Abstract nr. 8
Abstract code
Assessing the risks and opportunities of climate change in Europe -

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

Bottom-up national assessments of climate change risks in Europe can be classified according to how impacts are considered and what valuation metrics is used. This overview of methods in Europe reveal: Despite different decision making contexts (local-regional-national, climate risk adaptation and disaster risk reduction) all methodologies acknowledge the inevitability of “unquantifiable impacts”. Methods to translate qualitative impacts into multi-criteria risk assessments are still under development. Risk assessments at the local or sectoral level are often selective out of limited resources or time constraints. Uncertainty is pervasive in all generic climate risk assessments, but confidence rankings are not universally applied. Often uncertainty is considered in qualitative terms such as worst case-narratives or ‘wild cards’. Risk score cards and CBA coexists in almost all countries but are differently established in adaptation planning processes. Climate risk assessments (CRAs) are often formally embedded into planning procedures and more frequently conducted, while CBA is more informal and less regularly conducted in adaptation planning. Examples from Switzerland demonstrate how CRAs and CBA can be pragmatically combined in an ‘order of magnitude’ approach by standardised monetisation factors. In contrast, V-assessments are still very much in their infancy and scarcely applied in practice.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 15
Abstract code

The fourth generation of European-wide climate change impact assessments – lessons and outlook

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

The European Environment Agency (EEA) is a boundary organization that bridges between data providers, including the scientific community, and policy makers. Its mandate is to provide timely, relevant and quality-controlled information on the environment to European policy makers (in particular the European Commission and the European Parliament), to national and sub-national policy-makers in its 32 member countries and 7 cooperating countries, and to the broader public. In 2012 the EEA published its third indicator-based report on climate change, impacts and vulnerability, following earlier reports in 2004 and 2008. The next report is scheduled for publication in 2016, and its preparation has already started.

The 2012 EEA report presents more than 40 quantitative indicators on observed and projected climate change and its impacts, most of them with European-wide coverage. The systems and sectors covered include coastal zones, terrestrial and marine ecosystems, agriculture, forests and forestry, fisheries and aquaculture, human health, energy, transport, and tourism. However, some important impact domains are not covered because information is not readily available at the European level, impacts are hard to quantify or to measure, and/or because the influence of climate change is hard to disentangle from socio-economic, technical, cultural and political developments. Under-reported impact domains include industry and manufacturing, insurance, infrastructure (except transport infrastructure), livestock production, cultural heritage (with some exceptions), migration, and general human wellbeing. Furthermore, the report presents cross-sectoral information with a focus on territorial impacts, on the vulnerability of cities and urban areas, and on climate change costs. The cross-sectoral assessments rely on information that is not fully consistent with the sector-based indicators, because these indicators are often not amenable to aggregation due to differences in climate change scenarios, non-climatic scenarios, impact metrics, and/or incompatible modelling and assessment approaches.

This paper summarizes the availability of consistent information on observed and projected climate change and its impacts across climate-sensitive sectors and systems in Europe and identifies major knowledge gaps. It also presents the planning of the 2016 EEA report, including efforts for refocussing the indicator set in order to increase its policy relevance, improving coverage of information related to extreme weather and climate events, expanding consideration of cross-sectoral effects, and strengthening links between information on climate change impacts and adaptation-related issues. We also report on past and planned efforts at improving the assessment and reporting of uncertainties in observed and projected climate change and its impacts.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards

Additional information

Abstract nr. 25
Abstract code

Modelling European Agriculture with Climate Change for Food Security (FACCE MACSUR)

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

The knowledge hub »FACCE MACSUR« is a network of currently 270 scientists from 18 European and associated countries for improving the European capacity of modelling the effects of climate change and socio-economic changes on agriculture. This concerns crop and grassland production, meat production, farm management related to adaptation and mitigation measures, and development of price relations on national to global markets. The emphasis is on the linking of models and data across scientific disciplines. Collaborative efforts in the network include interactions with decisionmakers, farmers, and other stakeholders, agreement on common modelling scenarios for joint evaluation, comparison of model performance, development of new research projects, organization of training courses and workshops, and advancement of modelling methodologies. The wide range of activities is presented at this conference from the modelling perspective and the application perspective in regional integrated case studies from Finland, Austria, and Italy. Further information on the project is available from http://macsur.eu with reports on http://ojs.macsur.eu and conference proceedings on http://ocs.macsur.eu.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 28
Abstract code

Economic Evaluation of Climate Impacts - Blueprint and Application for Austria

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

Scientists attempting to evaluate the impacts of climate change are often caught between hard theory and exceedingly rocky empirics. Impact assessment models are necessarily based on highly aggregated - and sometimes highly simplified - damage functions. This study took an alternative approach: a bottom-up, physical impact assessment and respective monetization, attempting to cover a much broader set of impact fields, feeding directly into a macroeconomic and welfare analysis at the national level. To ensure consistency, our approach applied impact assessment at the sectoral impact chain level using shared socioeconomic pathways, consistent climate scenarios, computable general equilibrium evaluation, and non-market impact evaluation. The approach is applied to assess a broad although still very limited scope of climate impacts in Austria. Results indicate significant impacts around 'known knowns' (such as changes in agricultural yield from climatic shifts), with uncertainty increased by 'known unknowns' (e.g. changes in water availability for irrigation, changes in pest and diseases) but also raises the question of unknowns and unknowables, which may possibly dominate future impacts (such as exceedance of critical ecosystem function for supporting agriculture). This implies a crucial look at extreme events as core triggers for economic damages and one of the benefits of bottom-up scenario-based assessments is at least the capability to compare economic certainties to yet not assessable dimensions of economic impacts. Thus, Climate change, ultimately, is a risk management problem, where insurance thinking warrants significant mitigation and adaptation action today.
Core questions to be tackles with respect to the demands of the session: Which scenario information is needed for the different modeling approaches? What are the most appropriate economic models to assess macroeconomic effects of climate change? What sort of basic damage data is needed for economic assessments? Which are potential data sources? How to assess the current adaptation deficit as sort of base for climate change/socio-economic change add-on costs? Which sort of results is appropriate for policy uptake/decision support in investments on mitigation and adaptation? Does it make sense to compare sector results and to come up with grand totals (at the state-of-art we have right now? How to overcome the divide between the assessment of gradual climate change and extreme event impacts?
Many questions and yet solutions are premature for their majority. Nevertheless, policy demand is high at the given stage of deciding on adaptation/mitigation investments in many countries as well as at EU level.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 35
Abstract code

Determinants of Climate Related Damages

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Keywords

The total estimated damage from climate related disasters between 2011 and 2013 was US$ 641 billion while the average number of deaths and affected between 2003 - 2012 were 106,000 and 216 million, respectively. This paper examines the determinants of climate related disasters and attempts to model adaptive capacity in terms of income and population density elasticities. Along with evidence of adaptation taking place, we find that developed countries have greater adaptive capacity helping to reduce exposure to damages compared to lower income countries. Furthermore, we provide evidence that increasing GDP per capita Granger causes higher climate related damages in lower income countries but not in higher income countries.

Presentation Preference Oral presentation
Audio/Visual Equipment
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Additional information

Abstract nr. 99
Abstract code

Climate Change Vulnerability and Adaptation Assessment for Biodiversity: Testing an Integrative Methodology on Portuguese Herpetofauna.

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Keywords

Although the biodiversity sector is considered prioritary in the European Union's ten-year growth strategy (Europe 2020) and by all countries developing national adaptation strategies, the integration of biodiversity conservation measures into adaptation strategies is still poor. The overwhelming complexity of the natural systems presents fundamental limits to modelling species vulnerability to climate change and the resulting uncertainties are still a strong constrain to develop robust adaptation strategies.
It is widely acknowledged that biodiversity vulnerability assessments should consider both impacts and species adaptive capacity. However, most studies focus only on impact assessments based on bioclimatic models or "expert judgment". Using the Portuguese herpetofauna as case study, we developed an integrated vulnerability and adaptation assessment methodology which included: i) an impact assessment based on bioclimatic models, ii) an adaptive capacity assessment based on species' life history traits and populations' status, iii) an expert consultation workshop for validation of the vulnerability results and identification and prioritization of adaptation measures.
Our results indicate that both bioclimatic models and adaptative capacity indexes present strong limitations for conducting vulnerability assessments, due to: i) availability and quality of data, and ii) the fact that models and indexes are inherently simplifications of the reality. Conducting an expert workshop for validation of results guaranteed that these limitations were to some degree minimized since detailed information on species distribution, genetic variability, ecological traits and sensitivity to indirect impacts could be brought in by the experts.
Our approach has allowed to: i) identify six new vulnerable species (three that had been classified as not vulnerable with the vulnerability assessment approaches and three that had not been assessed due to unavailable data), ii) identify species in need of a periodic revision of their conservation status, iii) identify indicator species that will be monitored, iv) identify geographic regions that will suffer higher biodiversity loss, v) identify knowledge gaps and define methodologies to overcome them, vi) identify methodological issues with the vulnerability assessments used, and vii) identify and prioritize measures and actions that have already been included in the Portuguese national adaptation strategy.
Although our understanding of all factors affecting species vulnerability to climate change is still very limited, this lack of complete understanding should not be used as an excuse for inactivity. Conducting a validation stage within a vulnerability assessment will enable a "best expert judgement consensus" based on available knowledge, providing a good basis for action in spite of uncertainty.

Presentation Preference Oral presentation

Audio/Visual Equipment
Awards
Additional information

Abstract nr. 138
Abstract code

Assessing climate impacts for the German Adaptation Strategy in an inter- and trans-disciplinary network

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

Cross-sectoral assessments of climate impacts are important to prevent maladaptation since the impacts of climate change as well as the adaptation activities of one sector have also effect on other sectors. Since cross-sectoral vulnerability assessments are based on complicated processes, during which many information of different origin have to be collected, selected and aggregated, expert knowledge on many areas as well as normative decisions are needed.
To create a cross-sectoral process based on collaboration of science and society a network of 16 different public national authorities, the “Netzwerk Vulnerabilität” was founded, supported by a scientific consortium. In a cooperative manner the scientists developed the methodology, collected the available knowledge, prepared the assessment, and worked with the scientific officers of the authorities, who supported the scientists by their expert knowledge as well as provided impacts models and data. These methodological proposals were discussed, modified and finally agreed by the experts from the federal authorities in the network. Scientists provided substantial detailed knowledge, help to structure the process and to ensure its objectivity and transparency. By working together a co-design of the assessment could be reached, which facilitates also the communication and ensures the applicability of the results in the following political process.
The derived methodology is based on systemic approach by using cause-effects chains between climate signals and climate impacts for identifying the most important chains and for selecting appropriate climate impact models or indicators. The representative of the authorities decided which climate change impacts should be investigated in detail in the assessment, independent of the availability of data. If no quantitative data was available, expert judgments of the public administration as well as of other experts were used to estimate future trends of specific climate impacts. The adaptive capacity was differentiated into generic capacity, expressed by generic indicators, as well as sector specific capacity, estimated by expert judgments. To compare and aggregate the quantitative and qualitative data, the climate change impacts were normalized and semi-quantitative classes were created. In a final step, the level of confidence of the results was assessed by the scientists and the scientific officers of the authorities assessed the potential climate change impacts in regard to their importance for Germany. This structured approach helped to identify the most important climate impacts and as well as the available knowledge and knowledge gaps. This assessment was used as basis for the national adaptation action plan of Germany.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 141
Abstract code

T1009 Tomorrow's Railway and Climate Change Adaptation: facilitating a step-change in improving railway performance

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

TRaCCA – Tomorrow's Railway and Climate Change Adaptation – is a project which will enhance and augment knowledge of climate change impacts on the GB railway.
The work is funded by RSSB and Network Rail through the FutureRailway programme, as part of the undertaking, commissioning and managing of research and innovation programmes to provide knowledge for decision making now and for the future, and promoting step changes to deliver the Rail Technical Strategy.
Work Package 1 started in January 2013 has delivered a compendium of current research that has been shared with the industry via the RSSB SPARK platform. It has also delivered a series of recommendations which have been prioritised by the industry. Work Package 2 runs through to December 2015 and builds upon WP1, delivering a step change in our understanding of climate change, identifying potential cost-effective and timely actions, and outlining decision making tools that will aid climate change adaptation. The project will provide a range of decision making tools and information which will enable the railway to become more resilient.
This paper presents results of Work Package 1. The paper will describe the processes followed during the knowledge review, the subsequent gap analysis together with the development of a knowledge dissemination platform which will help foster a systems-wide approach by signposting and disseminating knowledge that might currently be held by functional silos across the railway industry. Recommendations made based on the results of the knowledge review will be presented.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 164
Abstract code

Climate Risk and Vulnerability Assessment in Switzerland: Case Study Canton of Basel

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

Switzerland is conducting a national risk and vulnerability assessment of climate change related opportunities and risks as a basis for the implementation of the Swiss climate change adaptation strategy. Various case studies assess related risk and opportunities for different geographical and climatic regions. Impacts in the areas of health, agriculture, forests and forestry, energy, tourism, infrastructure and buildings, water management, biodiversity, open spaces and green areas are analysed depending on their relevance in terms of climate change. The assessment identifies and evaluates the most significant opportunities and risks resulting from climate change for yearly impacts of a range of events and gradual changes for today (2010) and in the future (2060) for two different climate scenarios, and compares these across sectors. The methodology is focused on quantitative assessments using literature and expert estimates complemented by qualitative assessments. Socio-economic and demographic conditions are also considered. The assessment is based on a rigorous treatment of uncertainties and a transparent statement of assumptions.
The current study (INFRAS/Egli Engineering 2015a) of the city of Basel assessed the major risk on health, infrastructures and biodiversity. Opportunities were found in the energy sector. The total estimated costs will increase until 2060. The costs will mainly arise from health sector. Health related assessments took also into account the so-called urban heat island effect as approximation for the current and future situation using specific climate indices (INFRAS 2015). For example, it was found that heat related costs concerning health will increase by 150–450 % until 2060 depending on the scenario considered. The main reason is the urban heat island effect which significantly intensified climate related temperature changes in the central parts of the city compared to the surrounding areas.
The study also revealed process related findings. The joint work on the case study in workshops and interviews enhanced the dialogue between institutions and the government, intensified the knowledge transfer and let stakeholders realize, why and how climate change will affect their daily business and what are future expected hot spots.
The quantification of the risk and opportunities as well as the estimation of uncertainties and the derivation of applicable expert estimates were major challenges of the entire case study process. The appropriate communication of the main findings to the public press is another challenge which may not be underestimated in terms of impact and success of climate risk and vulnerability

assessment studies.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 305
Abstract code

Climate-related risk assessment in Switzerland: Experiences and lessons learned

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

Switzerland is conducting a cross sectoral climate change risk assessment. It serves as basis for the implementation of its national adaptation strategy and for its further development. For the assessment, the country is divided into six large areas (Swiss Plateau, Alps, Foothills of the Alps, Jura, Southern Switzerland and urban areas). For each area, one or two representative case study cantons are identified and analysed in detail*. The resulting cantonal risks and opportunities are then translated to the national level. Based on a set of predefined criteria (e.g. adaptive capacity, uncertainty, costs), priority risks are determined for Switzerland. The risk assessment is complemented with a research project on adaptive capacity** and together they will provide an important basis for the prioritization.

In this presentation, we discuss illustratively two important risk clusters for Switzerland (1) heat waves and (2) water scarcity. In addition, the related adaptation goals and implications for measures which are needed to reach these goals are presented. The first cluster relates to impacts of heat waves on the population of large agglomerations, and on the effective coordination of appropriate measures between the health, energy and spatial planning sectors. The second one focuses on possible conflicts arising from different interests related to water conservation and use in times of water scarcity. Further, it discusses ways to include different dimensions of risk in the assessment, including environmental, economic and social consequences.

By identifying current policies and measures in relation with the risk clusters, and performing a consistency check between the risk assessment and the national adaptation strategy, we point out concrete benefits but also limitations of the Swiss risk assessment for the national adaptation process. Besides the usability of the risk assessment in the policy process, a reflection is conducted on the assessment itself and the way forward, including collaboration and communication between different actors, research gaps and cross sectoral aspects.

*see abstract on “Climate Risk and Vulnerability Assessment in Switzerland: Case Study Canton of Basel”, authors: J. Füssler et al.

**see abstract on "Are there adaptation barriers? Experiences from Switzerland", authors: J. Jörin

et al.

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Presentation Preference Oral presentation

Audio/Visual Equipment

Awards

Additional information

Abstract nr. 343
Abstract code

Quick scan tool urban heat stress: how to help the urban planner?

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

Abstract

As climate change seems to be inevitable and as large effects are expected for urban areas, Dutch cities have agreed to anticipate climate change. In the period 2020-2050 changes in the urban area need to ‘climate proof’ or adapted to climate change. It is however still uncertain and open for discussion when an urban design is climate proof. Specially for urban areas this is a difficult point, because there are no guidelines or standards and even the awareness for this subject is very low.
In order to investigate the possible effects and to make the urban designers, water managers and so on better awareness of possible effects we have developed a quick scan tool to visualize those effects.
The tool uses only readily available data and does not require large computation times, even for a whole city. Because detailed digital elevation maps are available and because of the smart set up of the model, the tool results in highly detailed temperature maps. The accuracy of the calculated temperatures by this tool is of course less than of more advanced models, but we learned in discussions with several municipalities that the maps really helps to raise awareness on the subject of urban heat stress.
The tool gives insight in the air temperature and in (PET) Physiological Equivalent Temperature. In discussion with urban planners at several municipalities we are now finding out what parameter and what way of presenting helps them best to address urban heat stress.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 368
Abstract code

Sectoral and cross-sectoral vulnerabilities in Germany

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

The "German strategy for adaptation to climate change" (DAS) aims at reducing the vulnerability of relevant sectors to the impacts of climate change. These sectors are for example agriculture, building industry, transport, energy and tourism. Therefore, the DAS seeks to sustain or even improve the adaptive capacity of natural, economic and societal systems. In order to create a sound basis for this, a vulnerability analysis for Germany within and across sectors has been conducted.
Based on impact chains, which show the impacts of climate change in each sector, these effects were assessed qualitatively and quantitatively as far as possible. One result of the analysis are maps showing climate change, sensitivities and possible climate impacts on a local level in Germany. Climate impacts, which could not be determined this way, were assessed by interviews with sectoral experts. The experts were requested to estimate the impacts and to pinpoint spatial differences. Thus, the assessment provides for a first time a detailed overview of possible climate impacts in Germany, sectoral adaptive capacities and vulnerabilities in each of the sectors and across them, based on a uniform method.
The presentation will show the findings of the vulnerability assessment, highlighting highly vulnerable sectors and the impacts climate change may have in near and far future. Important climate signals within sectors and cross-sectoral will be presented as well as vulnerable regions. Furthermore, interdependencies between the sectors will be illustrated to identify possible cascade effects.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 373
Abstract code

Metrics and concept for climate resilient development

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

This paper aims to contribute to the debate on climate change policies and their link to development. A climate resilient perspective is adopted to understand how climate change policies objective can be reconciled with development goals and to explore win-win opportunities given by the integration of the climate change and poverty reduction policies. The paper reviews the main theoretical concepts that characterise the scientific literature on climate risk and vulnerability assessments, and identify climate resilient indicators accordingly. This made it possible to build the theoretical foundations for a newly design index, design to improve understanding of the implications of aid financing on reversing unsustainable paths, reducing vulnerability to climate change related hazards and get more equitable outcomes. The novelty of this paper lies on the emphasis given to economic aspects related to climate risk assessment, most notably: the concepts of loss and damage, the understanding of factors enhancing economic resilience, the links between climate change policies and development (besides economic growth) and the acknowledgment of the role of natural capital in pursuing development policies. By reviewing grey and peer-reviewed literature, 124 suitable indicators are identified and grouped along six components. The next steps will be to build a composite indicator for supporting funding allocation decisions on climate resilient development policies and their monitoring and evaluation.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 387
Abstract code

Sustainable protection of real estate against stormwater – examples from Denmark and Norway

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

A new tool "KAEJ" has been developed by NIRAS A/S to analyse risk sof surface water flood events affecting real estate and buildings. The tool is based on a combination of national terrain models (DTM), hydrological terrain models (hydro-DTM) developed by NIRAS and new software combined with drones for domestic use. By analysing the water movements on the terrain under different pre-defined flooding regimes, e.g. a 20 year, 100 year or 500 year flood or precepitation events, the new tool can predict, where water may enter the estate, and under which conditions, buildings and vital infastructure may get damaged. The tool is divided into 4 phases, from an overall screening phase, to more detailed analysis and finally an action plan defining the actions needed to be taken to prevent flod events from damaging buildings and real estate. A cost-benefit tool may calculate to whcih extent it is feasible to invest in preventive measures, or not. The tool may interact with the real estate companies exisiting risk management plans and tools, and interlinked to a web-based interface to get an immediate overveiw of the need for actions and investments. Examples from Denmark and Norway will be presented and discussed.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 395
Abstract code

Methodological approach for assessing climate impacts and identifying spatial patterns of climate change for the German Adaptation Strategy

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

This paper proposes a collaborative approach towards an integrated vulnerability assessment to climate change in Germany that attempts to bridge the gap between scientific output and policy demand. A Vulnerability Network ("Netzwerk Vulnerabilität") emerged from an applied research project commissioned under the Adaptation Action Plan of the German Strategy for Adaptation to Climate Change by the Federal Ministry for the Environment, Nature Conservation, Building and Nuclear Safety and the Federal Environment Agency. The assessment serves as evidence basis for the implementation of the German Adaptation Strategy. Thus, all relevant federal authorities and agencies are represented in the Vulnerability Network.
Conceptually the approach follows the definition of vulnerability as used by the IPCC, but it has modified this basic concept. It clearly distinguishes between three time slices (presence, near and remote future) not only regarding the change in the climatic conditions, but also socio-economic development trends. The paper concentrates on the selected methodological framework and the collaborative research design.
Existing studies lack a fine-grained, GIS-based assessment component that uncovers the regionally diverse patterns of climate change impacts. Moreover, changes in sensitivity (i.e. demographic change, economic change, and change in land-use patterns) may determine the magnitude of climate and weather-related impacts in the near future more significantly than the changing climate itself. These spatial patterns need to be identified for territorially differentiated adaptation efforts. Finally, existing vulnerability studies conducted by the different Federal States of Germany have not applied a consistent methodology. As a consequence a comparative nationwide view on given patterns of impact and vulnerability based on various existing vulnerability studies was not possible prior to this study.
The approach is the first really integrative vulnerability assessment for the whole Germany as it considers not only 16 sectors, but also interconnections between these sectors and cumulative effects for three different time slices. In doing so, moreover, the normative component of the assessment was clearly separated from the analytic one. The Vulnerability Network as a whole has been responsible for all normative decisions to be taken during the assessment procedure thus ensuring a wide understanding and acceptance of commonly achieved results.
This paper first describes the methodological approach chosen in the ”Netzwerk Vulnerabilität” climate change vulnerability assessment for Germany. Finally the paper draws on results by

discussing the identified spatial patterns for the present, near and remote future and points at existing research gaps.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 412
Abstract code

Assessed climate change risks of multiple forest ecosystem services incorporated into adaptive forestry practice pathways map

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

Climate change poses many threats to multiple sectors and ecosystem services. These result in numerous risks affecting the future delivery of services beneficial to people, with these information required to inform decision-making. In forest management, multiple abiotic risks influence tree growth and forest resilience. Drought, a major abiotic risk, has caused a reduction in tree productivity. Therefore, to support the provision of ecosystem services, forest managers need to know about drought risk. Building upon the latest climate research we used the novel probabilistic climate change projections for the UK (UKCP09) to estimate the drought risk for ecosystem services provided by British forests. The UKCP09 provides subjective probabilities about the future climate - quantifying different associated uncertainties – and allowing a more accurate estimate of risk. Furthermore, with high spatial resolution of 5km and high temporal resolution at seven decadal periods until the 2080s, our estimates offer timely information for forest management. The vulnerability component of risk, defining a trees response to drought, comes from the Ecological Site Classification impact model developed for British forests. The drought risk influencing tree productivity allows us to assess other forest ecosystem services: forest production and carbon sequestration. Furthermore, to reduce communication barriers between research and forest practice, and to acknowledge inertia of climate change, we incorporated assessed ecosystem services into a map of dynamic adaptive forestry practice pathways.
The findings mainly show a reduction in tree productivity in Britain for major conifer tree species – spruce and pine - but also a small increase for broadleaves – oak. A more detailed assessment in Scotland provided a better insight into the spatial variability of the future ecosystem services. The western part of Scotland will become slightly more productive for both conifers and broadleaves but eastern part of Scotland will become less productive. The same applies also to forest production. For the carbon sequestration, our results show a large decrease in carbon stocks caused by reduced tree productivity. Combined quantified ecosystem services into map of adaptive forestry practice pathways shows, for example, the need to adapt Sitka spruce and its management in the lowlands if the limiting threshold value was set to 10% reduction.
This map should inform forest management and policy making by defining when and how much forest ecosystem services can deliver under climate change to help identify lead time needed for adaptation and also to identify consequences of climate change inertia on forests.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
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Abstract nr. 435
Abstract code

Vulnerability assessment in practice: impact chains and their analysis for cross-sectorial evaluation

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Topic Supporting adaptation by climate risk and vulnerability assessments
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The assessment of the vulnerabilities of a country or a region to the effects of climate change is a complex task. It addresses the reality of socio-ecological systems with typically cross-sectorial interdependencies and feedback loops that lead to non-linear responses to external pressures and shocks. One of the main challenges of vulnerability assessments (VAs) to climate change in practice is therefore to reduce this complexity and to allow for suitable estimations by using a reasonable amount of financial resources and time.

This paper presents a stepwise approach to run such VAs for various purposes and at various scales. One of the centerpieces of our VA methodology is the definition of so-called ‘impact chains’, which are generated as joint effort by all relevant VA stakeholders: scientists, practitioners, general as well as local experts. These chains visualize the cause-effect relationships between climate signals, sensitivities, adaptive capacities and (potential) climate impacts. Impact chains support the focus on most relevant aspects of climate risks. Their design may serve as starting point for the selection and the evaluation of indicators. The process of generating impact chains triggers lively discussions and reveals fields of agreement and disagreements between the various experts and actors. We present examples from the Vulnerability Network ("Netzwerk Vulnerabilität") in Germany and from a number of development cooperation projects that have been carried out according to the ‘Vulnerability Sourcebook’. This Sourcebook is a guideline for the implementation of VAs in practice and has been developed for the GIZ (Deutsche Gesellschaft für Internationale Zusammenarbeit).

Though successfully applied as a tool to structure and focus the subsequent work within a VA, it is evident that impact chains reduce the real complex relationships to simplifying linear and mono-sectorial ones. The research field of system dynamics tackles these shortcomings and use for example causal-loop-diagrams to capture the dynamic nature of interrelationships and cascading effects of events. However, these approaches have not found their way into operational procedures yet. A first step to account for some of the system’s complexity is the analysis of cross-sectorial links between individual impact chains. The results of such an analysis is shown using the example of the abovementioned project Vulnerability Network, for that network diagrams have been created to visualize type and intensity of connections amongst various sectors.

Presentation Preference Oral presentation

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Abstract nr. 453
Abstract code

Enhancing strategic adaptation planning at the local level: challenges and prospects in developing the French vulnerability and risk assessment tool ‘’Impact’Climat"

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Keywords

France’s National Adaptation Policy gives a central role to local authorities. All cities and authorities larger than 50,000 inhabitants are legally bound to carry out every five years territorial and cross-sectoral climate change vulnerability assessments as the basis for local adaptation strategies and plans that take into account both changing climate risks and associated uncertainties.
Adaptation entails French local policy-makers and technicians to revisit the way they design and implement public policies in order to better respond in the short-term to longer-term challenges. Anticipation, flexible planning and adaptive management for addressing current and future risks are becoming key requirements of any local development policies. Yet, adaptation tends to remain a slowing emerging theme for French local authorities with a majority of them still unfamiliar with the concepts and methods of this new 'science'. Beside the need to raise awareness of their local governments and councilors, local authorities are now facing a significant methodological challenge that requires adequate analytical and decision support tools to ensure successful mainstreaming of adaptation concerns and measures into their day-to-day planning and operations.
The French Environment and Energy Management Agency (ADEME) support these policy efforts by developing since 2011 the ‘’Impact’Climat’’ vulnerability assessment tool (**www.pcet-ademe.fr**). “Impact’Climat” is a computer-based analytical tool that promotes a pragmatic approach using available knowledge on climate change in France and its expected impacts. The tool has been continuously revised and updated to account for the evolving needs of the local authorities as well as latest developments from the climate and adaptation research. In 2015, a third version of Impact’Climat will be released with the help of the Adaptation service consulting firms TEC and ACTERRA. The tool will integrate new resources, data and analytical features, including *inter alia* automated use of downscaled climate projections from French and European models available in the EUROCORDEX programme and Meteo-France’s “DRIAS’’ Climate Information Portal.
The presentation will thus provide an overview of the progress made on the development of “Impact'Climat” and its benefits for strategic adaptation decision-making by local governments. It will share feedback on the challenges and research gaps encountered by ADEME throughout developing the tool and will highlight best practices and success factors that can be derived from the French experience. It will finally deliver general reflections and recommendations to experts, researchers and policy-makers involved in the design and implementation of similar methods across Europe.

Presentation Preference Oral presentation

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Abstract nr. 470
Abstract code

Innovative approach to the development of a transdisciplinary adaptation strategy - an example from the Madeira islands.

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Keywords

The development of an Adaptation Strategy should be a multidisciplinary process that involves relevant stakeholders. What seems to be the challenge is how to coordinate it in a way that promotes sectorial cross-pollination to find synergies and support systemic thinking, and how to deeply engage the stakeholders in the process. This paper presents some conclusions and reflections based on the results of an Adaptation project that applied an innovative methodology to overcome those challenges.
The Madeira archipelago is an European outermost region that has been directly and indirectly affected by climate variability. This led Madeira policy-makers to support the development of a regional adaptation strategy to climate change. With a transdisciplinary approach the project CLIMA-Madeira addresses six sectors: agriculture and forestry, biodiversity, energy, health, water resources and tourism.
To take advantage of the project multidisciplinary, the same methodological was followed by all sectorial experts' teams. The vulnerability assessment was based on the design of an impact chain that analyzed the system current adaptive capacity against the potential impact (based on the climate exposure on the system sensibility). By using the same conceptual methodology, the experts were invited to present their sectorial results framed in the same way using a common set of categories. Each outcome was also presented with an associated confidence level to invite the experts to present all the results independently its intrinsic uncertainty. Having the different sectors outcomes labeled with the same set of categories and a consistent treatment of uncertainties was the starting point to compare them, find synergies and identify complex impact interactions.
Stakeholder involvement was carried out first by mapping the list of key actors that were then selected to the project workshops based on their potential contribution, motivation and influence for the adaptation process. In the first workshop it was used a World Café Technology to facilitate the stakeholders discussion on the Madeira's current vulnerability and the Open Space Technology to brainstorm about adaptation measures. These results were framed in five adaptation dimensions which fed the second workshop dedicated to the prioritization of adaptation measures.
During this process some barriers were identified and some opportunities were acknowledge which created interesting lessons learn.

Presentation Preference Oral presentation
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Additional information

Abstract nr. 492
Abstract code

ECONOMIC CLIMATE CHANGE IMPACTS AT THE NATIONAL LEVEL: KNOWN TRENDS, UNKNOWN TAILS, AND UNKNOWABLES

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

Economists attempting to evaluate the impacts of climate change are often caught between hard theory and exceedingly rocky empirics. Impact assessment models are necessarily based on highly aggregated – and sometimes highly simplified – damage functions. This study takes an alternative approach: a bottom-up, physical impact assessment and respective monetization, attempting to cover *a much broader set of* impact fields, feeding directly into a macroeconomic and welfare analysis at the national level. To ensure consistency, our approach applies impact assessment at the sectoral impact chain level using shared socioeconomic pathways, consistent climate scenarios, computable general equilibrium evaluation, and non-market impact evaluation. The approach is applied to assess a broad scope of climate impacts in Austria. Results indicate significant impacts around 'known knowns' (such as changes in agricultural yield from climatic shifts), with uncertainty increased by 'known unknowns' (e.g. changes in water availability for irrigation, changes in pest and diseases) but also raises the question of unknowns and unknowables, which may possibly dominate future impacts (such as exceedance of critical ecosystem function for supporting agriculture). Climate change, ultimately, is a risk management problem, where insurance thinking warrants significant mitigation (and adaptation) action today. Analysis of the study result indicate that the current welfare damage of climate and weather induced extreme events in Austria is an annual average of € 1 billion (large events only). This has the potential to rise to € 4 to 5 billion by mid-century (annual average, known knowns of impact chains only), with an uncertainty range of € 4 to 9 billion. When extreme events and the tails of their distribution are included, even for a partial analysis focused on extremes, damages are seen to rise significantly, e.g. with an estimated increase to € 40 billion due to riverine flooding events alone by the end of the century. These highlight the need to consider the distribution of impacts, as well as the central values.

Presentation Preference Oral presentation
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Additional information

Abstract nr. 499
Abstract code

Exploring risk and vulnerability to climate change - the HEALTHY FUTURES Atlas

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Keywords

Global climate change is projected to have geographically varied and potentially substantial, negative effects on health, with sub-Saharan Africa a focus of adverse health impacts. Malaria remains one of the world's most devastating infectious diseases, particularly in sub-Saharan Africa, with both the malaria vector and pathogen affected by climate conditions. Prevailing levels of social vulnerability are increasingly recognised as a critical determinant of impact. Recent reports call for assessments of vulnerability and risk to be at the centre of future assessments of climate change impacts, and for increased research on effective decision support systems.
The HEALTHY FUTURES Atlas (accessible through www.healthyfutures.eu) is an interactive, web-based mapping and decision support tool, built within an open-source framework, which aims to provide meaningful and guided access to information on climate change, potentiality of disease occurrence and population vulnerability for vector borne diseases. The aim of the atlas is to visualize modeling outputs (i.e., disease risk, its domains and sub-domains), and to illustrate the spatial interrelationships with the underlying indicators in an interactive manner. It integrates results from spatial (i) risk, (ii) disease occurrence, and (iii) vulnerability assessments. The user is guided by a visual representation of future scenarios and a conceptual risk and vulnerability framework (based on IPCC 2014), which enables accessing the different components of risk.
The atlas integrates a range of climate and health data from multiple sources, including archival. Mainly however the atlas operates on multiple ensembles of downscaled and bias-corrected, high-resolution, future climate change projections, which are based on two emission scenarios (RCP4.5 (mid-level change) and RCP8.5 (high-level change)) used in IPCC AR5. The projected climate conditions drive two, state-of-the-art dynamic malaria transmission models (LMM and VECTRI), which provide information on the present and future probability of simulated transmission intensity (entomological inoculation rate - EIR), simulated prevalence and simulated length of transmission season.
Modeling outputs can be accessed as pre-defined maps; yet results can also be further explored using a set of tools (pie-charts, bar-charts, etc.). In addition to providing a means of assessing spatial variations in risk throughout eastern Africa, HEALTHY FUTURES Atlas can be used to generate visualization aids for incorporation in, e.g., policy and planning documents and to target surveillance and intervention strategies. The tool has been rolled-out through a series of stakeholder meetings in EAC countries hosted by HEALTHY FUTURES.

Presentation Preference Oral presentation
Audio/Visual Equipment
Awards
Additional information

Abstract nr. 501
Abstract code

Risk assessment concerning landslides and coastal erosion – a Swedish government commission to meet a changing climate

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

The Swedish Geotechnical Institute (SGI) is commissioned by the Swedish government to perform risk assessment for landslides and coastal erosion within the national climate change adaptation allowance. Our commission include several tasks: (I) to map the risks in present and future climate conditions, (II) to develop new methodology; (III) to make benefit of the outcome of the results for society; (IV) to co-ordinate a harmonization of existing material concerning landslides and erosion from several national authorities and; (V) to put together guidelines for users of this material. We briefly present the work we have conducted so far by focusing on challenges and solutions concerning our mapping, co-operation with other national and regional authorities, our dialogue with local stakeholders and our plans for future work with methodology development and risk mapping.

SGI previously developed a first methodology version for mapping landslide risk, and we mapped the landslide risk for present and future climate conditions the Göta river valley. Subsequently, we have developed a simplified, cheaper and more generally applicable second version of the methodology. It has been tested to ensure the quality of the outcome and its usefulness for stakeholders, and it is now being applied to nine additional river valleys of national economic importance. SGI also developed and tested a separate methodology for mapping risk for coastal erosion. The test results of these two risk methodologies show that future climate conditions are easy to include in the vigorous analyses of landslide risk, in which probability is the key parameter over time. Climate conditions are trickier to include in the simple and mainly GIS-based analyses of vulnerability for coastal erosion (the third of in total five steps in our risk methodology for coastal erosion). A continuous dialogue with local authorities is necessary to ensure usefulness of the outcome. We also have to find solutions for complementing published risk maps when local authorities make preventive measures, because the risk maps have a big influence on insurance matters in regions with high-risk spots.

Additionally, several different kinds of maps indicating risk or vulnerability for future landslides and coastal erosion have been produced by national and regional authorities. It is difficult for non-experts among stakeholders to interpret the various maps provided when planning and prioritizing adaptation measures. SGI’s new responsibility for harmonization constitutes the necessary condition for successful co-operation among authorities.

Presentation Preference Oral presentation
Audio/Visual Equipment
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Additional information

Abstract nr. 535
Abstract code

A probabilistic risk based approach to addressing impacts of climate change on cities: The Urban Integrated Assessment Facility (UIAF)

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

Urban areas are particularly vulnerable to economic and social impacts of climate change due to their high concentrations of people and assets. Moreover, the increasing temperatures due to global warming are exacerbated in cities due to the Urban Heat Island (UHI) effect. In recent years cities globally have been developing strategies for responding to the risks of climate change. However, they often lack the evidence needed to make the case for and prioritise adaptation actions. Consequently, the development of adaptation strategies for urban areas requires integrative thinking to understand and model relationships between the built environment, land-use, infrastructure systems, the urban economy and climate.

As part of the ARCADIA (Adaptation and Resilience in Cities: Analysis and Decision making using Integrated Assessment) project a new system of models for analysing climate risks and assessing the performance of options for adapting to climate change has been developed. The models developed have been integrated within an Urban Integrated Assessment Framework (UIAF). The UIAF incorporates future scenarios of climate, economic, and demographic change (including implications of urban land use and anthropogenic heat emissions), and starts to incorporate important feedbacks between models. A probabilistic methodology has been used to generate risk estimates that incorporate the effects of uncertainties in climate and vulnerability. The framework enables the exploration of a range of climate and socio-economic scenarios and their implications, providing a whole-system approach to assessing adaptation strategies to enhance future urban sustainability.

The UIAF has been developed for Greater London and the surrounding region, incorporating input from key stakeholders to ensure the analysis was relevant to the climate risks they faced. This presentation will present an overview of the UIAF, demonstrate its application to direct impacts of extreme heat and flooding on people, buildings and transport infrastructure, and implications for the development and assessment of adaptation strategies. The integrated approach is beneficial in that it facilitates a range of impacts and adaptation options to be considered within a single framework; the spatially coherent data allows the user to map and identify risk hot spots; vulnerability due to socio-economic change as well as climate change can be captured; and the modelling approach is flexible in its potential to build in more specific information on adaptation policies and pathways as more quantitative information becomes available.

Presentation Preference Oral presentation
Audio/Visual Equipment
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Abstract nr. 562
Abstract code

From static socio-economic sensitivity to interactive scenarios: Innovative developments of a key component of climate change impact and vulnerability assessments

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Topic Supporting adaptation by climate risk and vulnerability assessments
Keywords

For many years long-term scenarios of future socio-economic developments were mostly hidden in the background of climate change impact and vulnerability assessments. At the forefront of scientific studies on climate change were climate scenarios and related modelling advances. Long-term socio-economic scenarios were nevertheless needed as drivers of the underlying emission projections. For this purpose four main ‘storylines’ of demographic, social, economic and technological developments were defined by the IPCC’s Special Report on Emission Scenarios. But the socio-economic scenarios of the ‘storylines’ were coarse and remained largely in the background of impact and vulnerability assessments. In fact, the socio-economic sensitivity components of such assessments were usually static, i.e. they used only the most recent data on population, economic output and other related indicators. Thus future climate conditions were related to current (and not future) societal conditions.Since the SRES scenarios new approaches and methods for demographic and socio-economic projections have emerged. And the IPCC eventually adopted a ‘parallel modelling approach’ allowing climate and social science researchers to develop their models in parallel instead of in a sequential fashion. Social scientists developed a set of ‘shared socio-economic pathways’ that are only loosely linked to different policy assumptions and thus opened up even more flexibility for exploring different socio-economic constellations.These methodological advances reflect the realization that socio-economic developments are much more dynamic and thus more difficult to project than physical changes. It is also an often neglected fact that socio-economic conditions in Europe have in the past 50 years changed to a much greater degree than climatic conditions – and this is likely to hold true for the future as well. Thus, future climate change impacts will also be primarily determined by socio-economic changes. Moving from fixed (i.e. the most current) socio-economic sensitivities to a variety of flexible scenarios therefore holds the promise of greatly enhancing impact and vulnerability assessments and applied tools for policy advice. This paper reviews examples of recent climate change impact and vulnerability assessments that treat socio-economic sensitivities in different ways – ranging from static status quo to flexible scenarios. A special focus is put on studies that have fully embraced the scenario approach. In fact, some recent and ongoing European research projects like CLIMSAVE or CLIP-C are offering users the ability to interactively explore different future developments. The paper identifies methodological achievements as well as opportunities for decision-makers, but also highlights key challenges of these new approaches.

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