

This is my first review of the manuscript “**The 2022 Drought Needs to be a Turning Point for European Drought Risk Management**” by Riccardo Biella et al.

The paper addresses the increasing threat of drought across Europe, focusing in particular on the extreme 2022 event. The authors present a comprehensive analysis based on a large-scale survey of 481 water managers from 30 European countries, linking these responses with climate data to evaluate current drought risk management strategies. They find that responses remain largely reactive, with limited long-term or systemic planning, and advocate for a shift toward more proactive, integrated governance. Central to their argument is the call for a European Drought Directive, modeled after the existing Flood Directive, to harmonize risk management across the EU.

The manuscript is overall well written and provides timely, valuable insights into drought governance. While some of the findings—such as the reactive nature of current responses—may be expected, the strength of this paper lies in its empirical demonstration of these trends across a broad and diverse sample of practitioners. I believe the paper makes a significant contribution and is well suited for publication in this journal. However, I outline below several technical and methodological aspects that could be improved to enhance the manuscript’s clarity, precision, and overall impact.

1. While the paper is overall informative and timely, I noticed **variability in the writing quality across sections**. Some parts are written in a highly polished and engaging style, while others would benefit from improved clarity, cohesion, and editorial refinement. This is understandable given the likely multi-author contributions, but I recommend a more thorough language review to ensure consistency throughout. Additionally, the manuscript is quite long and could benefit from tightening in structure and expression. Some sections—particularly methodological details or extensive contextual framing—could be more concise without sacrificing content. This would make the article more accessible and directive, improving its impact for both academic and policy audiences.
2. I recommend that the authors define **key terms** such as “drought risk” and “drought impact” etc.. early in the manuscript, preferably in the introduction (now reported after lines 240). These concepts are key to the study, yet their definitions and distinctions are currently scattered. A clear, upfront definition would improve readability and conceptual clarity, especially for interdisciplinary readers or those less familiar with drought governance literature.

3. I suggest including a summary **table** that outlines the key features of the EU-level directives and communications discussed in the paper—particularly the Water Framework Directive, the 2007 and 2012 EC Communications on Drought, and the Floods Directive. Such a table could include information on the directive's purpose, legal status (binding or not), scope (e.g. drought-specific or general water management), and its relevance or gaps in addressing drought risk. This would enhance clarity and reinforce the paper's argument for a dedicated Drought Directive.
4. In **Section 2.1** ("Climate data"), I suggest renaming the section to "Climate Data and Drought Assessment", as its current content focuses more on the definition and methodological framework of drought (e.g., SPEI, PET) than a traditional climate dataset description. This would better align reader expectations with the content presented.

Furthermore, I recommend the authors:

- Be more precise in the definition of drought. For example, include higher-than-normal temperatures alongside "abnormally low precipitation" to reflect common definitions and emphasize the role of temperature in increasing evapotranspiration (see line 211).
- Include a threshold-based definition (e.g.,  $\text{SPEI} < -1$  for moderate drought) to help readers understand how drought severity is categorized.
- Explicitly describe the CRU dataset used (temporal/spatial resolution, variables).
- Justify the choice of the 1971-2000 reference period, especially in light of more recent climatological baselines.
- List and cite the sources of additional variables (e.g., wind speed, radiation) used to compute PET with the Penman-Monteith method.

I acknowledge these might seem like technical details, but given that the paper targets a broad audience, including policy and decision-makers, being transparent and precise in this section is essential for replicability, credibility, and comprehension.

## **5. Some methodological aspects**

At line 270, the authors acknowledge limitations due to uneven national responses, and thus restrict country-level analyses to those with more than 10 responses. However, this raises a broader concern: why is the analysis so heavily centered on countries, when drought is a transboundary risk that does not align with political borders?

I am not asking here to redo the analysis but I would encourage the authors to clarify the rationale for presenting both country-level and a large number of regional breakdowns—especially when many of these regions are effectively synonymous with a single country (e.g., SE = Greece + Cyprus). This risks redundancy and may obscure rather than illuminate regional trends. For me a simplified and more meaningful regional classification, such as Northern vs. Southern Europe, or humid vs. drought-prone zones, which would better reflect climatic, hydrological, and socio-institutional differences in drought exposure and response and improve readability and interpretability of the results as well as align better with the paper’s framing of drought as a pan-European, systemic issue.

6. **Line 304-305:** the sentence is not clear.
7. **Line 320.** I suggest to cite here rather than at lines 79: *Avanzi, F., Munerol, F., Milelli, M., Gabellani, S., Massari, C., Girotto, M., ... & Ferraris, L. (2024). Winter snow deficit was a harbinger of summer 2022 socio-hydrologic drought in the Po Basin, Italy. Communications Earth & Environment, 5(1), 64.* This paper provides evidence that align well with the narrative in this part, especially regarding the role of snowpack as a hydrological buffer and its failure during the 2022 drought with its sociohydrological consequences.
8. **Lines 341:** the sentence is not clear.
9. **Section 3.4:** The paper includes detailed “regional spotlight” case studies on Italy and Catalonia, which are both valuable and illustrative. However, I recommend the authors explicitly clarify the criteria used to select these two regions for deeper analysis. Were they chosen due to data availability, impact severity, institutional diversity, or exemplary practices? Without this clarification, it may appear arbitrary, especially given that other regions also experienced significant drought impacts. Additionally, a brief mention of how these cases contrast with or represent broader patterns seen in the survey would help locate them more clearly within the Europe-wide analysis.
10. In **line 731**, the authors mention that disparities in drought risk management capacity are likely influenced by factors such as resource availability and drought awareness. I think it is important also acknowledging the role of governance systems, specifically the level of decentralization or federalism in water management. Countries with federal or devolved systems (e.g., Germany, Spain) may have highly region-specific approaches and coordination challenges, which can affect both preparedness and response. This for example what

happens in Italy in 2022. This institutional diversity is an important dimension of drought governance and could help explain some of the observed regional disparities.

11. **Figure 6** is visually dense and somewhat difficult to interpret effectively, especially given the number of countries, sectors, and metrics (impact severity and prioritization) displayed at once. I suggest the authors consider simplifying the figure, perhaps by initially presenting only panel (a) (impact severity), which already conveys the core message of regional differences quite well. Additional detail on prioritization could then be discussed in-text or moved to supplementary material if needed. Additionally, this figure highlights the challenges of the regional aggregation strategy. For example, in the SE region, Agriculture and Livestock appears as impact level 4 overall, but most individual countries in the group report level 5. Is this due to response imbalance (e.g., a high number of responses from Turkey relative to others)?

Based on the strengths of the manuscript and the relevance of its contributions, I recommend **acceptance after minor revisions**.

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