

Developing Decision Relevant Information for Adapting to **Climate Change and Variability**





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Prof. Dr. Daniela Jacob, GERICS Director

Introduction

The Climate Service Center Germany (GERICS) was initiated by the German Federal Government in 2009 as a fundamental part of the German high-tech strategy for climate protection. Since June 2014, GERICS has been a scientific organisational entity of the Helmholtz-Zentrum Geesthacht – Zentrum für Material- und Küstenforschung GmbH.

GERICS delivers scientifically-sound products, advisory services and decision-relevant information to help support government, administration, and business in their efforts to adapt to climate change. We are located in the historic “Chilehaus” in Hamburg and employ an interdisciplinary team of natural and social scientists.

The Director of GERICS is meteorologist and climate scientist Prof. Dr. Daniela Jacob.

An innovation hub for climate services

Global climate change has different regional impacts, which are already noticeable today. We will have to adapt to these different impacts, and this poses a challenge to a range of different policymakers.

For example, politicians, public administrations and businesses are faced with questions such as:

- To what extent will cities have to improve their rainwater management with regard to future heavy precipitation events?
- What does a climate-adapted urban development look like?
- How can companies take into account climate change impacts in the frame of their process planning?
- How do climate change impacts affect increasingly global supply chains?

These questions provide an indication of the wide range of information that decision makers in various economic sectors, will need in relation to climate change impacts.

GERICS functions as an innovation hub for climate services in order to meet these information needs. It develops prototype products (toolkits) and (factsheets) in the area of climate services and works in close cooperation with science and practice partners from politics, economy and administration. GERICS actively promotes networking between these actors.

GERICS develops and provides multifaceted climate services in order to establish a sustained transfer process of appropriate scientific findings into relevant social decision-making processes regarding adaptation to climate change. The focus of our current activities is in the water, energy, and ecosystems sectors, and cities.

For activities connected with adaptation to climate change highly resolved climate change information is needed. In order to provide local climate change information, GERICS is involved in the development of different models and methods.

GERICS works with a wide range of businesses and organisations from both the public and private sector, providing them with decision relevant information, that can help them adapt to climate change and variability. In addition, GERICS plays a leading role in the development of Climate Services on the European as well as the global stage, through its participation in a number of major research projects and various international networks, for example, GERICS was a founding member of the international Climate Services Partnership (www.climate-services.org)

Assessing climate change impacts in Germany

In order to develop national and regional level climate adaptation and mitigation strategies, decision makers need information on both current and future climate impacts. To help provide this decision relevant information GERICS brought together a wide range of scientific experts from across Germany to produce a report that would summarise the current state of knowledge with respect to climate change and impacts in Germany. This peer-reviewed report, entitled “Klimawandel in Deutschland: Entwicklung, Folgen, Risiken und Perspektiven” (“Climate Change in Germany: Development, Consequences, Risks and Perspectives”), provides an up-to-date assessment of what is known about the impact of climate change in Germany.



The report incorporates knowledge from the IPCC (Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (AR5), as well as new scientific findings that have been published since 2014, and a number of case studies from within Germany. In addition to summarising climate impacts, the various chapters also provide suggestions as to possible responses to the impacts.

The report is aimed at professionals from all disciplines from politics, business, and administration, who are confronted with climate change in their activities, and can be freely accessed as an e-book.

Some of the key findings of the report are:

- Even if we were able to limit global warming to 1.5-2°C, there will still be changes in all natural areas, economic sectors, and all areas of life in Germany.
- As a result of the increasing number of warm days and heat waves, as well as the increase in ground-level concentrations of ozone and particulate matter, people with chronic health conditions, elderly people, and allergy sufferers will be particularly affected in the future. This threatens the urban space and requires climate-friendly urban and regional planning, for example through improved warning systems and making cities greener.
- Increasing extreme weather activity (thunderstorms, heavy rain, hail, and in some parts of Germany, storms), present a major challenge to cities and the country.
- The water balance will also be affected by climate change; on the one hand increasing heavy rainfall events may lead to flooding, while on the other, drought periods threaten groundwater recharge and endanger waterways.
- The quality of arable and forest soils will also decrease, for example due to waterlogging or drying out. Increased soil erosion will further reduce the amount of available productive soil.



“There will be a large number of challenges resulting from climate change even for Germany. Though they might be limited in size and therefore manageable on the first sight, we should not rule out the existence of feedback-loops that may exacerbate the effects”, Prof. Guy Brasseur, former director of GERICS and initiator of the report, explains “we need therefore integrative measures that reflect the systemic nature of the Earth system. And these measures, which require trans-disciplinary approaches must be urgently generated if we want to keep the negative consequences of climate change as small as possible.”

Daniela Jacob, director of GERICS adds “From the water budget, to the energy sector, and the

construction industry, all economic sectors and aspects of life are affected by climate change in Germany”, and echoes Guy Brasseur in saying “cascade effects, which often take place across different sectors, need to be tackled, and this demands a systemic approach.” The publication of Klimawandel in Deutschland provides a solid basis for decision makers to take the first steps in tackling the impacts of climate change.

Links

Klimawandel in Deutschland, e-book
<https://goo.gl/D8xJaQ>

Assessing climate impacts in Europe under 2°C global warming

There is a serious debate about whether or not we can limit global warming to +2°C above the pre-industrial period. The EU-FP7 project “IMPACT2C – Quantifying projected impacts under 2°C warming” (Grant Agreement No 282746), provides information and evidence on the impacts of a +2°C global warming for Europe, and key vulnerable regions of the world.

IMPACT2C enhances knowledge, quantifies climate change impacts, and adopts a clear and logical structure, using climate and impacts modelling, vulnerabilities, risks and economic costs, as well as potential responses, within a pan-European sector based analysis. IMPACT2C utilises a range of climate, sector, and economic models within a multi-disciplinary expert team composed of researchers from across Europe. It assesses the impact on water, energy, infrastructure, coasts, tourism, forestry, agriculture, ecosystems services, human health, and air quality-climate interactions.

In addition, a cross-sectoral perspective was adopted to complement the individual sector analyses. The question asked in the cross-sectoral analysis was: Are there areas in Europe that may be particularly negatively or positively affected by climate impacts in a future +2°C world? Hotspots of both negative and positive impacts were analysed with respect to water temperature, hydrological drought, flooding, crop yield, net primary production, soil organic carbon, and the value at risk in summer and winter tourism. The results showed a clear north-south pattern with most “winners” being located in northern Europe, while most “losers” were located in southern Europe (figure 1).

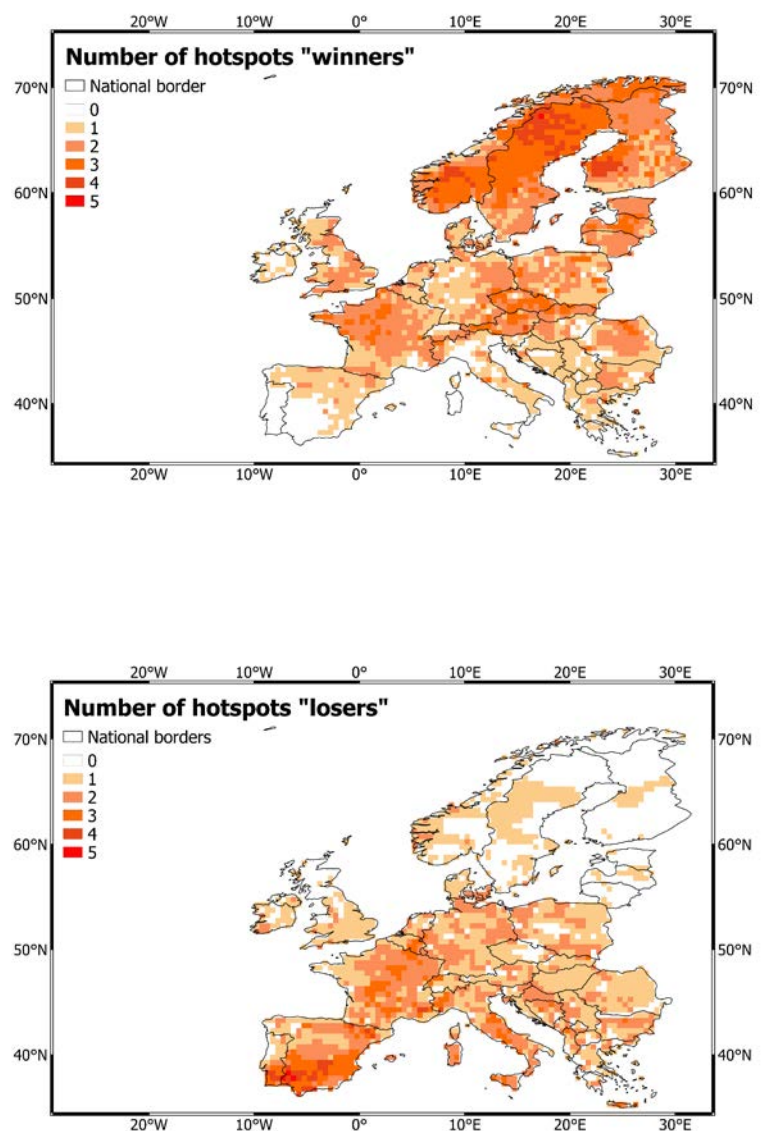


Figure 1. Multi-sectoral “winners” (top pane) and “losers” (lower pane), as identified in the IMPACT2C cross-sectoral analysis

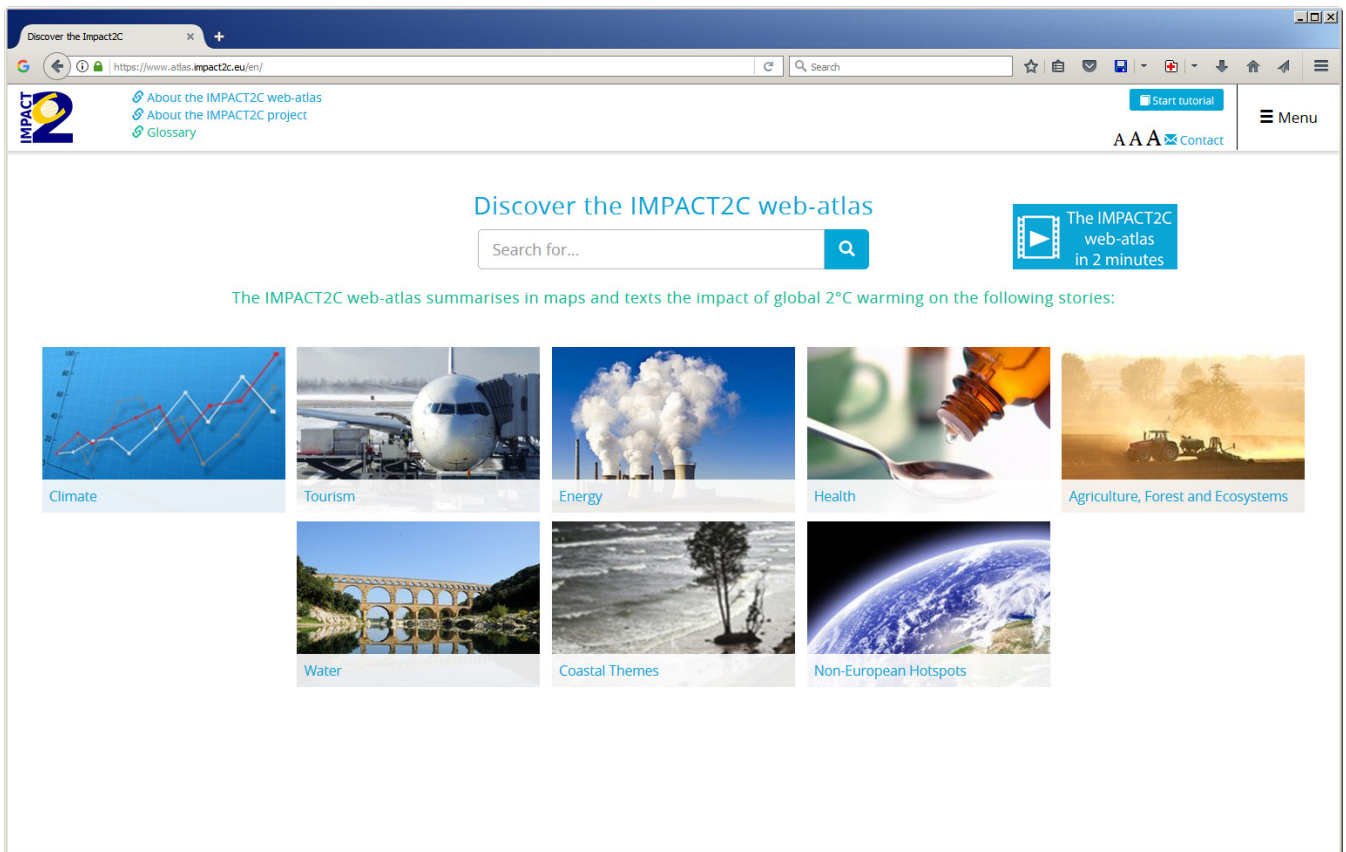


Figure 2. A screenshot of the IMPACT2C web-atlas <https://www.atlas.impact2c.eu/en/>

These results have major implications for European climate policy making, and as such were featured in the recently published European Environment Agency report “Climate change, impacts and vulnerability in Europe 2016”. This clearly demonstrates the societal relevance and impact of the IMPACT2C project on the European policy making stage. This societal relevance and impact was further extended with the production of the IMPACT2C web-atlas. The IMPACT2C web-atlas makes available a large number of the results from the project, in a user-friendly interface, where the background story to the research and results are described in clear words, in addition to numerous maps of the results at the pan-European level (figure 2). The main objectives and results presented in the IMPACT2C web-atlas were explained to various conference delegates at the last UN climate change conference 2016 in Marrakech, COP22.

Links

EEA Report 1/2017: Climate change, impacts and vulnerability in Europe 2016
<https://goo.gl/qZvavi>

IMPACT2C in European Climate Adaptation Platform of EEA (European Environmental Agency) <http://climate-adapt.eea.europa.eu/knowledge/adaptation-information/research-projects/impact2c/>

IMPACT2C web atlas
<https://www.atlas.impact2c.eu/en/>

IMPACT2C project webpage
<http://impact2c.hzg.de/>



Risk perception key to managing climate risks

Results of the EU-FP7 projects ENHANCE (Grant Agreement No 308438) and KNOW HOW (Grant Agreement No 612615) will be published in a special issue of the AGU journal *Earth's Future*. The overall objective of the KNOW HOW project was to improve the capacities of participating institutions and researchers in producing, translating and effectively delivering scientific knowledge to decision makers, with an emphasis on local governments in the coastal zone as key actors in adaptation to global environmental change, particularly climate change. In both projects the assessment of risk governance was an important issue. Within the frame of both projects, GERICS developed a framework for assessing governance performance. This framework has been utilised in different locations around the world and has served for analysing the capabilities of local governments to react to adverse climate change effects.

The special issue has the title “Assessing Risk Governance Performance in the Face of Global

Change”, and will focus on geographies that are affected by different extreme events and for which the last IPCC reports show a high likelihood that those risks will increase in intensity and/or frequency. Examples of these geographies include but are not limited to South Africa, Kenya, the Maldives, Spain, Austria, Iceland, and Mexico. The special issue will highlight the particularities of effective risk and adaptation governance processes delineated through political, historical, and societal differences.

Within the ENHANCE project GERICS developed and implemented an analysis of how people perceive risk and how this perception actually drives risk management. Risk perception plays an important role when reacting to hazards, and can be influential in determining how people choose to mitigate the risk of those hazards. Therefore, understanding risks and how they are perceived is a crucial step for creating management initiatives to promote awareness across groups dealing with natural hazards.



Considering that risk perception has long been identified as an important driver of risk management practices, it is of primary importance to include risk perception analysis in the design of intelligent climate risk policies, because actions are taken according to the assumptions made by certain groups surrounding a risk. These actions cover all components of the risk management cycle (assessment, prevention and mitigation, preparedness and recovery). If we do not succeed in taking this premise into account, climate risk policies will be less effective than otherwise.

This assumption was shared with the European Forum for Disaster Risk Reduction in 2015 in Paris, and was translated into the policy recommendations to the European countries for the implementation of the Sendai Framework (article. 18 of the EFDR Paris Outcomes).

Links

6th European Forum for Disaster Risk Reduction (EFDRR) Paris Outcomes, 7-9 October 2015, Art. 18 as Policy recommendation
http://www.unisdr.org/files/43847_efdr2015franceoutcomesfinal.pdf

ENHANCE (2016). Novel Multi-Sector Partnerships in Disaster Risk Management. Results of the ENHANCE project. Jeroen Aerts and Jaroslav Mysiak (eds). EU FP7 project ENHANCE. pp. 346, Brussels
[https://dl.dropboxusercontent.com/u/474256963/ENHANCE/BOOK/Enhance Book 2016.pdf](https://dl.dropboxusercontent.com/u/474256963/ENHANCE/BOOK/Enhance%20Book%202016.pdf)

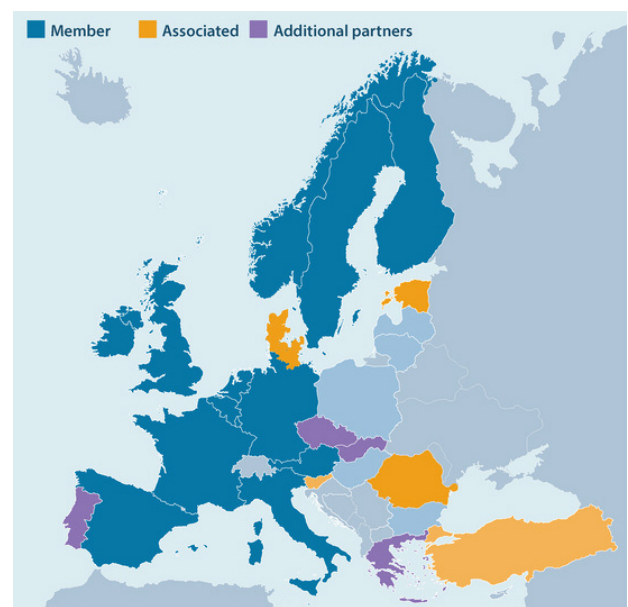
Coordinating and connecting the European climate services research agenda: JPI Climate

GERICS provides information on decision support in and through various initiatives at various levels. One of these initiatives is the Joint Programming Initiative – Connecting Climate Knowledge for Europe (www.jpi-climate.eu) (JPI Climate).

The aim of JPI Climate is to respond to the knowledge needs of policy and European society. It strives to achieve this by aligning national research programmes via coordinated research activities. In so doing, the aim is to avoid unnecessary fragmentation, and thus provide a better return on investment of public funds. In addition, JPI Climate endeavours to generate synergies in research programmes, and facilitate collaboration between researchers in Europe.

Similar to the IPCC, JPI Climate is a pan-European intergovernmental initiative to jointly orient the research activities and the necessary funding among the countries participating in the initiative. 17 European countries (see map) and four additional partners are taking part in the initiative. JPI Climate was initiated by the network of funders in the individual countries, which is typically the ministries of research, or research funding bodies.

The individual funders nominate national experts on various topics which, through appropriate working groups, can contribute their experience and expertise to the process of the funders agenda setting. In addition, the workgroups function as a “Fireplace”, which should strengthen network formation and cooperation among the experts. The working groups themselves have the possibility of further dialogue-oriented formats, for example to organize workshops to put the recommendations on a broader basis.



In this way, GERICS has contributed its knowledge and expertise to the working groups. In particular, GERICS played a leading role in Working Group II “Development and Deployment of Climate Services”, and has coordinated individual tasks throughout Europe. The findings from the working groups are then used to inform a number of downstream activities, for example, in the development of the European Research and Innovation Roadmap for Climate Services, and providing the impetus for the development of numerous current projects under Horizon 2020, the biggest EU Research and Innovation Programme ever.

Within JPI Climate, we have also, among other things, helped shape the development of the new strategic research agenda, and the content orientation of the European Research Area for Climate Services (<http://jpi-climate.eu/ERA4CS>).

Links

<http://jpi-climate.eu/programme/membercountries>



