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Drought risk analysis – state of the art and future challenges

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Drought impacts are widespread and affect directly or indirectly human and environmental systems globally. In order to understand the determinants of such impacts, drought risk, i.e. the likelihood of drought impact occurrence, is analysed. The development of reliable drought risk assessments (in all its components of drought hazards, exposure and vulnerability) is understood to be one of the essential steps to foster resilience to drought. But the variety of sectors impacted, and the different interests of the specific users the analyses are made for, resulted in a wealth of conceptual definitions and methodological approaches to analyse drought risk.

This study discusses the current state of drought risk analysis based on a systematic literature review with the aim to disentangle issues of scale and focus on the different facets of risk, such as application, indicator and data selection, hazard identification, vulnerability assessment, impact information application and the theoretical foundations and methodological approach of risk analysis. Commonalities between studies and approaches are apparently lacking.

The review highlights a lack of national and regional investigations in the Americas, as well as Northern and Eastern Asia. The majority of assessments focuses on the agricultural sector, but also studies that reflect overall unspecified risk of a region are common. Drought risk analyses differ by the temporal aspect of analysis, information/predictor selection criteria and the methods applied to combine such information. Hereby, a lack of statistical evidence for predictor selection as well as validation of final results became evident. Further, the majority of studies use static approaches and only few studies developed future scenarios of risk. The analysis of existing studies suggests that there is only little agreement on what a drought risk analysis entails.

Nevertheless, common paradigms of data application- and combination practice could be identified and resulted in the overall recommendation that the components of hazard predictors, exposure, vulnerability and impact information should be considered in the frame of statistical and expert models. The common practice to preferably apply existing data which might not optimally suite the purpose of the analysis, rather than the integration of novel information has to change. Predictor selection should become more transparent, and should also be based on both statistical evidence and expert knowledge. In order reduce the gap between natural and social science, and to account for transferability of studies, more efforts to validate approaches against each other in comparative analyses are needed. Therefore, more efforts to collect standardised impact information are necessary. In summary, the collected information on common practice of applied methodological approaches and data with regard to the location, spatial resolution and thematic focus paves the way forward for a drought risk catalogue, giving sectors specific guidance on risk analysis criteria. All those factors together determine drought risk, which can be managed by developing drought risk reduction policies and drought risk management plans that are adapted to the regional, national and local context.