



## **Implementing drought early warning systems: policy lessons and future needs**

Ana Iglesias (1), Micha Werner (2,3), Rodrigo Maia (4), Luis Garrote (5), and Washington Nyabeze (6)

(1) Department of Agricultural Economics and Social Sciences, Universidad Politécnica de Madrid, UPM, Madrid, Spain, (2) Deltares, P.O. Box 177, 2600 MH, Delft, the Netherlands, (3) UNESCO-IHE, P.O. Box 3015, 2601 DA, Delft, the Netherlands, (4) Department of Civil Engineering, Faculty of Engineering of the Univeristy of Porto, Portugal, (5) Department of Civil Engineering, Universidad Politécnica de Madrid, UPM, Madrid, Spain, (6) WR Nyabeze and Associates, Witkoppen, South Africa

Drought forecasting and Warning provides the potential of reducing impacts to society due to drought events. The implementation of effective drought forecasting and warning, however, requires not only science to support reliable forecasting, but also adequate policy and societal response. Here we propose a protocol to develop drought forecasting and early warning based in the international cooperation of African and European institutions in the DEWFORA project (EC, 7th Framework Programme). The protocol includes four major phases that address the scientific knowledge and the social capacity to use the knowledge:

- (a) What is the science available? Evaluating how signs of impending drought can be detected and predicted, defining risk levels, and analysing of the signs of drought in an integrated vulnerability approach.
- (b) What are the societal capacities? In this the institutional framework that enables policy development is evaluated. The protocol gathers information on vulnerability and pending hazard in advance so that early warnings can be declared at sufficient lead time and drought mitigation planning can be implemented at an early stage.
- (c) How can science be translated into policy? Linking science indicators into the actions/interventions that society needs to implement, and evaluating how policy is implemented. Key limitations to planning for drought are the social capacities to implement early warning systems. Vulnerability assessment contributes to identify these limitations and therefore provides crucial information to policy development. Based on the assessment of vulnerability we suggest thresholds for management actions to respond to drought forecasts and link predictive indicators to relevant potential mitigation strategies. Vulnerability assessment is crucial to identify relief, coping and management responses that contribute to a more resilient society.
- (d) How can society benefit from the forecast? Evaluating how information is provided to potentially affected groups, and how mitigation strategies can be taken in response.

This paper presents an outline of the protocol that was developed in the DEWFORA project, outlining the complementary roles of science, policy and societal uptake in effective drought forecasting and warning. A consensus on the need to emphasise the social component of early warning was reached when testing the DEWFORA early warning system protocol among experts from 18 countries.