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## Comment on nhess-2021-276

Anonymous Referee #1

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Referee comment on "Lessons from the 2018–2019 European droughts: a collective need for unifying drought risk management" by Veit Blauhut et al., Nat. Hazards Earth Syst. Sci. Discuss., <https://doi.org/10.5194/nhess-2021-276-RC1>, 2021

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nhess-2021-276 (review) - Veit Blauhut et al. (2021) Lessons from the 2018-2019 European droughts: A collective need for unifying drought risk management

### General comments

This paper evaluates how drought management strategies influence the impact of drought events, based on a survey with respondents from 28 European countries. It was found that there is a high heterogeneity in perception, values and management styles in different countries. The authors ask for an improvement in EU policies regarding drought, maybe by creating a new drought directive, in order to improve national drought management.

The EU does not have a drought directive and the current tools, such as the "European Commission's Communication on water scarcity and drought" and the "Blueprint to Safeguard Europe's Water Resources" seem not to be enough, as there is not enough EU level drought. Drought is mostly managed at the country level, often with indirect regulations (not explicit drought regulations) and in the case of transboundary basins, the uncoordinated actions of countries can increase conflicts with downstream countries.

The article focuses on the 2018 and 2019 droughts. The first one affected north-central and north-eastern countries of Europe, and the 2019 affected the central European countries that were still recovering from the previous year's drought.

The relationship between drought management, perception and impacts is limited. There is some evidence that drought management plans decrease vulnerability, but they might

also increase reporting, as they increase perception. Thus, an increase in drought impacts might be due, in part, to the implementation of these plans, which increase drought reporting.

The study assesses how monitored drought-hazard severity (as monitored by the European Drought Observatory) relates to drought perception and drought management strategies. The hypothesis is that national awareness and drought management strategies influence drought perceptions more than drought severity. The author's try to answer this question using a survey targeting water managers.

There is a very large heterogeneity in how countries declare drought situations. Also, the expectation on the impacts of climate change, has no relationship to how this is considered in policies. However, there is some link to climate, respondents from non-European countries see less need to increase regulation to prepare for climate change.

Most countries, according to the responses of the participants, don't have drought management plans. There are more countries with drought management or emergency action plans in the West than in the East, and the reason not to have these plans are insufficient resources and a lack of perception of risk. However, the causes for not having such legislation vary across Europe, with difference between different clusters of countries (east, west, north, etc.).

The 2018 drought influenced on how the 2019 drought was managed and perceived, as for the second event, they were faster to recognize the situation and act accordingly.

The results of the survey are very heterogeneous, due to different factors. First, that the pedo-climate and socio-economic conditions of different countries are very different. Second, droughts are never pan-European, they always affect different regions differently, in this case, the Mediterranean was much less affected than Central, Northern and Eastern Europe. I wonder also about the representativity of the survey, does it represent well all relevant sectors in all countries?

In general, the hazard severity perceived by the surveyed stakeholders corresponded well with the hazard severity monitored by the EDO, which is good news. The discrepancies can be due to sectorial differences, scale differences between impact indicator and affected sector and also to the pertinence of a standardized index to represent potential impacts.

Concerning standardized indices, the article has a very good discussion on the topic, which states that "drought indices may not be appropriate to predict impacts and consequences for management of hydrological or agricultural (soil moisture) droughts". Later it says "an effective implementation of macro-regional drought risk management requires a more

holistic interdisciplinary view".

The situation of each country, in terms of drought management, depends on the impacts and frequency of drought in this country. There is a strong memory effect too, so recent droughts incentivize the development of measures.

In page 13 there is a discussion on the effects and needs of a EU-level drought directive. It is unclear if this discussion is derived from the survey, or it is the opinion of the authors. This should be clarified.

The study concludes that some EU countries don't consider drought as a risk, that the perception of the hazard matches the severity, but the impacts don't, which means that there is further complexity linking hazard and impacts, drought awareness and drought management are not linked, there is a large variability between countries in how they legislate and manage drought. The study recommends a more unified drought legislation within the EU.

I believe this paper is an important contribution to the debate of drought policies within Europe and should be published, provided that some minor revisions are applied.

### **Specific comments**

Maybe the data on the most important water resources by country can be organized in more homogeneous and clear categories:

- Figures 2b and 2c show that there is no data on the most important water resource in Spain. This seems strange to me, as there are between 10 and 25 respondents in this country. Then, I have seen in the text that "this question was adapted to national specificities and resulted in #1 regulated surface water and #2 groundwater". It seems to me that "regulated surface water" is mainly "Surface Water from Dams", so it could go into this category. I think this can be improved for greater clarity.
- In two countries, artificial groundwater recharge (Figure 2b) is the main source of water, but the artificially recharged water comes from somewhere. Does it come from the river? Does it come from water treatment plants? My question is, is artificial groundwater recharge a water resource, or it is a method to distribute the resource? Also, I don't understand why individual wells are not included in the same category as groundwater.

So, it seems to me that:

- The number of categories can be reduced (groundwater and individual wells).
- The Spanish categories can be assigned to the same categories as the rest of Europe.
- Clarify what "Artificial recharge" means in this context, because the water injected must come from some other resource.

Concerning the indices by country, the text says (Page 8, 243): "About 40% of all participants did not have an operational drought definition in their municipality or company, and a further 15% did not know whether there was one". I'm surprised by the words "municipality" and "company". What kind of managers were these? Are these workers from municipal water supply? What about water managers at the regional, basin and national levels? They don't work for municipalities, nor companies, they work for governmental institutions.

The results are very heterogeneous, due to a lot of reasons. I wonder if the results are also different between countries due to biases in the different kinds of participants in each country. Maybe in one country the respondents are more biased towards water managers, in others toward water supply utilities, etc. I would like to see a table or chart that shows the kinds of participant per country.

The discussion in the last paragraph of page 11 and first paragraph of page 12 is very good. Earlier in the article it is said that, in Spain, one of the countries which has a more developed drought policy, each basin has defined its own drought and water scarcity indices, which are defined according to local needs. I would like to know if this is the kind of holistic approach the authors have in mind or if they are thinking on a different approach. I think this is the conundrum to solve if we want to have an EU-scale drought policy that makes sense and which the users trust. Maybe the authors could comment on this. But I would understand if they want to be more diplomatic and want to avoid comparing the policies of different countries.

It must be made more clear if the discussion about an EU drought directive found in page 13 reflects the opinions of the survey respondents or the author's. For example, and this is just an example, it is said "However, not all countries fully share this view", based on what? How did the authors arrive to that conclusions. So, I'm not sure if this rather interesting discussion belongs to this paper or to an opinion piece. Author's should edit this section to make more clear on what basis they affirm what they affirm and how the survey shaped these statements.

## **Technical corrections**

Figure 2.a would be easier to read if it was in color, instead of grayscale.