

**Discussion of “Perceptual models of uncertainty for socio-hydrological systems  
a flood risk change example”\***

Ertsen, Maurits W.

**DOI**

[10.1080/02626667.2018.1547504](https://doi.org/10.1080/02626667.2018.1547504)

**Publication date**

2018

**Document Version**

Final published version

**Published in**

Hydrological Sciences Journal

**Citation (APA)**

Ertsen, M. W. (2018). Discussion of “Perceptual models of uncertainty for socio-hydrological systems: a flood risk change example” *Hydrological Sciences Journal*, 63(13-14).  
<https://doi.org/10.1080/02626667.2018.1547504>

**Important note**

To cite this publication, please use the final published version (if applicable).  
Please check the document version above.

**Copyright**

Other than for strictly personal use, it is not permitted to download, forward or distribute the text or part of it, without the consent of the author(s) and/or copyright holder(s), unless the work is under an open content license such as Creative Commons.

**Takedown policy**

Please contact us and provide details if you believe this document breaches copyrights.  
We will remove access to the work immediately and investigate your claim.



## Discussion of “Perceptual models of uncertainty for socio-hydrological systems: a flood risk change example”

Maurits W. Ertsen

To cite this article: Maurits W. Ertsen (2018) Discussion of “Perceptual models of uncertainty for socio-hydrological systems: a flood risk change example”, Hydrological Sciences Journal, 63:13-14, 1998-2000, DOI: [10.1080/02626667.2018.1547504](https://doi.org/10.1080/02626667.2018.1547504)

To link to this article: <https://doi.org/10.1080/02626667.2018.1547504>



Published online: 03 Dec 2018.



Submit your article to this journal [↗](#)



Article views: 306



View related articles [↗](#)



View Crossmark data [↗](#)



Citing articles: 1 View citing articles [↗](#)



DISCUSSION



## Discussion of “Perceptual models of uncertainty for socio-hydrological systems: a flood risk change example”\*

Maurits W. Ertsen

Water Resources Department, Delft University of Technology, Delft, The Netherlands

### ABSTRACT

Dealing with uncertainty is key in socio-hydrological analysis. As such, thinking through what uncertainties mean for whom and when is key. This discussion contribution introduces three issues related to defining uncertainties. The first issue deals with the problem of defining uncertainty as a given external reality. The second issue deals with who decides about relevant uncertainties. The third issue deals with the issue whether coupled human-hydrological systems can be seen as existing on their own. Finally, the text provides two examples of hydrological research that try to be explicit about our dealing with multiple (interpretations of) realities.

### ARTICLE HISTORY

Received 30 March 2018  
Accepted 13 September 2018

### EDITOR

A. Castellarin

### ASSOCIATE EDITOR

H. Kreibich

### KEYWORDS

uncertainty; socio-hydrology;  
hydrological models

Socio-hydrology is a field still aiming to define itself. Several scholars in this emerging field propose that socio-hydrology entails a new science that combines physical and social sciences. As I think that combining the physical and the social may be new within hydrology, but not in long-existing fields like complexity sciences or archaeology, I would defend a different view on socio-hydrology. For me, the main – and highly exciting – idea of socio-hydrology is that hydrology should move to emerging models of water flows, with parametrizations that update themselves in part because of human agency. In this view, socio-hydrology would not relate humans to hydrology, but incorporate effects of human interventions in the models.

Attempts to deal with (different types of) uncertainty in hydrological analysis – whether with humans or not – would benefit from a well-thought approach to what uncertainties mean for whom and when. Therefore, the paper by Westerberg and colleagues (Westerberg *et al.* 2017) addresses an issue of high relevance for the socio-hydrological field. Actually, because of the framing within socio-hydrology, the paper opens up new debates on an old term: uncertainty.

The many questions that the authors pose in their Table 1 (Westerberg *et al.* 2017) are indeed important. Defining what we know less, or know differently, would quite often not only pose constraints on our

certainties, but also allow additional insights into what we wanted to understand in the first place. Confronting different approaches and ideas on what is discussed – either between hydrologists themselves, as discussed by Pramana and Ertsen (2016), or between government and stakeholders, as discussed by Poolman (2011) – typically helps shaping to clarify where the shared understanding actually would be, what different ideas would be and how these matter.

Therefore, let it be clear that I welcome this direction in the debate on uncertainty. I appreciate the systematic identification of relations and narratives on uncertainty. Nevertheless, there are three related points I would like to address. After introducing these three issues, I will elaborate on why I think this is a problematic position and offer two examples from my own work to show how I try to deal with those issues.

- (1) The first issue deals with the framing of the three sets of questions in Table 1 (Westerberg *et al.* 2017, p. 1707). Even though the “*framing of the research problem*” is explicitly asked for in the first set of questions that “*identify uncertainty*” and the “*relative importance of the different uncertainty sources [...] from the perspective of different scientists and stakeholders*” enters the debate in the

**CONTACT** Maurits W. Ertsen ✉ [m.w.ertsen@tudelft.nl](mailto:m.w.ertsen@tudelft.nl)

\*Westerberg, I.K., Di Baldassarre, G., Beven, K.J., Coxon, G., and Krueger, T., 2017. “Perceptual models of uncertainty for socio-hydrological systems: a flood risk change example”, *Hydrological Sciences Journal*, 62 (11), 1705–1713. doi:10.1080/02626667.2017.1356926

third set of questions on “*defining uncertainty*”, the central concept we discuss, “uncertainty” itself, appears to be a neutral entity. We may be able to define uncertainty in different ways, we may even disagree on its relative importance, but the terminology by Westerberg and colleagues suggests that uncertainty is a given external reality that needs identifying and uncovering.

- (2) The second issue deals with the question of decision making on relevant uncertainties. The authors consistently differentiate between “stakeholders” and “scientists”, with stakeholders “*push[ing] certain representations of uncertainty (or neglect[ing] some sources of uncertainty altogether) if this fits their interests*” (Westerberg *et al.* 2017, p. 1711). I am a little uncomfortable with this distinction. It suggests that scientists would not have interests, as much as it suggests that other agents involved would not have knowledge. Latour (2013; see De Vries 2016) suggests that in very different domains – including policy and science – decision-making processes are rather similar, but that the content and, as such, what matters are different. Junier (2017) provides research from the water domain exactly on this issue. She shows that expertise is relative to a specific field and to other actors. Who is a “scientist” or a “stakeholder” is not automatically given.
- (3) The third issue is closely related, as the authors appear to (implicitly) defend a position that coupled human–hydrological systems exist on their own as well. I am not even sure that that idea is unreasonable in itself, but I would like to suggest that thinking along those lines does not really help us. Even when we accept reality to exist, we are still the ones that define it in our daily practices as stakeholder, scientist or parent. That does not entail that all claims on what may count as real are equally valid, but it should mean that we cannot use external nature – or socio-nature for that matter – as the referee for our own claims.

In my own work, I struggle with the same issues. Obviously, my students and I are not continuously breaking our heads on heavy, philosophical issues about truth and representation – even though we might engage with these questions more than the average hydrologist. Nevertheless, we strive to be explicit about our dealing with multiple (interpretations of) realities.

In Pramana and Ertsen (2016), we suggest an approach that can deal with a continuously shifting hydrological

reality. Many small-scale water-related interventions are accompanied by hydrological research, but that research is continuously changed because of changes in the intervention itself. In this particular paper, we propose a systematic planning approach for hydrological research that is based on dealing with possible surprises and actions – to cope with changes – and cost–benefit analysis – to value those changes.

A second example is a project with my PhD student Juan Carlo Intriago, start-up aQysta and colleague Jan Carel Diehl of the TU Delft Industrial Design department. The project aims to define possible applications of so-called Integrated Turbine Pumps in agriculture (<https://www.tudelft.nl/en/ceg/research/stories-of-science/the-self-reliant-irrigation-pump-a-fine-mess/>). Our starting position is that new technology is never used exactly in the way its designers envisaged. This need not be a problem, quite the contrary. Smartphones, originally developed for business people, are now widely used in developing countries. In line with my other example, we aim to compare different regions systematically, in order to unravel the complexities of the whole process while putting the experiences of the users on the ground centre stage.

Apart from being systematic on negotiations of meanings, processes, technologies and hydrology, I am afraid that I have no further solution to offer yet. Not having a solution, however, does not mean that we should not challenge Westerberg and colleagues – and the hydrological community in general – to consider what uncertainty analysis means once we assume that one cannot project the “hydrological” as a “material world” outside of oneself (Latour 2013, p. 98). Based on the idea that we cannot study material entities independently of what human agents do or think, our work is based on two interdependent negotiations. First, hydrology is continuously (re)shaped through interactions – negotiations – by agents of different kinds (soils, water particles, elephants, humans, dams, etc.). Second, in our research we mobilize a selection of those agents in a specific way within a negotiation process between our peers, datasets, models, etc.

Negotiating the meaning of (socio-)nature, for example in hydrology, therefore would not only deal with the negotiations between humans and non-humans that co-shaped the hydrology we aim to clarify, but also the negotiations on how we as scholars in the present choose to study that same hydrology and its associated uncertainties. We may (not) know facts, but those (unknown) facts cannot exist on their own anyway. Meaning is mobilized within different and varied perspectives (see for example the concept of “Fields of

Sense” or “*Sinnfelder*” discussed by Gabriel 2013). As much as “the world” may not exist (as nothing exists on its own), uncertainty may not simply be uncertain – it may not exist. Precisely because of this non-existence of uncertainty in hydrology, water scholars should try to define and capture it as precisely as possible. The paper by Westenberg and colleagues helps the hydrological community in doing exactly that.

### Disclosure statement

No potential conflict of interest was reported by the author.

### References

- De Vries, G., 2016. *Bruno Latour*. Cambridge: Polity Press.
- Gabriel, M., 2013. *Warum es die Welt nicht Gibt*. Berlin: Ullstein Verlag.
- Junier, S., 2017. *Modelling expertise: experts and expertise in the implementation of the Water Framework Directive in the Netherlands*. PhD thesis. Delft university of Technology. doi:10.4233/uuid:eea8a911-f786-4158-a67e-b99663275bf8
- Latour, B., 2013. *An inquiry into modes of existence. An anthropology of the moderns*. Cambridge: Harvard University Press.
- Poolman, M.I., 2011. *Present & future: visualising ideas of water infrastructure design*. PhD thesis. Delft University of Technology, uuid:8fc60786-7473-495c-ad94-577ec6081aae
- Pramana, K.E.R. and Ertsen, M.W., 2016. Towards systematic planning of small-scale hydrological intervention-based research. *Hydrology and Earth System Sciences*, 20, 4093–4115.
- Westerberg, I.K., et al., 2017. Perceptual models of uncertainty for socio-hydrological systems: a flood risk change example. doi:10.1080/02626667.2017.1356926