Federal Ministry
of Education
and Research

FONA
Sustainable Water Management

OUTLAST—Development of an Operational, Multi-sectoral, Global Drought Hazard Forecasting System

Water as a Global Resource (GRoW)

Droughts are a global problem and affect water supply, agriculture, and ecosystems on land and in water. Is it possible to forecast droughts over periods of several months? How reliable are such forecasts? The OUTLAST joint research project aims to answer these questions. It will develop and test a model system that provides monthly drought forecasts covering a six months period for all land areas on Earth. The value of such forecasts for reducing drought impacts will be optimized by regional project partners in data-poor regions of Africa and Asia. It is planned to implement an operational prototype of the forecasting system in cooperation with the World Meteorological Organization (WMO).

Improved Protection Against Drought Impacts Needed

Droughts exceed all other natural hazards in terms of number of people affected, with a large variety of negative impacts. For example, they can lead to shortages in water supply for human consumption, industry and agriculture. Falling water levels can restrict inland navigation and the supply of cooling water to power plants. Natural ecosystems are also threatened by drying out soils and decreasing groundwater levels.

A range of adaptation measures are being taken to limit the effects of drought: these include reservoirs and canals, the pumping of groundwater and the irrigation of agricultural crops. However, the capacity of this infrastructure is limited and only partially protects the affected sectors.

Regulations and laws govern water abstraction and distribution. They are designed to prevent overuse and damage to natural ecosystems. A major problem, however, is the uncertainty about how the water situation will develop in the coming months. Up to now, drought management has been largely based on experience gained in dealing with historical droughts. Common drought forecasting systems are mostly limited to describing the current status. Active drought management, however, requires information on the possible further course of a drought over a relevant period of time, usually several months. The aim of the joint project OUTLAST is to provide global seasonal drought forecasts for water supply, riverine ecosystems, non-agricultural terrestrial ecosystems, rainfed agriculture and irrigated agriculture.

Irrigation (here in rice cultivation in Ticino, Switzerland) protects plants from drought as long as sufficient water is available

Active Drought Management

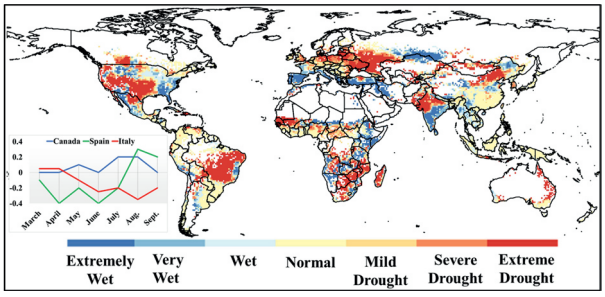
To this end, the OUTLAST project partners are developing a model system consisting of the global hydrological model WaterGAP and the Global Crop Water Model (GCWM). The models are driven by seasonal hydrometeorological forecasts that have been corrected for bias. The differences between the individual hydrometeorological forecasts are also transferred to the drought risk indicators calculated by the models and thus allow an estimation of uncertainties. The researchers examine the forecast quality of the models by comparing them with historical forecasts and with measured values. Thus, differences in forecast quality between regions, sectors, indicators and seasons can be systematically identified.

The choice of indicators to be modelled, as well as the way in which information is provided, will be jointly determined with regional pilot users in East Africa and West Asia. They will also help to validate the predicative quality for drought management in their region.

Trial Run

During the last six months of the project, the OUTLAST drought forecasting system will be tested at the International Center for Water Resources and Global Change (ICWRGC) in Koblenz. This will provide experience for an operational use of the system. The researchers will also develop a manual for setting up and operating the system. A flexible implementation as a cloud solution will ensure that the forecasting system can be used at different locations.

With the new drought forecasting system, the project participants aim to generate monthly forecasts, each covering the next six months period. The processed results will be visualized and described in the HydroSOS portal of the World Meteorological Organization (WMO). The results will be also available as open source geodata for further use.



The currently developed system will provide multisectoral drought forecasts in high spatial and temporal resolution

Funding Measure
Water as a Global Resource (GRoW)

Project Title
Development of an Operational, Multisectoral, Global Drought Hazard Forecasting System (OUTLAST)

Grant Number
02WGR1642A-D

Duration
September 1, 2022 – August 31, 2025

Funding Volume
EUR 1,300,443

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Website
outlast-project.net

Published by
Federal Ministry of Education and Research (BMBF)
Division Resources, Circular Economy; Geosciences
53170 Bonn

March 2023

Edited by
Project Management Agency Karlsruhe (PTKA)

Layout
Project Management Agency Karlsruhe (PTKA)

Printed by
Karlsruhe Institute of Technology (KIT)

Photo Credits
Front: Stefan Siebert, Universität Göttingen
Back: Neda Abbasi, Universität Göttingen

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