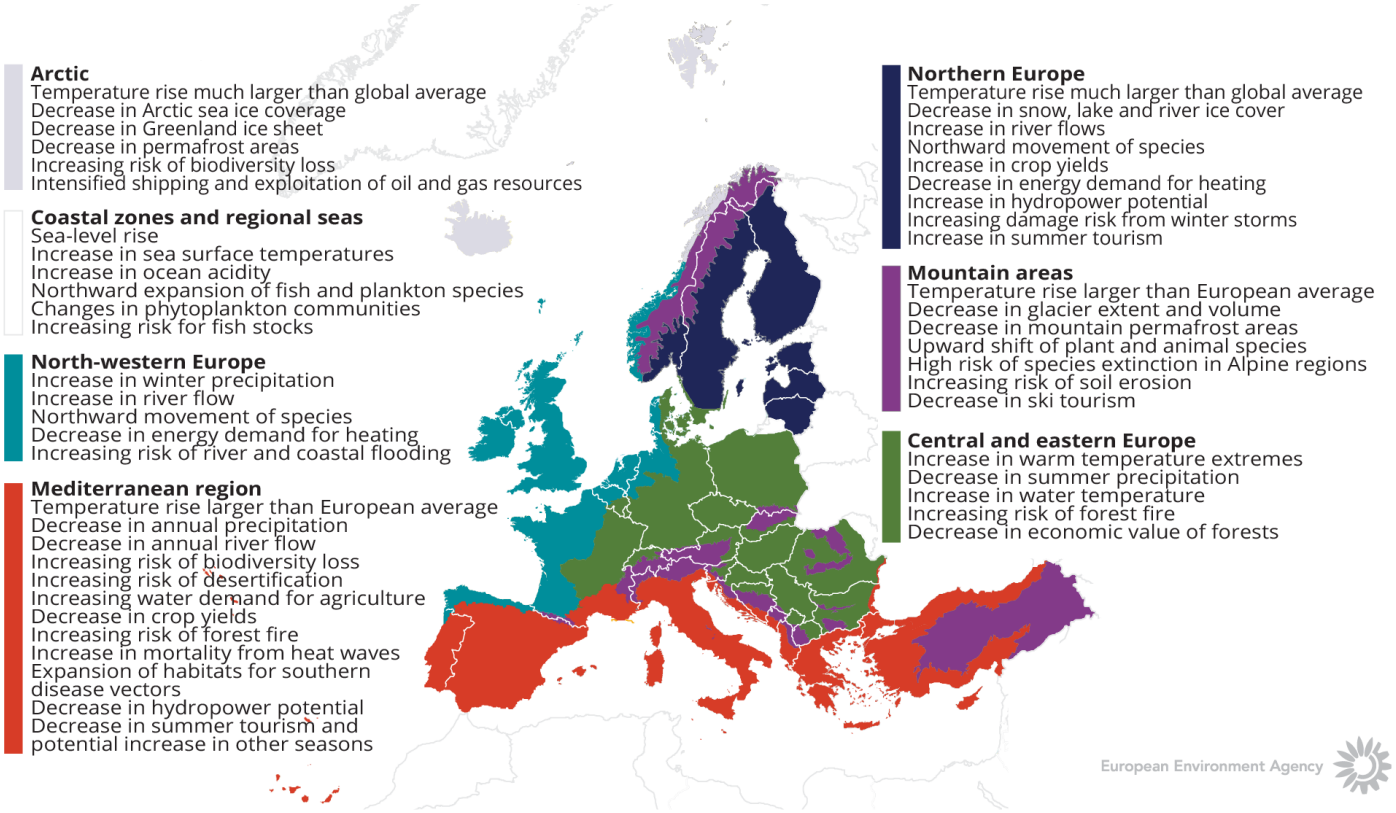
Key observed and projected impacts from climate change for the main regions in Europe



Climate change impacts on ecosystems | Water use and water stress | Urban systems and grey infrastructure | Climate change & related envi. health risks

Source: EEA (2012), Climate change, impacts and vulnerability in Europe 2012. An indicator-based report, EEA Report No 12/2012, European Environment Agency, Copenhagen, Denmark.

Related content

The EU CC adaptation strategy (2013)

Priority 1: Promoting action by Member States

Action 1.	Encourage MS to adopt Adaptation Strategies and action plans
Action 2.	LIFE funding, including adaptation priority areas
Action 3.	Promoting adaptation action by cities along the Covenant of Mayors initiative

Priority 2: Better informed decision-making

Action 4.	Knowledge-gap strategy
Action 5.	Climate-ADAPT

Priority 3: Key vulnerable sectors

Action 6.	Climate proofing the Common Agricultural Policy, Cohesion Policy, and the Common Fisheries Policy
Action 7.	Making infrastructure more resilient
Action 8.	Promote products & services by insurance and finance markets

EEA activities on climate change impacts, vulnerability and adaptation

Supported by a European Topic Centre, see: http://cca.eionet.europa.eu/

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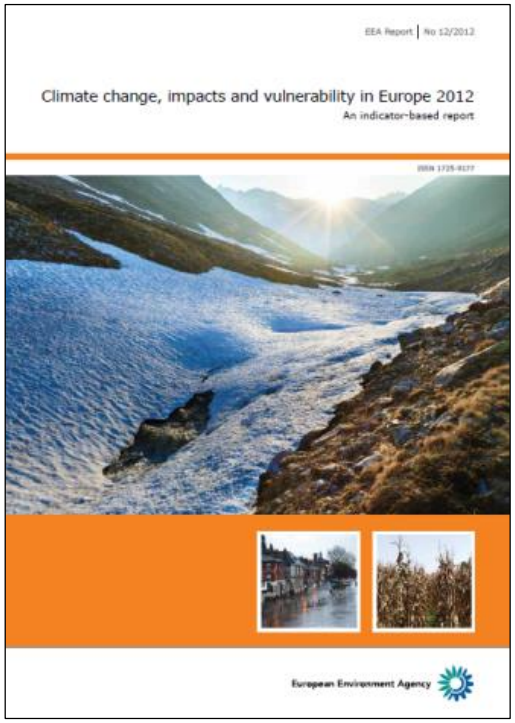
National adaptation policy processes in Europe (EEA report published 14 Oct 2014)

- **Self-assessment** of 44 questions; 30 EEA member countries responded
- Mid 2013-mid 2014; two consultation processes of countries
- Key findings clustered around 8 Key Topics :
  - Public and policy awareness of the need for adaptation
  - Knowledge generation and use
  - Planning adaptation
  - Coordination of adaptation
  - Stakeholders involvement
  - Implementation of adaptation
  - Transnational cooperation
  - Monitoring, reporting and evaluation

2012 EEA indicator report on climate change, impacts and vulnerability

- **Coordination** by EEA
- **Authors and contributors (total 90)**:
  - EEA and 3 European Topic Centres (CCA, ICM, BD)
  - Joint Research Centre (European Commission)
  - World Health Organisation (Regional Office for Europe)
  - European Centre for Disease Prevention and Control
  - Other organisations
- **External Advisory Group:**
  EC, EEA SC, WHO, ECMWF, IPCC, AMAP/SWIPA, etc.
- **Content:**
  Focus on indicators, but including additional information that is not suitable as EEA indicator
- **Data sources**:
  International databases, European and other research projects, academic publications
- **Extent**:
  300 pages, 42 indicators, >120 maps and figures



To be updated and new report published in 2016

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Content and structure of the 2012 CCIV report

Executive Summary

Technical Summary

Introduction

2. Changes in the climate system

- Key climate variables (5)
- Cryosphere (6)

3. Climate impacts on environmental systems

- Oceans and marine environment (5)
- Coastal zones (2)
- Freshwater quantity and quality (5)
- Terrestrial ecosystems (5)
- Soil (3)

(x): Number of "indicators"

4. Climate impacts on socio-economic systems and health

- Agriculture (4)
- Forests and forestry (2)
- Fisheries and aquaculture
- Human health (4)
- Energy (1)
- Transport
- Tourism

5. Vulnerability to climate change

- River flooding, water scarcity and droughts
- Integrated assessment of vulnerability
- Cities and urban areas
- Damage costs (1)

6. Indicator and data needs

Climate change, impact and vulnerability indicators on EEA web site (many updated 2013/2014)

Category	Indicators	Category	Indicators
Key climate variables	• Global and European Temperature • Temperature extremes • Mean precipitation and Precipitation extremes • Storms	**Soil**	• Soil organic carbon • Soil erosion • Soil moisture
Cryosphere	• Snow cover • Greenland ice sheet • Glaciers • Permafrost • Arctic and Baltic sea ice	**Agriculture**	• Growing season for agricultural crops • Agrophenology • Water-limited crop productivity • Irrigation water requirement
Oceans, marine environment, coastal areas	• Ocean acidification • Ocean heat content • Sea surface temperature • Phenology of marine species • Distribution of marine species • Global and European sea level rise	**Forests and forestry**	• Forest growth • Forest fires
Freshwater quantity and quality	• River flow • River floods • River flow drought • Water temperature • Lake and river ice cover	**Human health**	• Floods and health • Extreme temperatures and health • Air pollution by ozone and health • Vector-borne diseases
Terrestrial biodiversity and ecosystems	• Plant and fungi phenology • Animal phenology • Distribution of plant species • Distribution and abundance of animal species • Species interactions	**Energy**	• Heating degree days
		Vulnerability/risks	• Damages from weather and climate events

EEA web site: http://www.eea.europa.eu/data-and-maps/indicators/#c5=climate&c7=all&c0=10&b_start=0

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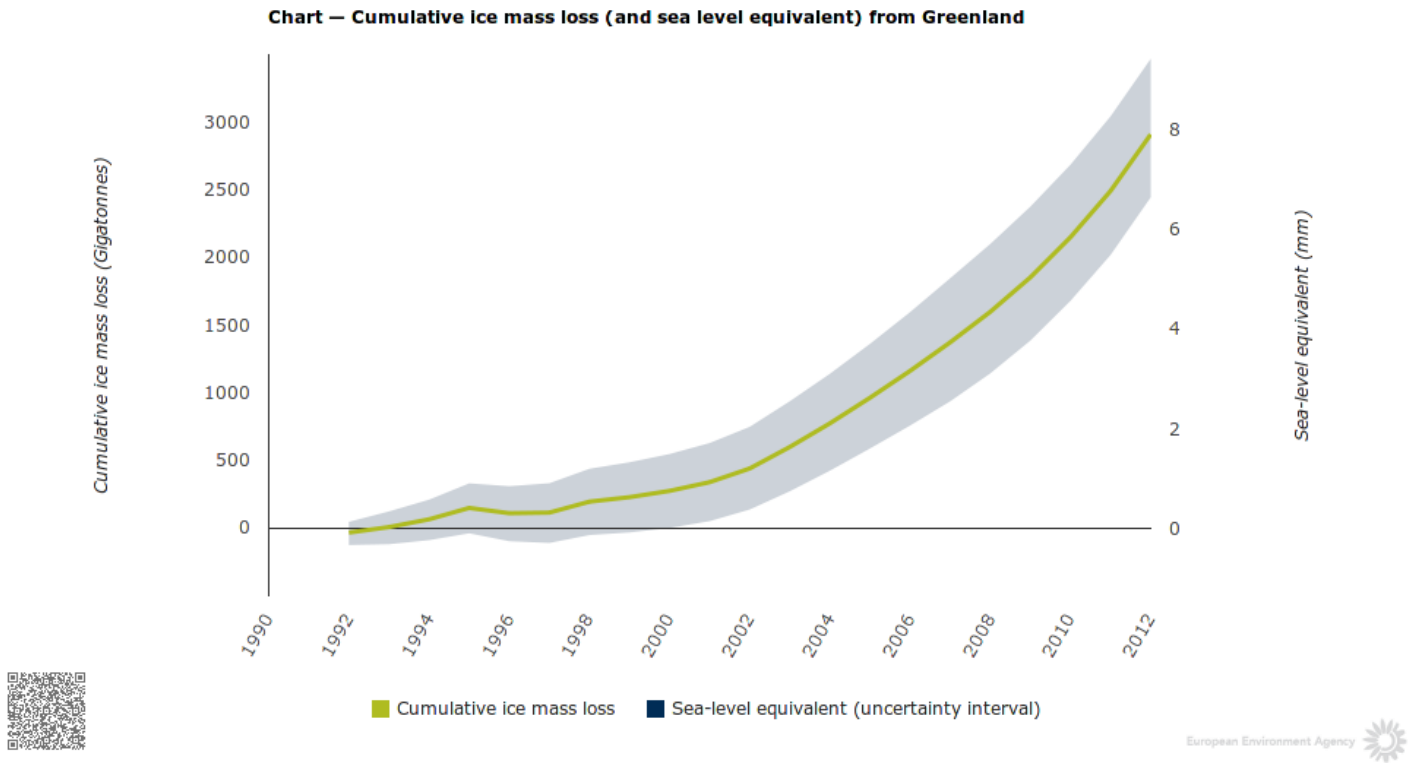
Planned content developments 2016 CC IV report

- **Refocus** and reduce the underlying **indicator set**
- Include information on **policy context for adaptation (summary, EU policies, referring to 2014 report)**
- Include information on **vulnerability** beyond indicators (e.g. regional case studies; cross-border)
- Improved presentation of information related to **extreme climate and weather events**
  - EEA expert workshop in March 2015
- Additional information on **terrestrial ecosystems**
- Additional information on **marine ecosystems**
- Improved **coverage** of relevant **EU research projects**

Organisation of 2016 CCIV report

- Lead: EEA climate change impact, vulnerability and adaptation group
- Various other EEA programmes involved
- External contributors:
  - European Topic Centres (ETC-CCA, ETC-ICM, ETC-BD)
  - JRC, WHO, ECDC, several EU projects
- External Advisory Group:
  - Commission (ENV, CLIMA, RTD, JRC)
  - EEA Scientific Committee
  - ECMWF
  - WHO Europe
  - UNEP Carpathian convention
  - Alpine Convention
  - AMAP
  - Countries' experts (DE, ES, SE, UK)
  - EPA network
  - several EU projects
- Review: Advisory Group, EEA member countries, Commission, further experts

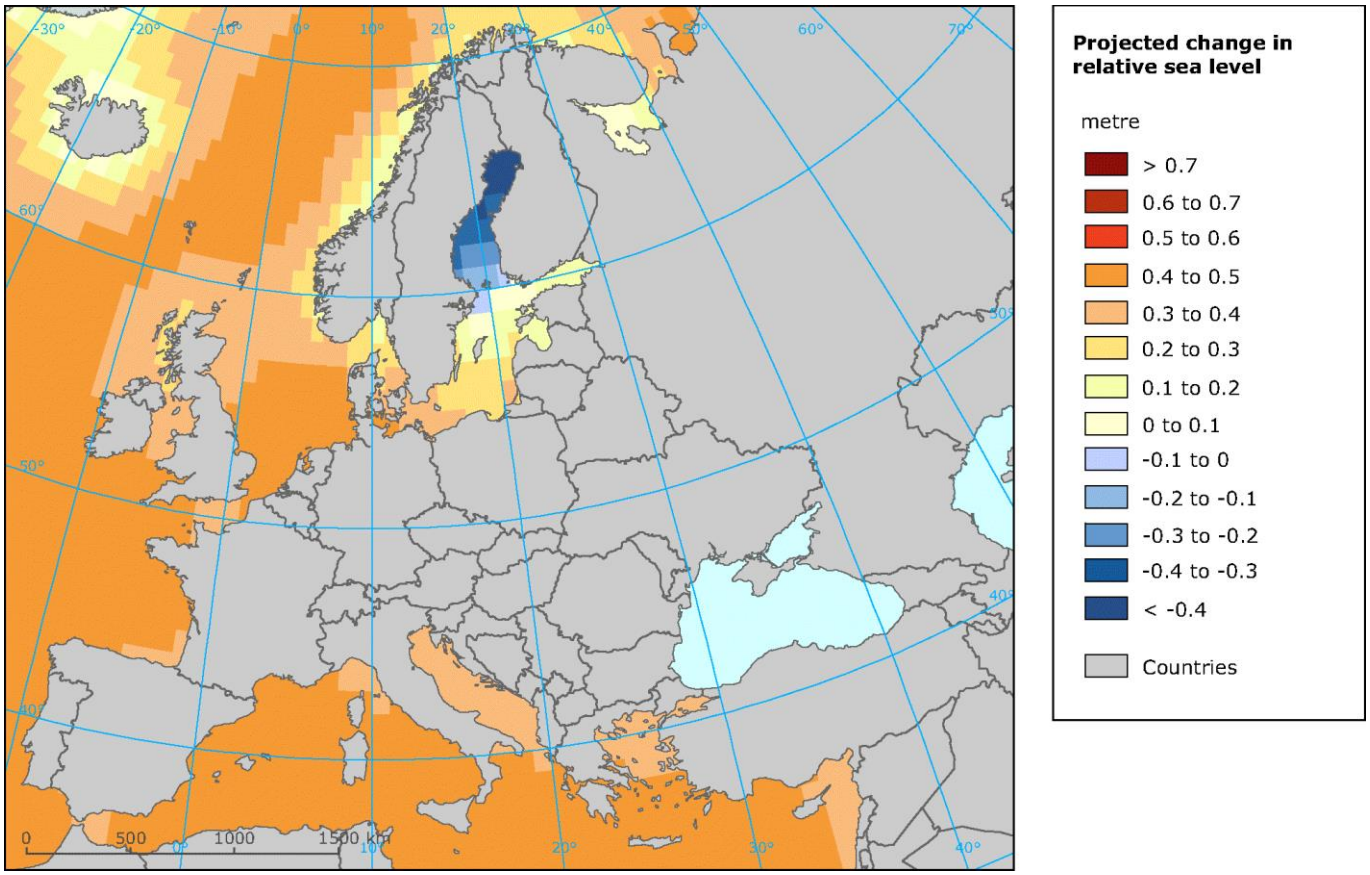
Greenland ice sheet, *example of CC indicator (1)*



EEA web site: http://www.eea.europa.eu/data-and-maps/indicators/greenland-ice-sheet-2/assessment-1

- **Note**: Cumulative ice mass loss from Greenland derived as annual averages from 18 recent studies.
- **Data source**: adapted from Figure 4.15, Chapter 4 of IPCC Fifth Assessment Report, WGI report. Data was provided by Ian Allison (Lead Author of that chapter; Antarctic Climate and Ecosystems Cooperative Research Centre, Australia). http://www.climatechange2013.org/images/report/WG1AR5_Chapter04_FINAL.pdf

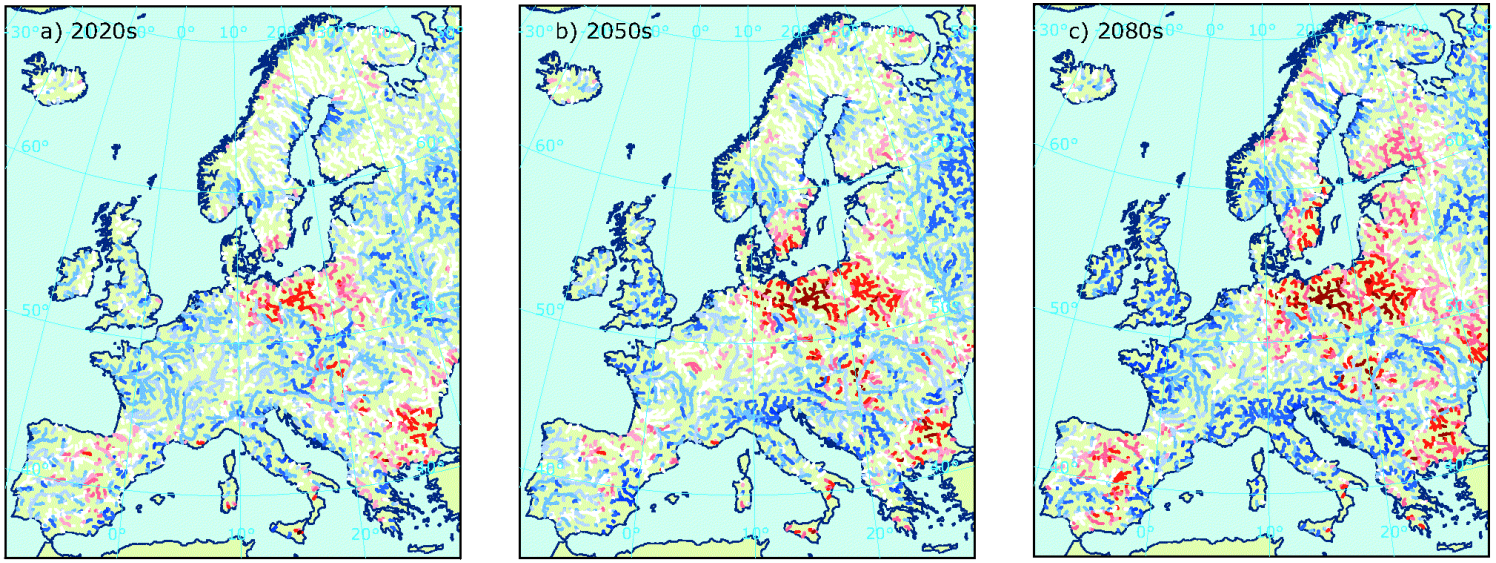
Projected change in relative sea level, *example of CC indicator (2)*



EEA web site: http://www.eea.europa.eu/data-and-maps/indicators/greenland-ice-sheet-2/assessment-1

- **Note:** The map shows the projected change in relative sea level in 2081-2100 compared to 1986-2005 for the medium-low emission scenario RCP4.5 based on an ensemble of CMIP5 climate models. Projections consider land movement due to glacial isostatic adjustment but not land subsidence due to human activities. No projections are available for the Black Sea.
- **Data source:** AR5 Sea Level Rise projections provided by Integrated Climate Data Center (University of Hamburg), http://icdc.zmaw.de/; ftp://ftp.icdc.zmaw.de/ar5_sea_level_rise/

Projected change in river floods with a return period of 100 years, *example of CC impact indicator (1)*



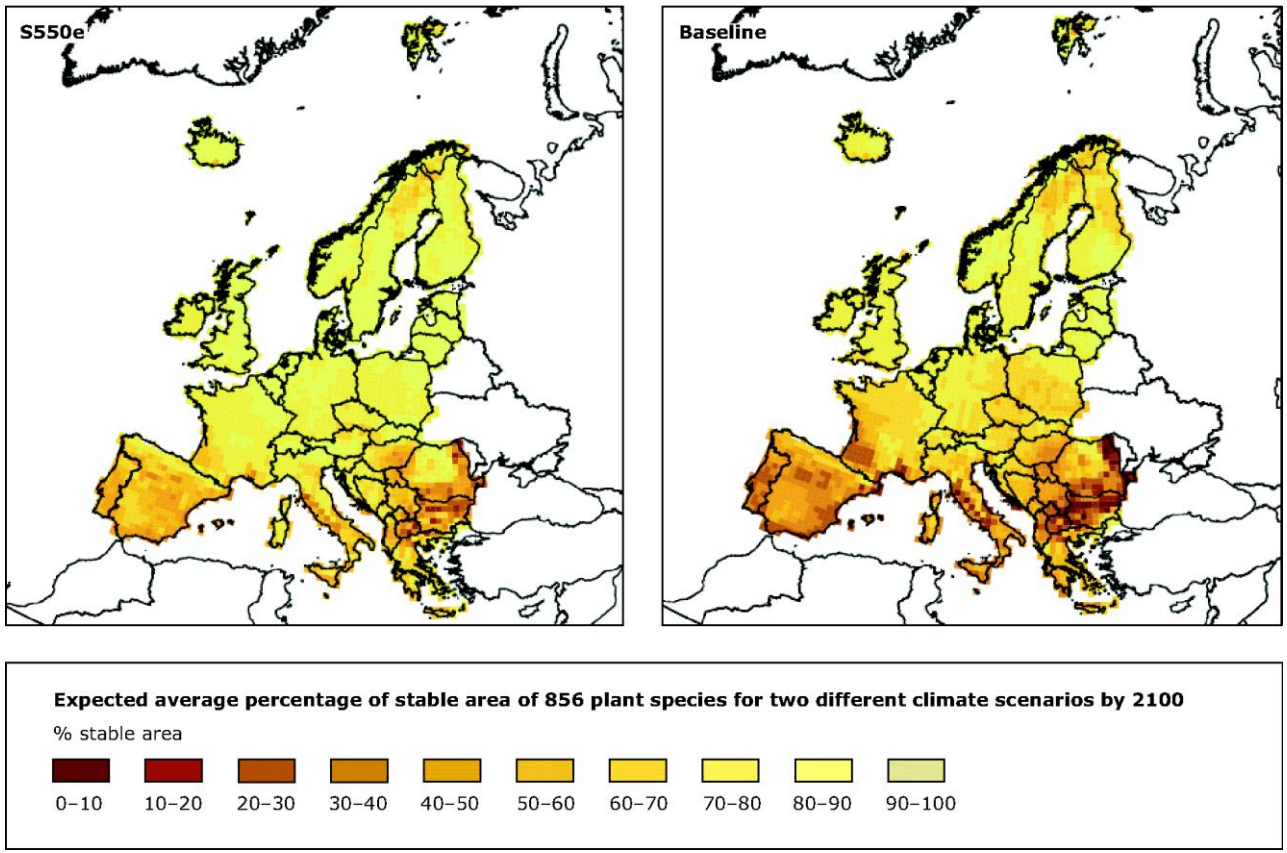
Relative change in river floods with a return period of 100 years between future period and 1961–1990 (SRES A1B)

(%) – 60 – 40 – 20 – 10 – 5 5 10 20 40 60

EEA web site: http://www.eea.europa.eu/data-and-maps/indicators/river-floods-1/assessment

- **Note:** Projected change in the level of a 100-year maximum level of river discharge between the reference period 1961–1990 and the 2020s (left), 2050s (centre) and 2050s (right) based on an ensemble of 12 RCM simulations with LISFLOOD for the SRES A1B scenario.
- **Data source:** Assessment of Future Flood Hazard in Europe Using a Large Ensemble of Bias Corrected Regional Climate Simulations provided by American Geophysical Union (AGU), http://dx.doi.org/10.1029/2012JD017461

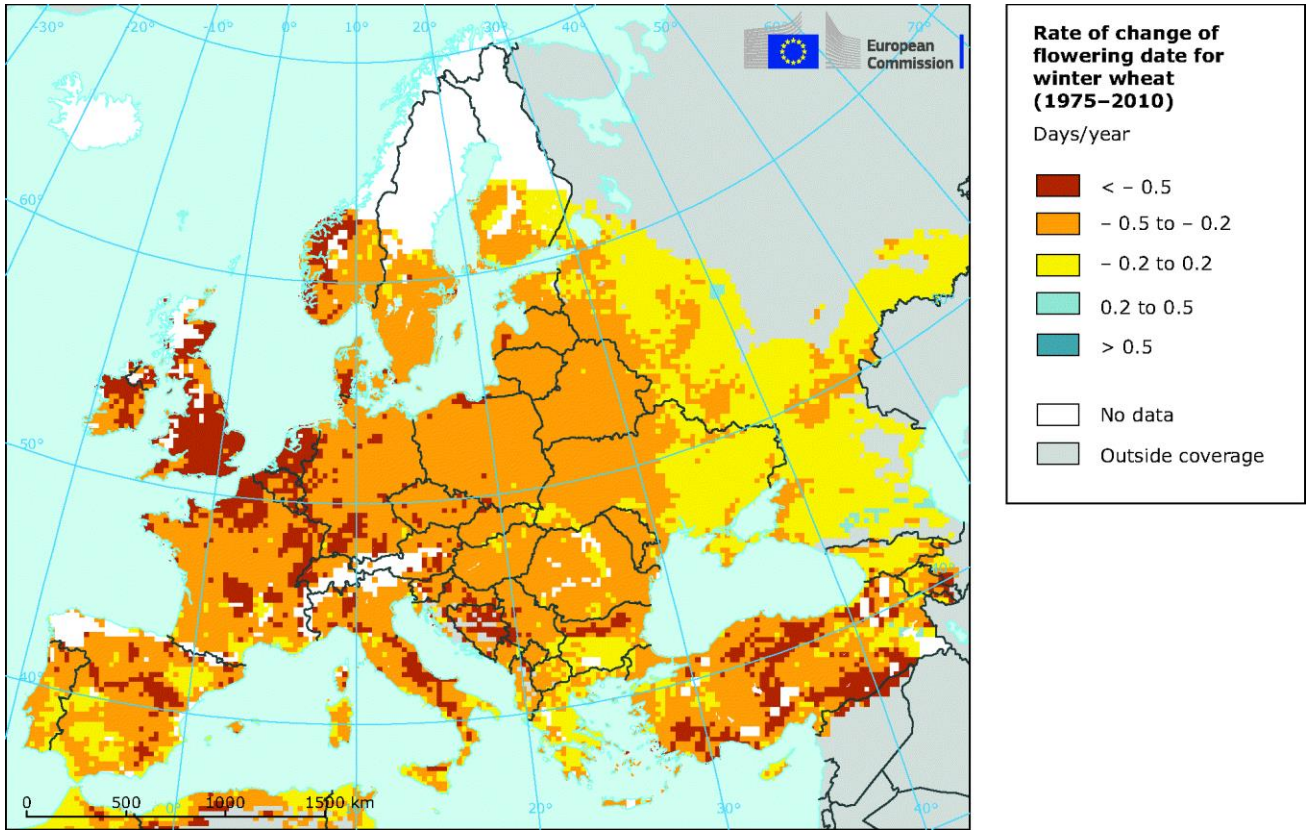
Projected percentage of stable area of plant species for two different climate scenarios by 2100, *example of CC impact indicator (2)*



EEA web site: http://www.eea.europa.eu/data-and-maps/indicators/distribution-of-plant-species-1/assessment

- **Note:** The figure shows the expected average percentage of stable area of 856 plant species for two different climate scenarios by 2100. The S550e scenario corresponds to a stabilisation at 550 ppm CO2 equivalent and a global mean temperature increase of 2°C, the baseline scenario corresponds to a global mean temperature increase of more than 3°C.
- **Data source:** Netherlands Environmental Assessment Agency (PBL), http://link.springer.com/article/10.1007%2Fs10113-010-0161-1

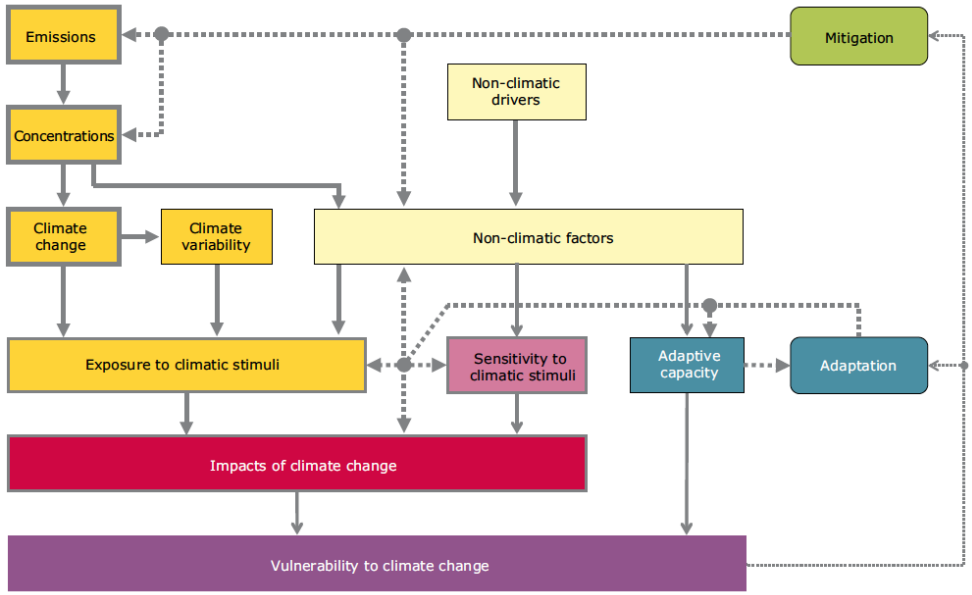
Change of flowering date for winter wheat (1975-2010), *example of CC impact indicator (3)*



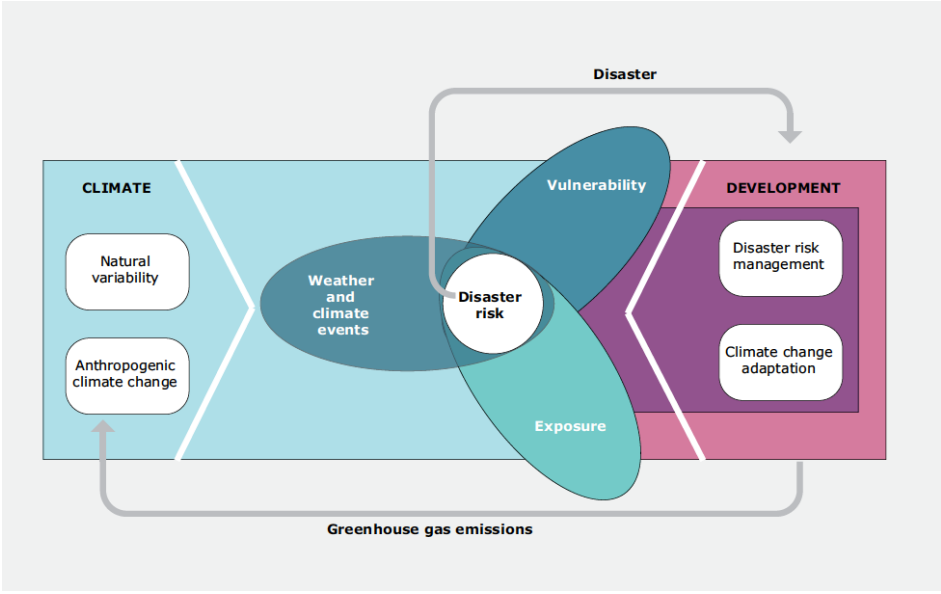
EEA web site: http://www.eea.europa.eu/data-and-maps/indicators/timing-of-the-cycle-of-1/assessment

- **Note:** The flowering date is defined as the day at which a modelization of the winter wheat reaches a development state of 100 in a scale 0 - 200 defined for the WOFOST growth model (Van Keulen H, Wolf J (1986) Modelling of agricultural production: weather soils and crops, Simulation monographs. Pudoc, Wageningen).
- **Data source:** Monitoring Agricultural ResourceS (MARS) provided by Joint Research Centre (JRC), http://mars.jrc.ec.europa.eu/mars

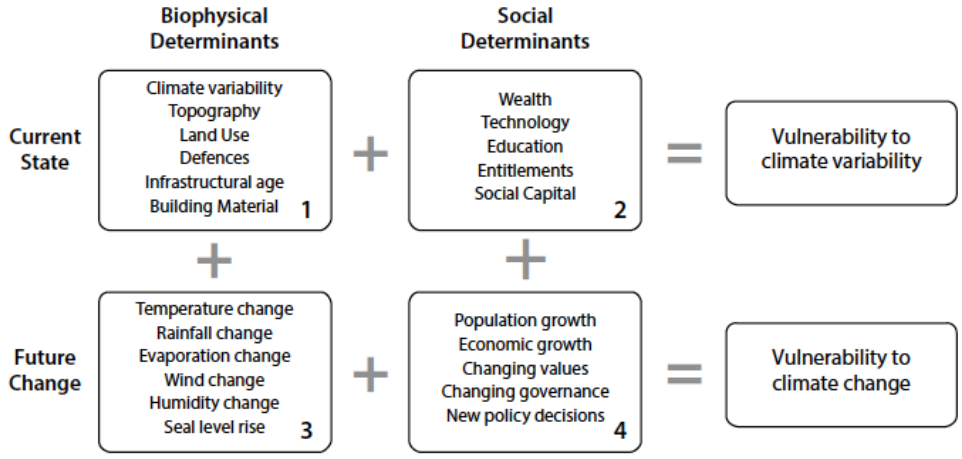
Methods for climate change vulnerabilities and risks information



Source: IPCC, fourth assessment report (2007)



Source: IPCC, Special Report Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)



Source: UNEP/Global Programme of Research on Climate Change Vulnerability, Impacts and Adaptation(PROVIA), Guidance on Assessing Vulnerability, Impacts and Adaptation to Climate Change (2013)

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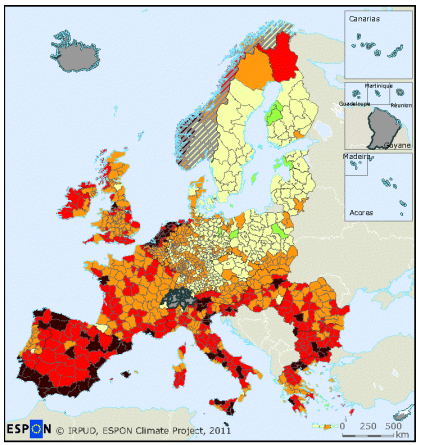
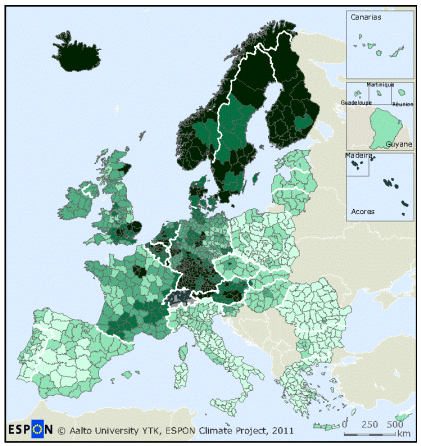
Example: *aggregated vulnerability* (ESPON climate project)



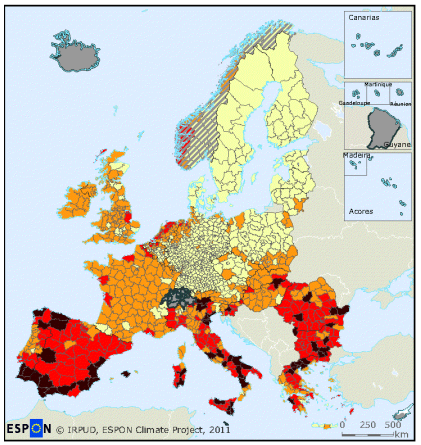
Aggregate potential impact of climate change

- Highest negative impact
- Medium negative impact
- Low negative impact
- No/marginal impact
- Low positive impact
- No data
- Reduced data



Overall capacity to adapt to climate change

- Highest capacity
- High capacity
- Medium capacity
- Low capacity
- Lowest capacity
- No data



Potential vulnerability to climate change

- Highest vulnerability
- Medium vulnerability
- Low vulnerability
- No/marginal vulnerability
- No data
- Reduced data

Method:

- Projections of the CCLM climate model (A1B scenario) were used comparing 1961–1990 and 2071–2100. **Eight climate change** variables were calculated and **supplemented by two variables** on 'triggered' changes in river flooding and coastal storm surge flooding. These exposure indicators were related to 22 sensitivity indicators.
- **Individual impact indicators were calculated** for protected natural areas, forest fire-prone forests, soil organic carbon and soil erosion **(environmental)**, and agriculture and forestry, energy production and consumption as well as summer and winter tourism **(economic)**.
- The **resulting individual impact indicators were aggregated, using different weights**, to determine the physical, cultural, social, economic and environmental impacts of climate change (at NUTS3 level).
- Similarly, **15 indicators** on the economic, technological, educational and institutional **adaptive capacity were aggregated.**

Data source:

- ESPON Climate, 2011, http://www.espon.eu/main/Menu_Projects/Menu_AppliedResearch/climate.html

See also other projects e.g. PESETAII (JRC) (published 2014) and CLIP-C (ongoing)

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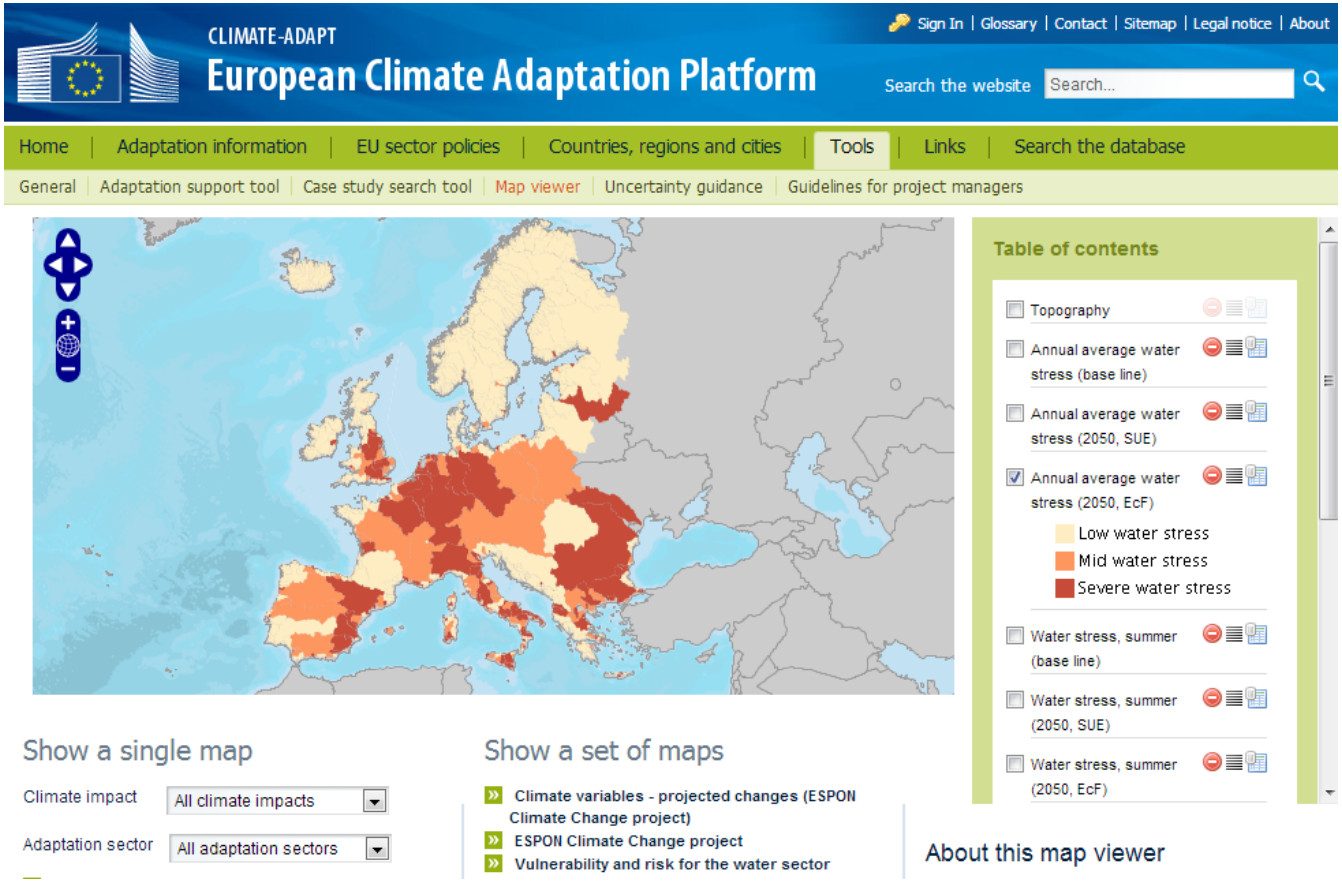
European Climate Adaptation Platform Climate-ADAPT

- **Supports** governmental policy and decision makers developing and implementing climate change adaptation strategies, policies and actions
- **Complementary** to national and sectoral platforms
- **Launched 2012** (DG CLIMA, EEA)
- **EEA maintains and updates**, with Commission, and supported by ETC CCA
- **New functionalities** since May 2014

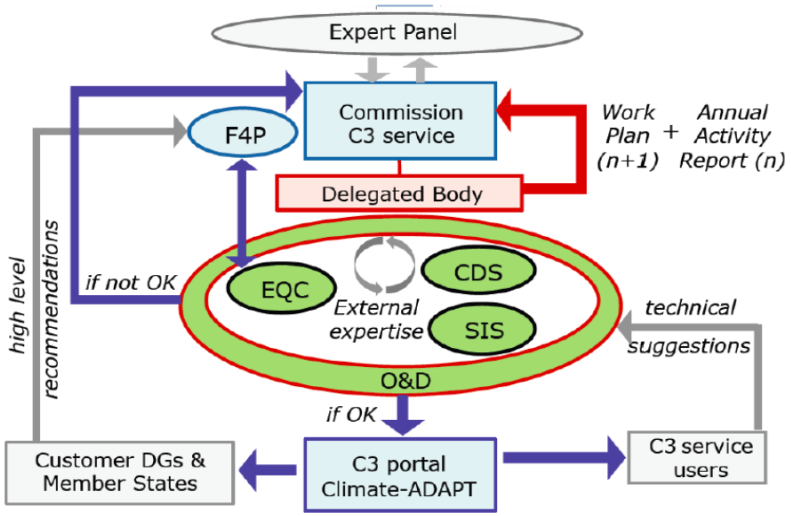
http://climate-adapt.eea.europa.eu

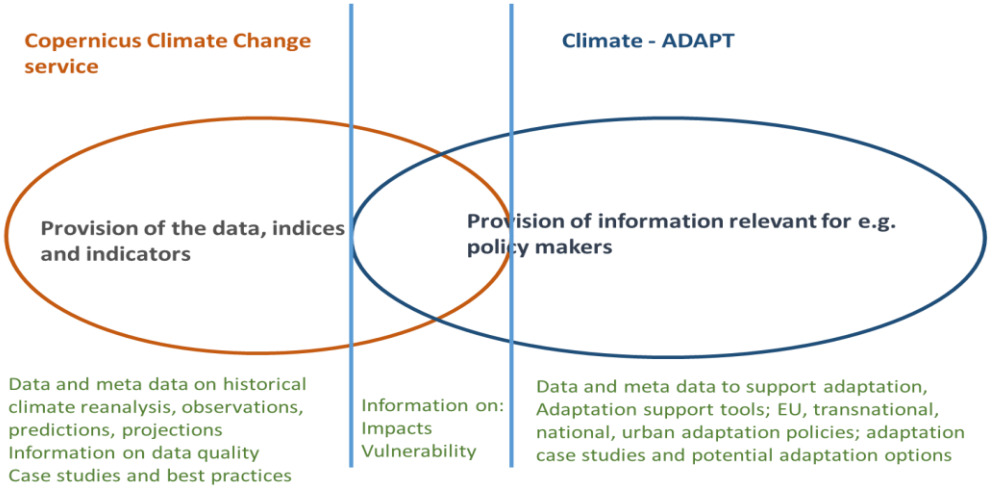
Map viewer

Information and maps from various projects, see example on water stress



Potential linkages between C3S and EEA activities (including Climate-ADAPT)





Conclusions

- **EEA supports and informs policy development and implementation** (data, indicators and assessments on climate change impacts, vulnerability and adaptation)
- EEA **main audience are policymakers** and EEA **collaborates with member countries** (environment agencies) and with many other organisations
- **EEA manages** (in collaboration with the European Commission) and **updates the European Climate Adaptation platform Climate-ADAPT** for sharing information and connecting adaptation communities
- The **Copernicus climate change service (C3S)** is expected to provide in-situ and satellite-based observations (essential climate variables), re-analysis data, climate change predictions and projections
- **C3S information can contribute** to EEA climate change and impact indicators; maps in the map viewer of Climate-ADAPT; and as searchable database items
- **Meetings to discuss collaboration between EEA and ECMWF** are planned (high-level, 11 March, and technical meetings afterwards)
- Exchanges on **how best to enhance and use the knowledge base on CC IVA and climate services** involving stakeholders, providers and users is needed (e.g. on Climate Services, 17 March, Brussels and the European Adaptation Conference, 12-14 May, Copenhagen)

Thank you

See for more information:

http://www.eea.europa.eu/themes/climate
http://climate-adapt.eea.europa.eu/

http://www.eea.europa.eu/soer

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