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Interactive comment on "HESS Opinions: A Planetary Boundary on Freshwater Use is Misleading" *by* Maik Heistermann

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I warmly welcome this opinion paper in HESS and appreciate the courage of Dr Heistermann in voicing these opinions. It must be especially difficult for him, given also that he is surrounded by a large community of fellow scientists doing PB research. I also suspect that Dr Heistermann represents the views of a section of the hydrologic community, admittedly small, who have followed the literature on the subject. A much larger section of the community, however, is either not aware of the PB idea, or is somewhat ambivalent on it, because it does not have any bearing on the work they do.

The author evaluated the concept of the planetary boundary on freshwater use from two perspectives: as a scientific framework that is built on systems theory, and as a guide towards sustainable development and resource management. He argues that

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Discussion paper

the PB on freshwater use fails in both regards. I have to say that I agree with him on both counts.

Having said that, I do believe that the notion of a safe operating safe does make sense at the local or watershed scale, i.e., human freshwater use must not exceed some threshold at the local scale beyond which the environment is irretrievably degraded. However, this threshold limit is different in different places, governed by local climate and hydrology, and the nature of the local human water use (e.g., for drinking water, for food production etc.). Sustainable management requires humans to manage this threshold not only through water conservation (e.g., efficiency of water use), but also through change of the local economies, through exchange of water with neighboring places which may be more well-endowed with water resources, and through trade of commodities produced using the water. Given the heterogeneity, and the nature of these interactions between places, any estimate of the planetary boundary at the small scale cannot simply be aggregated to the global scale: the strong non-linearities make it non-additive, and hence if at all there exists a planetary scale boundary on freshwater use, it is more of an emergent quantity.

Secondly, as the author correctly argues, the PB community has also not demonstrated that once this global threshold is exceeded (if such a thing does exist), something dramatic is going to happen to the Earth system. It is still to be demonstrated using a much more detailed model of the Earth system (e.g., global hydrology model that incorporates heterogeneous human impacts, including real and virtual water transfers at all scales) that the crossing of the threshold will produce a fundament or qualitative transformation of the freshwater crisis (no less than a quantum leap). For example, it must lead to a total breakdown in water security, food shortages, environmental degradation etc. leading to regional or global wars etc. The current definitions of the PB do not go anywhere near this, and I am not in a position to imagine that such an eventuality will come to pass. Please note that if one were to make the same argument for phosphorus (which is currently mined) I can believe it, but not for water.

I also agree with the author, for similar reasons, that accurate quantification of the PB for freshwater use is not going to lead to sustainable water management. However, the same notion applied at the local or watershed scale can indeed lead to sustainable management. The reason is that there is not a world government, nor a world management authority for water resources. Water management is highly devolved (and needs to be) to watershed, regional and national scales. There is a big difference between managing CO2 globally and managing water globally: CO2 in the atmosphere is a constant across the world, and is measurable and so can be easily monitored. Even in this case, we know how hard it has been for governments to agree to do something about managing CO2 and the global warming that results. With water, the problem hits closer to him, and yet global water management is much harder – I would say impossible. Exactly as the author says, it is even dangerous: if I am part of a small community in a corner of China or India, I would not want the management of my local water resources to be controlled by somebody sitting in Washington DC or Geneva. It could be the worst form of colonialism, and bring out the worst of globalization, even if practiced by otherwise well-intentioned people.

My last comment is on the author's call for hydrologists to resist the moves towards imposing the PB idea through instruments of the United Nations. I agree with the author that there is a sense that it is being pushed down our throats. Still I am somewhat ambivalent– I am not sure how to approach this. One can take the attitude the author adopts, which is for the hydrologic community to organize together to resist this move. This is hard, because apart from a small section of the community, most hydrologists are not in tune with this debate. Besides the hydrology community is already divided between pure hydrologists and water resource systems people, sitting in their ivory towers, and so we cannot easily mobilize the community towards something like this.

An alternative approach could be to adopt some of the concepts in PB research that we can live with and do it our own way. Like I said earlier, the concept of the safe operating space for humanity at the small scale does make sense to me, and we can

organize ourselves around this idea, and perform analyses on the factors that govern this safe operating space (climate, culture, socio-economic conditions etc.), and how they change with increasing spatial scale. This is fundamental science and we have a lot of experience dealing with these issues in hydrology. We have an ongoing decadal initiative called, Panta Rhei: Change in Hydrology and Society, spearheaded by the International Association of Hydrological Sciences. Like-minded people could come together to form a grassroots working group to work on this topic: IAHS and Panta Rhei will strongly welcome this. My main request is for the author to indicate how we as a community can organize ourselves and engage in research activities, and leadership that can present another way forward. Just complaining, and writing a few critical commentaries cannot be the solution.

For too long we hydrologists have sat in our ivory towers, and have tended to often forget that we are, in the final analysis, water scientists and, if so, water and humanity cannot be separated. Past isolation from addressing these broader issues have not served us well. The scientific community behind PB are very powerful, well connected at the UN and other global entities. They will do what they will do, they are not necessarily answerable to hydrologists (even if sometimes they speak as if they are hydrologists), yet they are helping to place the water agenda in the top echelons of global diplomacy and governments. If we play our cards well, it might be good for us in the long term. In other words, I would suggest that we adopt the idea that "if you can't beat them, join them". When we do, we should still be true to our science, and only do what is right by our science.

This is a welcome commentary: but commentary is not enough, the author needs to present an alternative way forward

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