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The need for multissectoral impact assessments to initiate concerted adaptation

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While sectoral impact assessments have become common in the climate change field, integrated approaches that outline the full, regional impact burden are still scarce. This information, however, is of importance to inform and prioritize adaptation processes and is requested by decision-makers.
To initiate informed adaptation, knowledge on several levels is needed. On the one hand those regions need to be identified which will have to deal with the highest impact burden and therefore have the highest need for adaptation. On the other hand detailed information on the concrete sectoral impacts and underlying cause-and-effect chains needs to be produced to enable efficient and purposeful adaptation. Knowledge on expected impacts in other sectors in the same location are also important to avoid maladaptation.

We present an approach which allows for a comparative and integrated assessment of climate change impacts, while enabling a sector-specific perspective of risk analysis. We demonstrate the approach through a multisectoral, regional case study in the German federal state of North Rhine-Westphalia.This region exhibits a strong spatial heterogeneity, while being of special relevance for the German economy generating about a quarter of the German GDP.
Sensitivity is quantified for the physical, social, environmental and economic dimension by means of tailor made approaches for specific sectors. These comprise sensitivity of settlements, humans, environmental resources such as protected areas, soils and lakes and economic branches such as forestry, agriculture and tourism.
For some sectors, existing approaches have been incorporated into analysis, for others new methodologies have been developed. Examples are an indicator based approach for the health sector, describing the sensitivity of humans to heat waves by the urban heat island potential of the surrounding region and the demographic structure based on a detailed literature analysis. Relevant sensitivity factors of windthrow of forest stands were identified by a comparison of pedologic, silvicultural and topologic conditions with a past storm event, which was accompanied by high timber losses.
Exposure is defined as normalised changes between relevant and sector specific climate variables between the past and future. It is exemplarily based on a regional climate model and related directly to the respective sensitivity sectors. Additional to these direct climate stimuli also indirect climatic exposure such as river flooding is considered. Aggregation of the sector specific impacts, comprising both sensitivity and exposure, lead to integrated impact measures on administrative level.
Our results show some sector-specific differences of impact-severity, yet spatial hot spots are clearly identifiable. The results give some clear indications towards suitable intervention options in specific sectors.