Linking drought indices to reported impacts - Germany 2003

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Drought develops slowly and on a large scale causing a variety of direct and indirect environmental and socio-economic impacts. It is a recurrent, transboundary phenomenon and can affect vast areas and millions of people. The 2003 drought in Europe caused over 11 billion Euros losses from impacts on agriculture, water quality, energy production, and other sectors. For characterising and monitoring of the natural hazard a number of drought indices are commonly used. However, approaches to link these indices to real, observed drought impacts are still missing. The presented work illustrates a methodology approach for linking common drought indices with measured physical, ecological and socio-economic drought impacts. As an example the Standardized Precipitation Index (SPI), the Standardized Precipitation Evaporation Index (SPEI), NAPAR anomaly and near-surface air temperature will be associated to observed impacts in Germany that occurred during the 2003 central European drought. Impact information is obtained from the European Drought Impact Inventory (EDII) compiled by the EU FP7 Drought REPLY (Fostering European Drought Research and Science-Policy Interfacing) project. The presented methodology aims to model this linkage is key information to elucidate the significance of available vulnerability thresholds of drought indices for different sectors and regions. It is thus an essential component to determine appropriate drought risk and vulnerability scenarios for Drought Risk Management to foster resilience for this hazard.

Methodology

- Appropriate vulnerability index - indices in non-European Scale
- Linkage between indices and impacts on - Plant ecosystems
- Linkage drought indices to past European drought impact
- Linkage rainfall index and evapotranspiration on - spatial and temporal scales - event drought impact indices to impacts of the 2003 event, Germany

The European Drought Impact report inventory (EDII) developed as part of the EU FP7 project Drought REPLY (Fostering European Drought Research and Science-Policy Interfacing) project makes use of the E-CAVE approach combining a drought hazard index (Cave) with a drought impact index (ACME). This approach was developed to systematically detect, characterise and monitor droughts and their impacts in Europe reported by various sources. Impact information is collected from a wide range of datasets and impact categories including economy, society, ecosystems, agriculture, forests, health, etc.

The presented approach illustrates the possibility of linking reported drought impacts to common drought indices. It has to be ascertained that the date of the inventory is not comprehensive for all impact areas and categories yet; preliminary results have to be treated carefully. Nevertheless, first analyses show a certain pattern of spatial impact report occurrence as well as impact indicator sensitivity. As expected, mean index values generally show an increasing trend with extending the standardisation period (1–12 months). Due to reasons of spatial extent results show a slight lowering in mean values (aside from outliers due to poor data) with increasing of NUTS levels. It becomes evident that a number of impacts (by categories) follow certain spatial and temporal patterns of occurrence: e.g. impacts in the category of Agriculture and Livestock farming dominate in northern Germany. Freshwater ecosystem related impacts concentrate in central and north-western Germany. Impacts on Freshwater ecosystems have an earlier onset than impacts on water quality. Furthermore, impact categories show certain sensitivity thresholds illustrating differences in its vulnerability. These preliminary results demonstrate the suitability of the methodological approach.

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