

Nat. Hazards Earth Syst. Sci. Discuss., referee comment RC1  
<https://doi.org/10.5194/nhess-2022-174-RC1>, 2022  
© Author(s) 2022. This work is distributed under  
the Creative Commons Attribution 4.0 License.

## **Comment on nhess-2022-174**

Anonymous Referee #1

---

Referee comment on "Analyzing the informative value of alternative hazard indicators for monitoring drought risk for human water supply and river ecosystems at the global scale" by Claudia Herbert and Petra Döll, Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2022-174-RC1>, 2022

---

### **Review on "Analyzing the informative value of alternative hazard indicators for monitoring drought risk for human water supply and river ecosystems at the global scale"**

In this paper the authors present an approach for the selection and calculation of streamflow drought hazard indicators for monitoring human surface water supply and for river ecosystems. In doing so, the authors discuss and propose to consider the habituation of people and ecosystems to the streamflow regime. For this purpose, eight existing drought indicators are compared and quantified and three new ones are proposed based on the global hydrological model WaterGAP2.2d.

This article has positive aspects, in particular the effort in modelling that the authors have made is remarkable, however it needs to be reviewed thoroughly as there are several points that need to be clarified and addressed by the authors. In short, the article has potential, but the authors need to make an effort to focus the analysis and make a readable manuscript. I hope that the comments below will help in this direction.

#### **Structure of the article**

First, the structure of the paper could be improved. It is very long, repetitive in some aspects, lacking clarity on the objectives and results, that should be better highlighted both in the description and conclusions sections.

Similarly, the order of the sections does not follow a story, some sections could be shortened, removed, or moved to increase the readability. This structure surely makes it

very difficult to read. For example, the introduction should be significantly shortened to focus on the description relevant to the objectives of this work. Section 3.4 should be moved into the methodologies section. In addition, there is an annex that includes only one figure that is quite relevant. I suggest including it in the main text, if the number of figures is an editorial requirement I suggest removing some other figures (e.g. Figure 9).

The methodology can also be reduced, focusing on the description of the proposed new indicators and model validation. In addition, some aspects should be clarified, e.g., eq(1) for SPI, X is noted as a generic variable, if this variable is precipitation this representation could be misleading.

### **Focus of the manuscript and sectoral risk representation**

The authors indicate that the focus of the article is on analysing indicators for monitoring drought risk in very specific sectors (human water supply and river ecosystems). I agree that the selection of the hazard indicator is key to determine this dimension of drought risk and the discussion on that direction is more than welcome and needed. However, apart from referring to these sectors as the focus of the article and several speculative and unsupported assertions, there is no information in this article on how drought specific indicators affect these sectors. The dynamics of how these sectors or systems are affected is surely complex, depending on various factors that determine their exposure and vulnerability beyond whether they rely on upstream reservoirs or the systems are seasonally dependent. However, this is not enough to characterize the vulnerability of these sectors. Further discussion and analysis in this regard is needed.

On the one hand, considering the way the article is structured, orienting the analysis in the description and comparison between indicators, derived metrics, etc. in a concise and targeted manner can improve the focus and structure of the article. On the other hand, to strictly evaluate whether the proposed indicators are valid to represent risk, a more detailed analysis of the proposed sectors is needed, with a description of their vulnerabilities and how their impacts are produced as a consequence of the combination of the different dimensions of risk.

### **Grid cells – case study selection and description**

The selection of the two grid cells seems to be motivated by characteristics derived from some of the modelled variables. However, no description of these sites exists in the manuscript. A quick search turns up that one gridcell is in central eastern Paraguay (perhaps including a portion of the Paraguay river) and the second near Firenze (Arno). Both points with very different realities regarding how they might be exposed and how they are vulnerable to droughts and surely each will have a very specific risk profile. Here I see a missed opportunity, as one of the objectives of this paper is to find out how the exposed systems can be used. Surely, a discussion along these lines would greatly improve the discussion on the usefulness of the various indicators. Indeed, the

comparison between indicators is merely informative, which does not enable identification or validation between them (Please refer to my final comment)  
Similarly, March 2002 has been used to describe Figures 3 and 4. But it is not clear why this period was chosen or how this comparison can be extrapolated to the whole period.

### **Comparison not validation**

As proposed in this article, the fundamental purpose of any drought indicator is to represent the sectoral impacts in the best possible way. Indeed, the validation of the best indicator should be consistent in how it represent sectoral impacts. In this sense, it is perfectly legitimate to compare indicators, but it is not possible to validate or rank one over another without looking at independent variables that represent potential impacts. Please elaborate further on this issue