

Interactive comment on “Exploring drought vulnerability in Africa: an indicator based analysis to inform early warning systems” by G. Naumann et al.

G. Naumann et al.

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Response to Review # 3 of the paper “Exploring drought vulnerability in Africa: an indicator based analysis to inform early warning systems” by G. Naumann et al.

We would like to thank the Reviewer 3 for the positive comments and suggestions to improve the manuscript. The specific comments are addressed in detail below. Please note that the Reviewers’ comments are shown in plain text and authors’ replies are in bold typeface.

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This paper deals with drought vulnerability in Africa. Specifically, the authors have developed a composite drought vulnerability indicator (DVI) that is meant to reflect social vulnerability associated with renewable natural capital, economic capacity, human and civic resources, and infrastructure and technology. The authors examined different weighting schemes and carried out a sensitivity analysis (by removing variables) to measure the degree of uncertainty associated with each component of the indicator. They found that the DVI computed within their theoretical framework components and using proportional weighting gave a robust and unbiased representation of overall vulnerability. A comparison at the country level between the DVI and the drought disaster information shows some disagreement, though they do find generally good agreement between drought vulnerability and the number of people affected by drought. The authors acknowledge some limitations of the DVI including the fact that it does not fully consider social conditions, response of stakeholder groups, market aspects, and there is no consideration of the dynamics of the variables making up the DVI (e.g., the impact of climate change and population growth). While I am not very familiar with the literature on drought vulnerability, this work appears to be an important step in developing a quantitative (and at some level verifiable) measure of drought vulnerability. The ability to dissect the DVI into the individual components appears to be a key strength that facilitates interpretation of the results and should help determine future improvements. My main concern is that the authors have not sufficiently addressed the link between vulnerability and disasters. I believe a discussion of this in terms of the differing characteristics of drought throughout Africa (e.g., length, seasonality, variability) as well as the differing regional climatologies (e.g., the timing and length of the rainy seasons) would help greatly in assessing the usefulness of the DVI, especially for decision-making. As such, I think the authors could also learn much from taking a closer look at why Ghana and Kenya had more than 10 million people affected by drought during 1970-2006, yet were classified as having low vulnerability according to the DVI.

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The two exceptions to this agreement are Ghana and Kenya where more than 10.000.000 people have been reported as affected by drought during the 1970-2006 periods but are classified as low vulnerable. In the case of Ghana, according to the EM-DAT disaster list there is only one major event in 1983-1985 that caused 12500000 people affected by droughts. During 1983 a severe drought and bush fires resulted in a grim famine in the country. The situation was worsened by political internal instability and the expulsion from Nigeria of about 1.5 millions of migrants, mostly of them from West African countries including Ghana. The fact that the DVI computed here uses data from around year 2000 (including the refugees and displaced population) can explain the relatively low value of DVI for Ghana. In the case of Kenya, this disagreement could be due to the fact that, as shown in the pixel and sub-basin level analysis (see Figure 2), there are pixels with high renewable natural component of vulnerability to drought and others that have a low vulnerability to drought. When computing the DVI with national level statistics there might be a generalization of the statistics that lead to a relatively low drought vulnerability when considering the whole country at once.

Other:

Page 12220 lines 26-27: “where all climate scenarios project further water limitations” - should include a reference to back that up.

A reference was added in the text to support the statement (Christensen et al., 2007)

Last sentence in abstract: not sure that such a statement (whether or not it is a valuable contribution) is appropriate here - would suggest removing or rewording.

We have changed the sentence as follows: “These results are expected to contribute to the discussion on how to assess drought vulnerability and should hopefully contribute to the development of drought early warning systems in

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Africa.”

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 12217, 2013.

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