

André Jol, EEA Head of Group
Climate change impacts, vulnerability and adaptation

JASPERS Networking Platform Event
Climate change adaptation: Vulnerability and Risk Assessment and
the Resilience of Major Infrastructure projects
7-8 June 2016, EIB Brussels

European information on climate change impacts, vulnerability and adaptation (Climate-ADAPT and other EEA products and services)



EEA networking with member countries (Eionet)



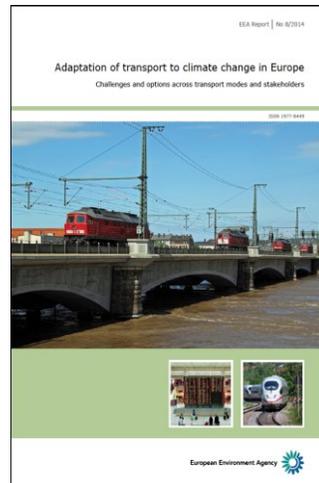
- **33 member** and six collaborating **countries** (ministries and **environment agencies**)
- Main target audience: **policymakers** at European and national levels
- Supporting and informing policy development and implementation by **data, indicators and assessments**
- **Networking:** annual Eionet workshop, expert meetings
- Supported by **European Topic Centres**, e.g. on adaptation see: <http://cca.eionet.europa.eu/>

EEA products and services on climate change impacts, vulnerability and adaptation 2014-2016

2014



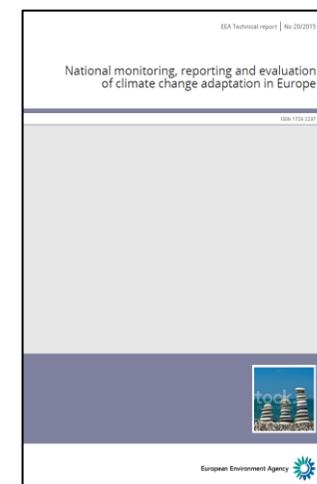
2014



2015



2015



2016 assessment reports

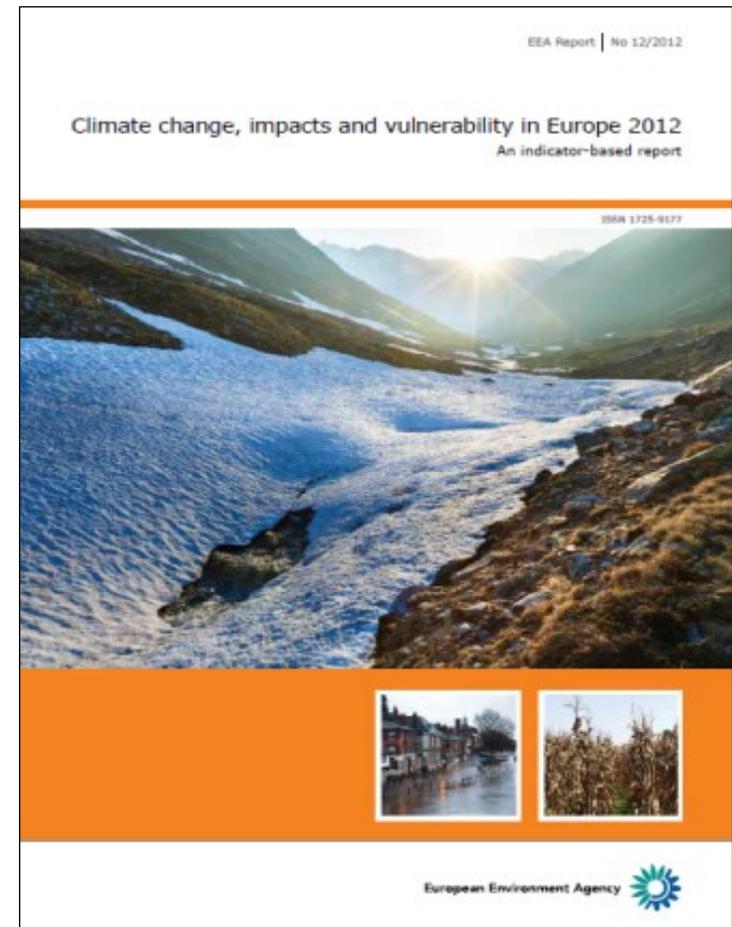
- Urban adaptation
- Climate change, impacts and vulnerability

All supported by a European Topic Centre,
see: <http://cca.eionet.europa.eu/>

2016 EEA report on climate change, impacts and vulnerability

- **Previous reports:** 2004, 2008 and 2012
- **Content:**
 - Assessing impacts of past and future climate change
 - Climate impacts on socio-economic sectors, ecosystems, and health
 - Vulnerability to climate change
- **Authors and contributors:**
 - EEA and European Topic Centres
 - Joint Research Centre (European Commission)
 - World Health Organisation
 - European Centre for Disease Prevention and Control
- **Data sources:**
 - International databases and reports
 - (European) research projects and data centres
- **Reviews:**
 - Advisory Group and experts (autumn 2015)
 - Eionet review (February/March 2016)

To be published end 2016



*Update and extension
of the 2012 EEA report*

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

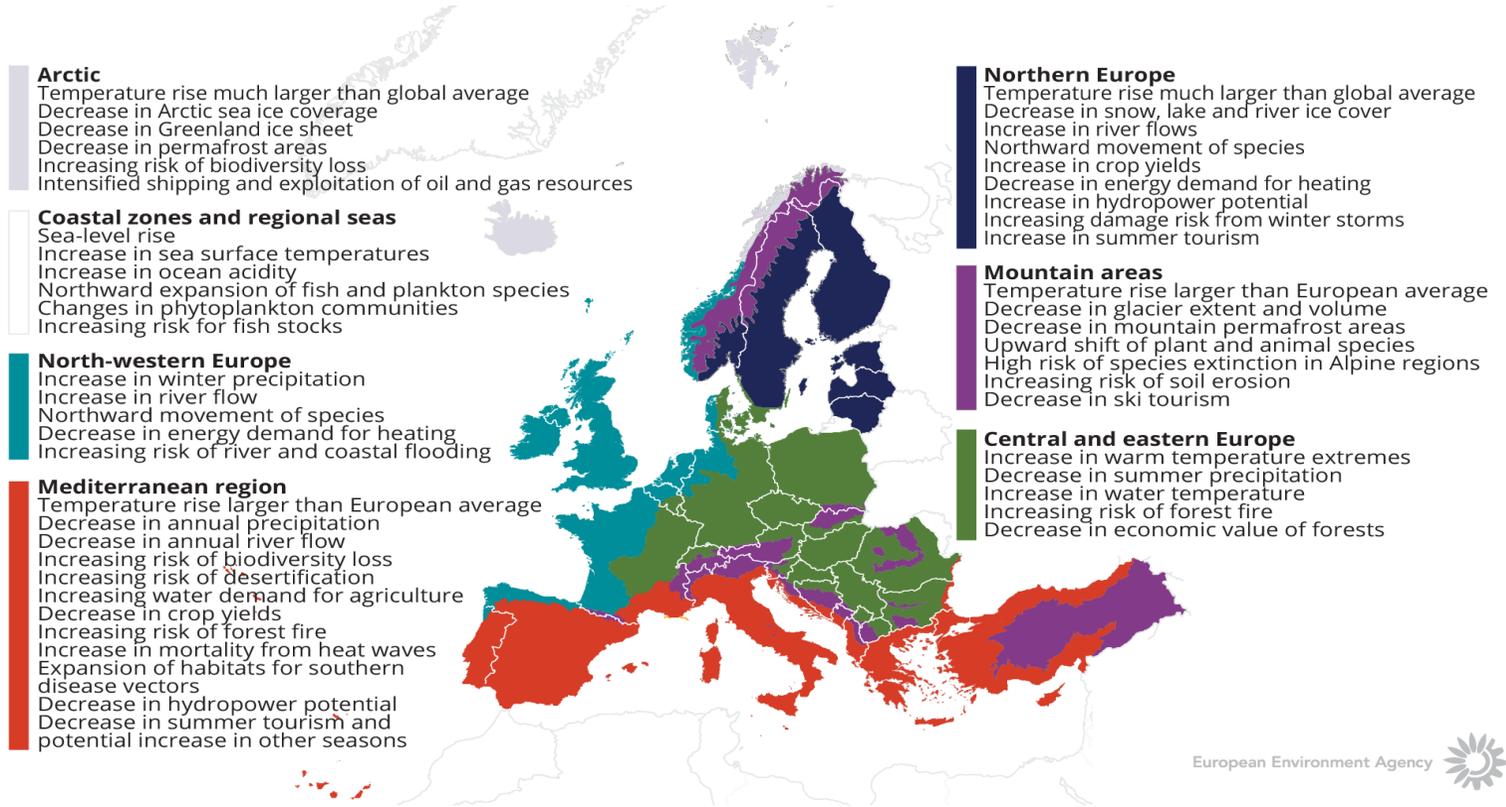
SYNTHESIS REPORT

GLOBAL MEGATRENDS

EUROPEAN BRIEFINGS

COUNTRY COMPARISONS

COUNTRIES & REGIONS



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

Indicators in the 2016 EEA CCIV report

Topic	Indicators	Topic	Indicators
Atmosphere	<ul style="list-style-type: none"> • Global and European temperature • Heat extremes • Mean precipitation • Heavy precipitation • Wind storms • Hail 	Economic impacts of extreme events	<ul style="list-style-type: none"> • Damage from extreme weather and climate events
Cryosphere	<ul style="list-style-type: none"> • Arctic and Baltic sea ice • Greenland and Antarctic ice sheet • Glaciers • Snow cover 	Human health	<ul style="list-style-type: none"> • Floods and health • Extreme temperatures and health • Vector-borne diseases • Water- and food-borne diseases
Oceans and marine environment, coastal areas	<ul style="list-style-type: none"> • Ocean acidification • Ocean heat content • Sea surface temperature • Distribution shifts of marine species • Ocean oxygen content • Global and European sea level rise 	Agriculture	<ul style="list-style-type: none"> • Growing season • Agrophenology • Water-limited crop productivity • Crop-water demand
Freshwater	<ul style="list-style-type: none"> • River flow • River floods • Meteorological and hydrological droughts • Water temperature 	Energy	<ul style="list-style-type: none"> • Heating and cooling degree days
Terrestrial ecosystems	<ul style="list-style-type: none"> • Soil moisture • Animal and plant phenology • Distribution shifts of animals and plants • Forest composition and distribution • Forest fires 	Transport	<i>No indicators</i>
		Tourism	<i>No indicators</i>

Red: New or substantially expanded indicator

Green: EEA core set indicator

EEA web site:

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

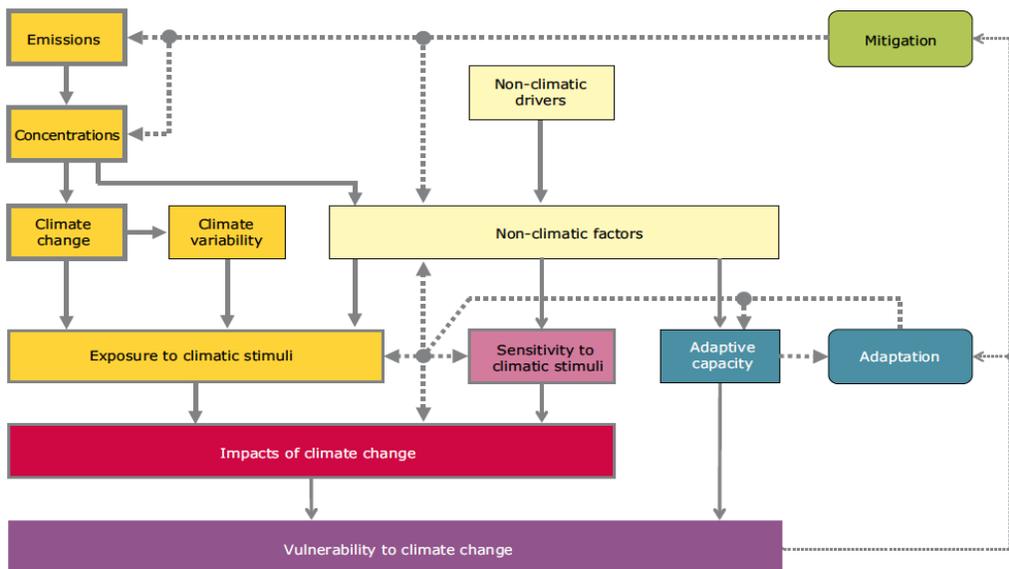
European Environment Agency



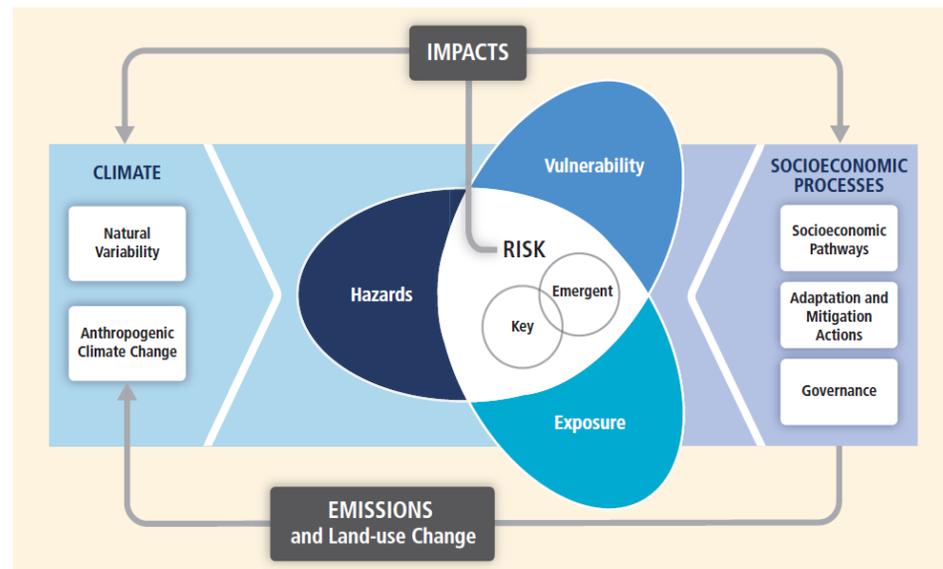
Key findings from the **draft** indicator-based summary

- **All key findings from the 2012 EEA CCIV report were confirmed**
- Some **new indicators** were included in the 2016 report (e.g. hail, ocean dead zones, cooling demand)
- Some **unprecedented climatic conditions** (e.g. all-time records in global and European temperature broken in 2014 and again in 2015)
- **Acceleration** of some climatic **trends** (e.g. ice sheet decline, sea-level rise)
- **Progress in attribution** of some observed climatic changes (e.g. statistical attribution of extreme climate events)
- **New quantitative projections** for some climate variables (e.g. cryosphere)
- More evidence of **future increases in climatic hazards** in some regions (e.g. heat waves, droughts, top wind speeds, storm surges)
- Progress in climatic **attribution** of some **observed impacts** (e.g. changes in forest species, establishment of invasive species, disease outbreaks)

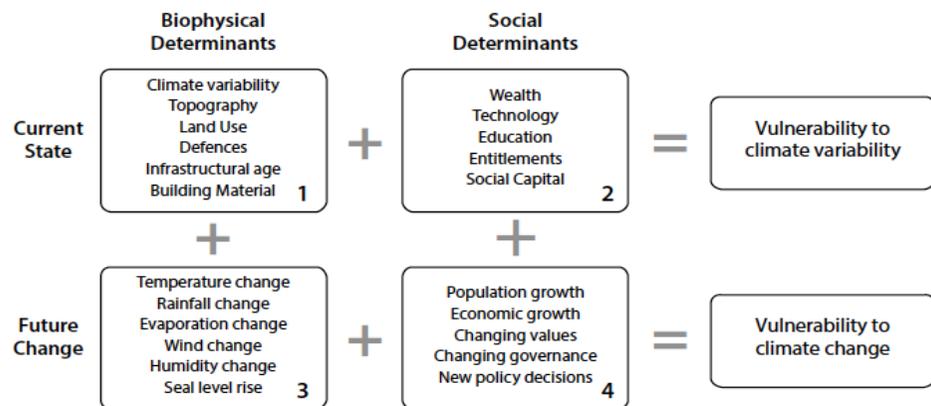
Methods for climate change impacts, vulnerabilities and risks



Source: IPCC, fourth assessment report (2007)



Source: IPCC, Special Report Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (2012) and IPCC, fifth assessment report WGII 'Impacts, Adaptation, and Vulnerability' (2014)



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)

JRC report (2015), Resilience of large investments and critical infrastructures in Europe to climate change; key messages

- Progressive and very strong **increase in overall climate hazard** especially in **south-western regions**.
- Key **hotspots** emerge particularly along **coastlines and in floodplains**.
- **Damages could triple by the 2020s, multiply six-fold by mid-century**, and amount to more than 10 times present damages by the end of the century.
- Economic losses are highest for the industry, transport and energy sectors. The **strongest increase** in damage is projected for the **energy and transport sectors**, and for EU investments in **environment and tourism**.
- **Floods currently** account for approximately **half of climate hazard damages**, but in the **future droughts and heatwaves may become the most damaging** hazards.
- **Substantial resources** may be required to **increase the resilience** of critical infrastructures and EU regional investments against future climate
- Impact and adaptation **costs do not fall equally across Europe**. Southern and south-eastern European countries will be most impacted.



JRC TECHNICAL REPORTS

Resilience of large investments and critical infrastructures in Europe to climate change

Final report for DG CLIMA

AA 071303/2012/630715//CLIMA.C.3 – JRC 32971-2012 NFP

"Resilience of large investments in Europe to climate change (CCMFE)"

Edited by

Giovanni Forzieri, Alessandra Bianchi,
Mario A. Marin Herrera, Filipe Batista
e Silva, Luc Feyen and Carlo Lavalle

2015



Joint
Research
Centre

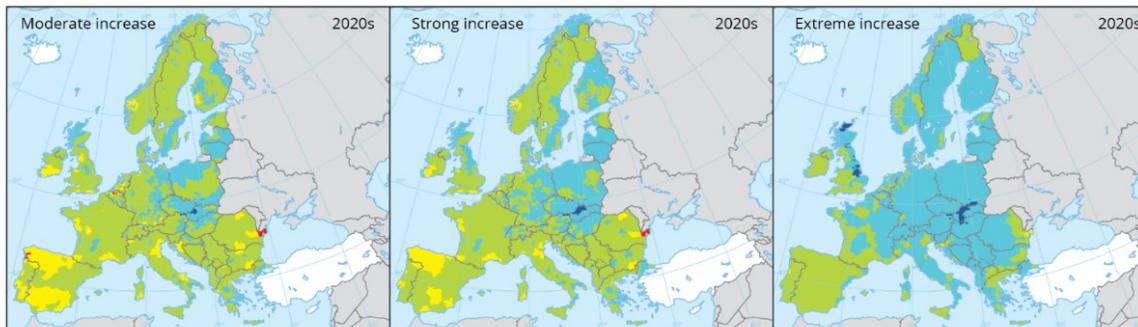
EUR 27590 EN



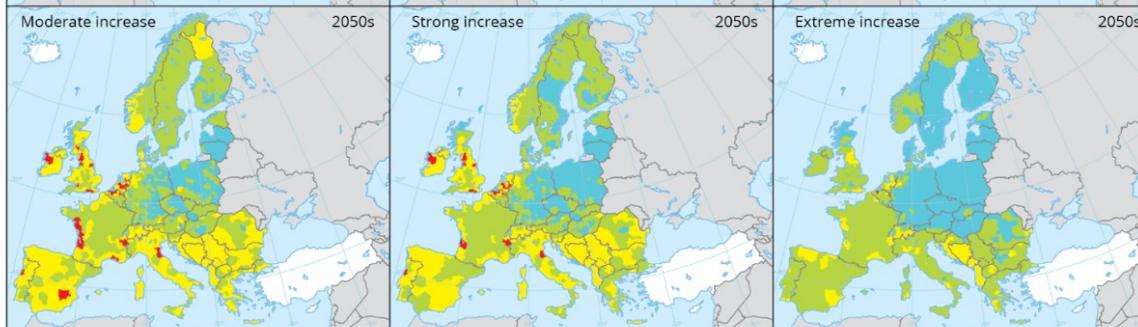
Projected increase in exposure to multiple climatic hazards

Moderate increase Strong increase Extreme increase

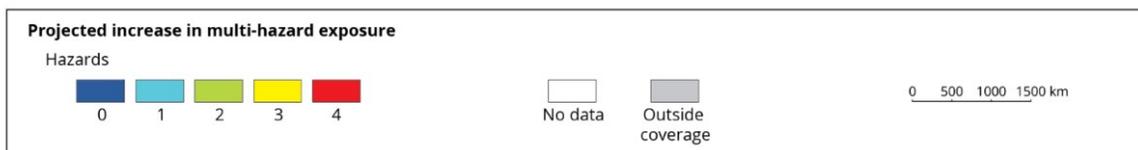
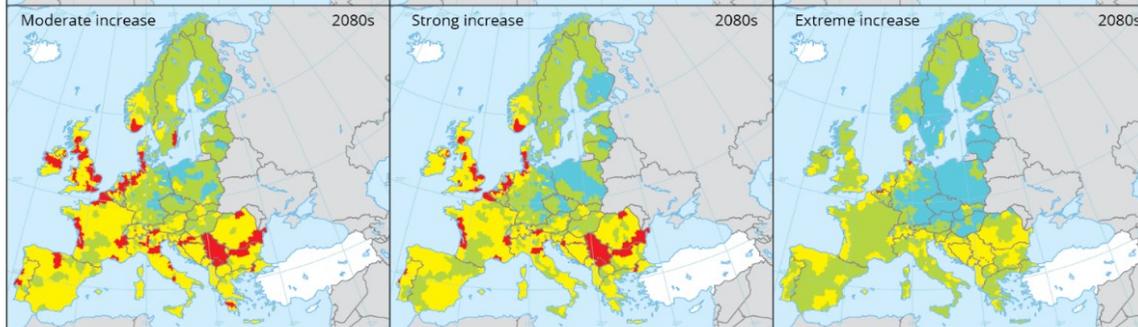
2020s



2050s



2080s



Hazards considered:

- Heat and cold waves
- Coastal flooding
- River flooding
- River droughts
- Wildfires
- Windstorms

Source:

ENHANCE project /
CCMFF project
(Forzieri et al., 2016)

National adaptation policy processes in Europe (EEA report, 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

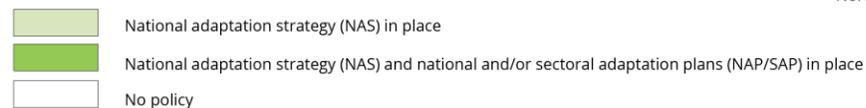


Overview of national and sectoral adaptation strategies and plans in Europe (EEA report, 2014) + updated information

- **23 countries** have a national adaptation strategy and 12 also have action plans (national and/or multi-sectoral)
- **Some countries** report they are in the implementation or monitoring and evaluation stage
- **Providing information and mainstreaming** in sectors are the most reported policies
- **Main drivers:** extreme weather events and damage costs, EU policies, research

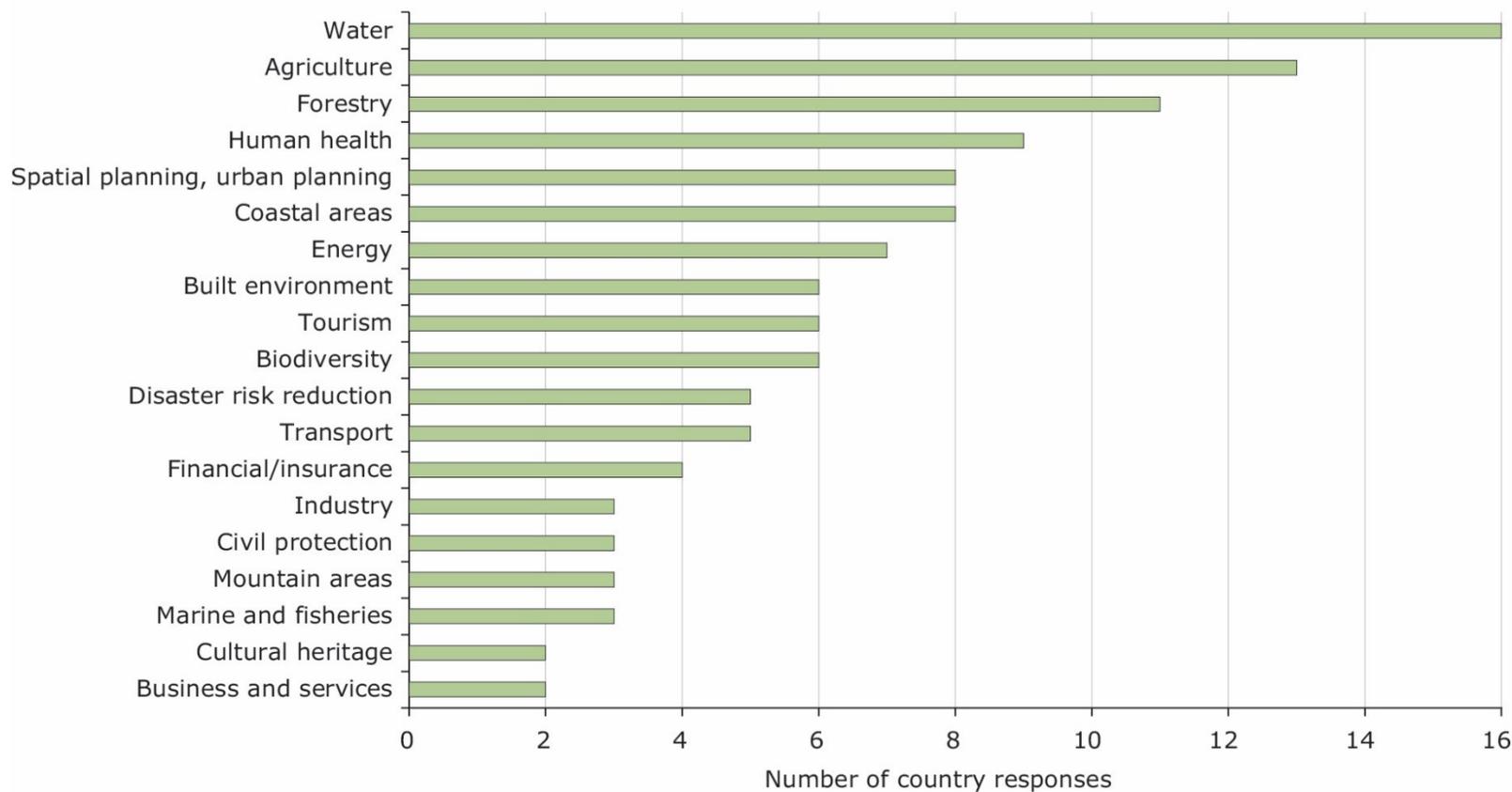
EEA Member states	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Austria											
Belgium											
Bulgaria											
Croatia											
Cyprus											
Czech Republic											
Denmark											
Estonia											
Finland											
France											
Germany											
Greece											
Hungary											
Ireland											
Italy											
Latvia											
Lithuania											
Luxembourg											
Malta											
Netherlands											
Poland											
Portugal											
Romania											
Slovakia											
Slovenia											
Spain											
Sweden											
United Kingdom											
Iceland											
Liechtenstein											
Norway *											
Switzerland											
Turkey											

* Norway had a NAP before a NAS



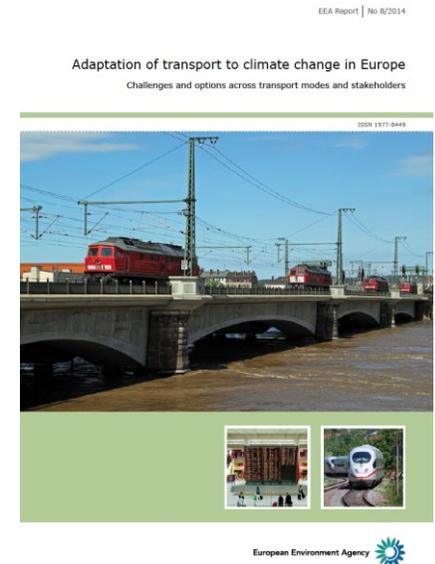
Priority sectors

Figure 2.16 Priority sectors for adaptation implementation (Question 31; 17 responding countries)



Main messages EEA 2014 report on 'Adaptation of transport to climate change in Europe'

- Climate change **threatens** to compromise **transport services**
- The **effects** of malfunction, disturbance and broken links may stretch **far beyond the originally affected area**
- **Attention** to adaptation is as yet **relatively low**
- Adapting could require **substantial infrastructure investments**; mainstreaming in infrastructure planning is needed now
- **Low-cost options also exist**, but as yet are less in focus
- **Cooperation** between the many diverse stakeholders can help achieve more **efficient and effective adaptation**
- The **EU and national governments** can create the **enabling framework** and invest in the **knowledge base**
- Potential benefits of exploring **innovative options**
- **Effectiveness** of current steps should be **evaluated** in the future



Examples of actions in the report

Making information accessible, assessing risks and vulnerabilities:

- National **information platforms** (various countries; see also the EEA report, published May 2015)
- **Adaptation** strategies for rail by **SNCF (France)**, **Deutsche Bahn (Germany)**
- Systematic data collections of **disruption events** under extreme weather for **railways (Austria)**
- Cooperation between **Network Rail** and Met Office on impacts of climate change (**United Kingdom**)
- **Cooperation** between transport stakeholders, hydrological and meteorological experts (**Norway**)
- **Research** project and cooperation on **inland and coastal water ways (Germany)**
- Stepwise approach of '**Road Network Climate Change Study**' (**Scotland**)
- Identification of **flood-sensitive** sections in **road network (Sweden)**
- Local knowledge in the **vulnerability study of Nice Airport (France)**

European Climate Adaptation Platform Climate-ADAPT

Scope:

- Launched 2012, supports developing and implementing adaptation strategies, policies and actions
- Complementary to national, other platforms

Intended Users:

- Experts and decision makers on EU, transnational, national, sub-national levels, research institutes

Maintenance:

- Funded and carried out by EEA with DG CLIMA, supported by ETC/CCA

Dissemination and sharing:

- Bimonthly newsletter
- Webinars
- Conferences, workshops

Climate-ADAPT - Sharing adaptation information across Europe

European Climate Adaptation Platform

Search the website Search...

About Search the database EU policy Countries, regions, cities Knowledge Network Help

White roof, innovative solar shadings and bioclimatic design in Madrid

Climate change impacts which are expected to be very relevant for the Madrid region include extreme heat in summer, water scarcity and sometimes, heavy rainfall.

→Read more

Adaptation support tool

New to adaptation? Use the Adaptation Support Tool

What are European countries doing?

Choose a country GO

Find case studies on adaptation in Europe

Share your information

News Events Newsletter Latest updates

<http://climateadapt.eea.europa.eu>

Selecting knowledge in line with the governance level



Climate-ADAPT

Main EU funded research projects

Transnational platforms: projects relevant from transregional perspective

National platforms: National adaptation research databases



Interaction with users and information providers

Transparency towards all stakeholders:

- via 5-year work plan

Personal interaction with users:

- Annual meeting with countries
- Webinars with users; e.g. on case studies

Personal interaction with information providers:

- Webinars. e. g. with research community
- New webinar autumn 2016

Regular promotion of new content and functionalities:

- Bimonthly newsletter



Help

The Climate-ADAPT platform aims to present and share information on climate change impacts, vulnerability and adaptation across Europe. The content of Climate-ADAPT is very complex and includes a set of decision support tools on adaptation, a searchable database, and many other valuable features. This "Help" section was set up, in particular for new users to offer guidance through the platform.

The [glossary](#) explains relevant terms and the [tutorial videos](#) offer guided tours dedicated to specific user needs. While the [FAQ for users](#) contain advice for using the platform, the "[Share your information](#)" section shows how to submit content to Climate-ADAPT.



- Glossary
- Tutorial videos
- FAQ for users
- Share your information

Disseminate platform news via the adaptation newsletter

European Climate-Adaptation Platform (Climate-ADAPT)
European Climate Adaptation Newsletter

Your update on Adaptation to Climate change in Europe

European Environment Agency 

Issue March 22, 2016

[EU policy and EEA activities](#) | [Climate-ADAPT](#) | [EU research](#)
[Transnational, national and local activities](#) | [Events](#) | [Subscribe](#)

News

» **EU policy and EEA activities**

» **1. Next steps for Europe after the Paris agreement**

The European Commission has presented an assessment of the implications that the new global climate agreement, adopted in Paris in December 2015, will have for the European Union.

» [Read more](#)



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» **2. Foreign Affairs Council calls for continuing European climate diplomacy following landmark Paris deal**

The European Union's Foreign Affairs Council has welcomed the global climate agreement, reached in Paris in December 2015, as a landmark achievement for combatting climate change and for multilateralism.

» [Read more](#)



Climate-ADAPT

» **5. Sharing knowledge on adaptation in Europe - a new case study**

As a result of the collaboration between the EEA and its member countries, in the frame of the European Environment Information and Observation Network (Eionet), a new case study has been published on Climate-ADAPT. The development of green roofs in Basel as a combined mitigation and adaptation measure has been proposed by Switzerland as an inspiring case study. Using a participatory approach, incentives were developed to enhance green roof coverage in Basel, with a view to providing a climate change adaptation function through limiting surface water runoff and reducing temperature in urban areas.

» [Read more](#)



© Stephan Brenneisen

EU research

» **6. Resilience of infrastructure**

This work by the European Commission's Joint Research Centre provided insight into current and future impacts of climate extremes on the present stock of critical infrastructures in Europe. It also considered regional investments under the EU Cohesion Policy for the 2007-2013 programming period.

» [Read more](#)



© Knowledge for Climate programme

» **7. ERA-NET Cofund for Climate Services officially launched at kick-off meeting in Paris**



Dissemination of Climate-ADAPT news



Key features of Climate-ADAPT

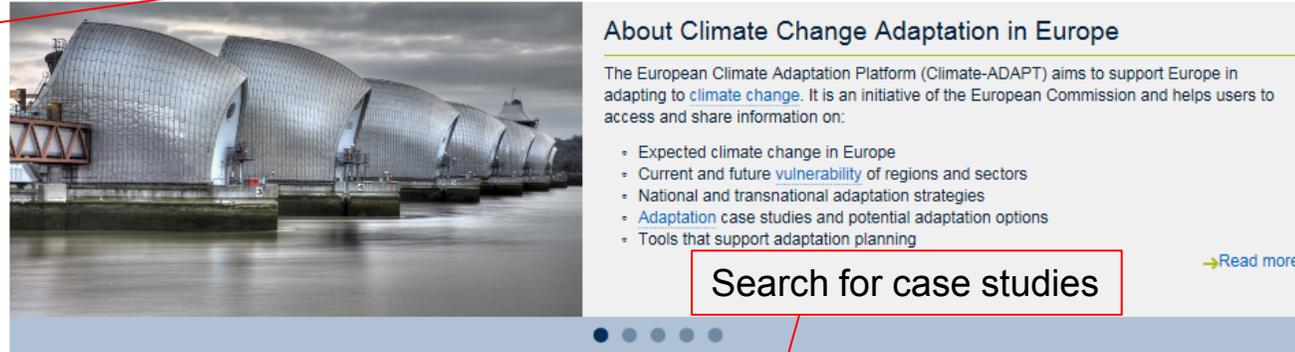
Database search

Cities

Tools



EU policy and funding



Search for case studies

Adaptation support tool



Country profiles

News

Events

Newsletter

Latest updates



EU sector policies and adaptation

- **Agriculture**
- **Forestry**
- **Health**
- **Biodiversity**
- **Water management**
- **Urban**
- ...

Description of EU policies with links to key resources and indicators at European scale

<http://climate-adapt.eea.europa.eu/eu-adaptation-policy/mainstreaming>



European countries adaptation policies

- Presenting official information based on **country reporting** (Art. 15 EU MMR)
- Unique **summary** of national policies, assessments, sectors and actions, stakeholder involvement
- Web-based template with **links** to key **national documents** and official web-pages



The screenshot shows the 'European Climate Adaptation Platform' website. The header includes the title 'Climate-ADAPT - Sharing adaptation information across Europe' and 'European Climate Adaptation Platform'. A search bar is present on the right. The navigation menu includes 'About', 'Search the database', 'EU policy', 'Countries, regions, cities', 'Knowledge', 'Network', and 'Help'. The current page is 'Country Information / United Kingdom'. A map of Europe with the UK highlighted and the UK flag is shown. The page title is 'United Kingdom' with a last update date of '31 August 2015'. There are tabs for 'Summary', 'Policy & legal framework', 'Information & assessments', and 'Sectors & actions'. Below the tabs are 'Engaging stakeholders' and 'Contact' buttons. A 'Summary table' is displayed with the following content:

Item	Status	Links
National Adaptation Strategy	Adopted	<ul style="list-style-type: none">• UK: Climate Change Act 2008• Wales: Adaptation Framework
Action plans	Adopted	<ul style="list-style-type: none">• England (and UK reserved matters): National Adaptation Programme• Scotland: Scottish Climate Change Adaptation Programme• Wales: Adaptation Delivery Plan• Northern Ireland: Northern Ireland Climate Change Adaptation Programme
Impacts, vulnerability and adaptation assessments	Climate Projections produced, follow-up currently being developed. First UK CCRA completed, second	<ul style="list-style-type: none">• UKCP09• CCRA

Interactive urban vulnerability maps and city information

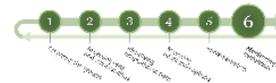
- Interactive map book based on European data presenting urban climate change threats (heat waves, urban flooding, water scarcity, forest fires)
- City profiles (see also Covenant of Mayors, <http://www.covenantofmayors.eu/>)

Urban vulnerability to climate change in Europe – a map book (Pilot version)



City Profiles

Copenhagen



Copenhagen - Denmark

Climate change impacts and adaptation responses

We cannot get away from it: the climate is changing, and in the future Copenhagen will get more rain, higher sea levels and warmer weather. This presents Copenhagen with a number of challenges.

Planned adaptation actions

Copenhagen's Adaptation Plan focusses on three levels of adaptation: 1) reducing the likelihood of an event happening, 2) reducing the scale of the event, and 3) reducing the city's vulnerability to the event. Some examples of adaptation measures include disconnection of storm water from the sewer by separation or SUDS, establishing dikes, raising building elevation, building green structures, and monitoring the impact of the changing climate on public health.

Good practice / spotlight item

Cloudburst Management Plan 2012

Heavy rainfall in July 2011 prompted the city of Copenhagen to develop a Cloudburst Management Plan in 2012 in order to prepare the city for one of the biggest climate change challenges it faces, namely extreme rainfall and pluvial flooding. The Plan contains approximately 300 site-specific projects. Some of the Plan's adaptation measures include developing structures that allow rainwater to be led out to sea such as roads, canals, and tunnels; developing storage for surface runoff such as emergency flood channels; and the building of blue-green infrastructure throughout the city. More information can be found [here](#).



Copenhagen during the flooding on 2 July 2011.



Climate change impacts

- Extreme Temperatures
- Flooding
- Sea Level Rise

Key vulnerable sectors

- Biodiversity
- Coastal areas
- Disaster Risk Reduction
- Financial
- Health
- Infrastructure
- Urban
- Water Management

Name & surname of mayor
Morten Kabel

Population
680000 inhabitants

Contact person
Jan Rasmussen
Head of Project for the Copenhagen Climate Change Adaptation Plan

Official e-mail
Sekretariatet@tmf.kk.dk
[Website](#)

Date of officially joining to Mayors Adapt
04 Mar 2014

Covenant of Mayors 2020 signatory
Yes

Options to use the maps ...

As a starting point, the indicated vulnerabilities will encourage stakeholders at European, national and city level to explore each situation in further detail, with more and local information. Furthermore, the map book enables cities to locate other cities with similar circumstances, as a starting point for sharing knowledge and experience. It shows clusters and hotspots for which national and European level actors can develop more tailored support. Finally, the map book provides a simple framework for urban vulnerability indicators, and indicates where further information is needed at local level, in order to make more detailed specific assessments.

... while recognising their limitations

The map book cannot provide a full and comprehensive picture, and the following limitations must be taken into account.

Case studies

- Successful and verified **implemented adaptation approaches**
- **Metadata** sheet with easy access to all aspects of planning and implementation
- Including images and documents
- **Searchable** via filter criteria and/or an interactive map based search tool



The screenshot displays the European Climate Adaptation Platform website. The header includes the European Union flag, the text "Climate-ADAPT - Sharing adaptation information across Europe", and the platform name "European Climate Adaptation Platform". A search bar is present on the right. The navigation menu includes "About", "Search the database", "EU policy", "Countries, regions, cities", "Knowledge", "Network", and "Help". Below the navigation is a breadcrumb trail: "Database / ViewMeasure".

The main content area is titled "Case study" and features an aerial photograph of Zaragoza, Spain. To the right of the image is the title "Zaragoza: combining awareness raising and financial measures to enhance water efficiency (2014)". Below the title is a detailed text description of the Zaragoza Water Saving City programme, which was initiated in 1996 in response to water scarcity. The text describes various measures implemented, including awareness campaigns, public commitments, revised water tariffs, and infrastructure improvements, leading to a 30% reduction in water consumption by 2011.

Below the text is a section titled "Case Study Illustrations" with a sub-count of "(3)". This section contains a bar chart showing data for various years from 2000 to 2011, with a significant drop in 2011. To the right of the main text is a sidebar with the following sections:

- Keywords:** Water consumption, water saving, behaviour change, tariffs, incentives, leakages, mixed solutions
- Sectors:** Urban, Water management
- Climate impacts:** Water Scarcity, Droughts
- Geographic characterisation:** Europe; Macro-Transnational region: South West Europe
- Biographical regions:** Mediterranean

Below the main text and sidebar, there are three sections of links:

- **Case Study Description**
 - [Challenges](#)
 - [Objectives](#)
 - [Adaptation Options Implemented In This Case](#)
 - [Solutions](#)
 - [Importance and Relevance of Adaptation](#)
- **Additional Details**
 - [Stakeholder Participation](#)
 - [Success and Limiting Factors](#)
 - [Costs and Benefits](#)
 - [Legal Aspects](#)
 - [Implementation Time](#)
- **Reference Information**

Changing approaches and actions across levels

- **Policymakers (EU, national, cities):** *from strategies towards implementation and monitoring/evaluation.*
- **Research and boundary organisations:** *from climate change and impacts observations and projections towards vulnerability/risk assessments, climate and adaptation services and co-creation of knowledge.*
- **Practitioners and businesses:** *from awareness raising towards innovative solutions and investments (green and blue measures, enhancing quality of life and protecting ecosystems).*
- **Collaboration and partnerships:** *from meetings towards a community and linking different networks and sharing e.g. by knowledge platforms.*



For info or further questions on this seminar and the activities of the JASPERS Networking Platform, please contact:

JASPERS Networking and Competence Centre

jaspersnetwork@eib.org

www.jaspersnetwork.org