

Reconstructing Droughts Beyond the Hydro-Meteorological Indicators: What can we Learn from Impacts in the US Drought Impact Reporter?

Motivation

Decision maker: "I want to be able to anticipate drought impacts associated with levels of drought severity to help protect public well-being!"



Scientist: "Our probabilistic



Questions

How can we jointly decrease this uncertainty in impact prediction to a level that is acceptable for decision making? What is an acceptable level?

Objectives

To use drought impact reports to reconstruct drought events beyond the hydro-meteorological indicators

To reveal sources of uncertainty in impact prediction due to the characteristics of impact data

Data for Drought Reconstruction



US Drought Risk Atlas droughtatlas.unl.edu US Drought Monitor droughtmonitor.unl.edu

Water Use Restrictions (WUR)



Source: Impact reports and State of North Carolina Drought Monitoring http://www.ncwater.org/Drought_Monitoring

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Drought Reconstruction

Drought Impact Reports



US Drought Impact Reporter droughtreporter.unl.edu





Qualitative and semi-quantitative visual analysis of drought indices used in drought monitoring, impact reports and the number of impacts, as well as the water usage restrictions imposed

Towards impact-oriented drought early-warning

Textual impact descriptions may inform users about historical analogues, including drought impacts in similar drought hazard situations; for statistical analysis and modeling, however, standardized impact data is needed.

One way towards achieving this is to work with stakeholders to identify existing and potential drought impact data networks, design a monitring strategy for key impacts and identify models with an acceptable level of uncertainty for decision makers.

Remaining challenges include a changing vulnerability and drought mitigation polices, affecting the measures and hence the impacts. These also need to be monitored.

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Acknowledgements: Funding to the project DrIVER by the German Research Foundation (DFG), the National Scinece Foundation (NSF), the Natural Environment Reserach Council (NERC) and CSIRO, under the Belmont Forum/G8HORC's Freshwater Security programme



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Drought index SPEI varies by accumulation period. Impacts occur during the entire drought event (bars show the report counts). Most impacts occur during the most severe WUR (color of the bars)

SPEI-1 fluctuates strongly during the drought.

SPEI-3 is low during onset of drought, neutral during peak impacts and positive during recovery.

SPEI-6 is negative at the peak of impact counts but positive during onset and recovery.

SPEI-12 is low at the peak of impacts and recovery but misses the onset.

Are impacts due to WUR or due to low water availability?



Different drought indicators, e.g. SPEI at different time scales, relate to different

Impacts are not only driven by water deficits, but also by management decisions and

Management decisions and actions can trigger or amplify water shortages, or reduce