

## ***Interactive comment on “HESS Opinions “Urgent water challenges are not sufficiently researched”” by P. van der Zaag et al.***

**P. van der Zaag et al.**

p.vanderzaag@unesco-ihe.org

Received and published: 20 April 2009

We were delighted by the number of responses so far to our essay arguing that urgent water challenges are not sufficiently researched. In fact, the referees (Erik Mostert, Larry Swatuk, François Molle and Murugesu Sivapalan) do not disagree with the general claims we make; and that shows that there must be some element of common consensus on these issues. The referees as well as Wouter Buytaert and Hessel Winsemius make valuable and stimulating suggestions that we want to reflect on in this (interim) response. We have separately reported our detailed responses on the specific comments made by the four referees.

We reflect on the following questions: 1. Why do the biases in the water research agenda exist and persist 2. Are citations in the international peer-reviewed English

C358

language journals a good measure 3. The scarcity of data sets in water science

1. Why do the biases in the water research agenda exist and persist

Several referees observe that our paper fails to satisfactorily answer the why question: why is it that the most urgent water challenges remain under-researched. This is a correct observation. In order to defend our approach we first note that it would be quite presumptuous to claim a full understanding of the scientific status quo, and the underlying dynamics that gave rise to it. But even if we would (claim to) have such knowledge, it is much more interesting and productive to challenge all water scientists to do some self-searching. This is now already creating an interesting discussion in HESSD, and is more likely to have some impact.

The necessity of raising the awareness regarding our research ethos is not only imperative but most beneficial for all of us water scientists. The best course of action in this matter would be self-examination

The why question points at the mechanisms that influence, enable and constrain, the research agenda. These mechanisms include the following: - Academic excellence: Paradigms influence what are considered good and challenging research topics and research questions; and how one can achieve academic success. - Funding: The research agendas are often not set by the envisaged users of the research findings, but rather by peer researchers; so the agenda setting may lack sufficient signals from the real world. - Publishing: the dilemma between scientific impact (citations of my research work) and the societal impact (has my research work influenced and improved the professional practice?). How to measure the latter?

We do not have a final answer how we can change these mechanisms to avoid that they have perverse effects. Debating these openly is already a step in the right direction.

2. Are citations in the international peer-reviewed English language journals a good measure

It is clear that our measure of research output using citation scores has serious limitations.

It could indeed be argued that certain fields of knowledge may exist outside the published international peer-reviewed English language journals, so we will have missed these. But if knowledge on a certain water field mainly exists as grey literature, then it is likely that such a field does not develop fast, as incremental learning will be constrained by the difficulties in accessing, sharing and cross-fertilizing it. We need to get such grey literature into the public domain, so that others can benefit from it, but also so that it is open to public scrutiny.

It may be true that some of the required research would not be innovative enough to be acceptable for certain scientific journals. This is an interesting fact. A research paper that is not conceptually innovative still needs to be scientifically sound. The problem is how to know if the research findings are scientifically sound if it has not gone through some kind of independent peer review process? This points to the need for, and relevance of, applied journals that adhere to rigorous scientific standards but that accept research studies of an applied or descriptive nature.

Another vexing issue related to using citation indices is whether this is a measure that is sound for the purpose of measuring societal (rather than scientific) impact. It most probably is not. The number of citations in international peer reviewed journals does not measure how often that research has been applied in practice and has made a (local) impact in the real world. So we may need to find indicators that supplement the citation scores, to measure the societal impact. A slightly better indicator than the number of citations might be the frequency a paper has been read. With electronic (web-based) subscriptions it is possible to count the number of downloads which may be an easy (but admittedly rough) proxy for the frequency a paper has been read.

Finally some more practical observations on how we used bibliometric information. All referees question our use of a limited bibliometric approach as an indicator of what is

C360

happening. However, it is our twenty years experience in teaching and researching in the water field that provoked us to undertake a quick ISI search to see if there is indeed an imbalance in the focus of science. Since then we have expanded to look at data within Scopus (Gupta and van der Zaag 2009) and are now working towards a comprehensive assessment of the issue. Having said this, we agree with Larry Swatuk that the use of the verb "prove" in our article (p.1414, 6) was inappropriate. We will replace it by the verb "illustrate".

The referees also focus on whether our search words were appropriate. Does sanitation include waste water collection and treatment? Does water supply include agricultural supply creating an obvious bias? Should we have included negotiation and collaboration to the existing search on cooperation? And so on. All of these are valid questions to be taken into account in future more comprehensive assessments but do not still negate our argument that there are biases in scientific research on water.

### 3. The scarcity of data sets in water science

Many hydrologists complain about lack of data. Papers on African river basins are frequently rejected because of "lack of data". This dilemma has been well identified by the comment of Wouter Buytaert, who noted that "New techniques ... are difficult to apply and evaluate in data scarce areas." Let us accept the lack of water data as a reality; and explore what this implies for the research practice. What does this mean for the methodologies we adopt? What can we learn from research programmes such as PUB (prediction in ungauged basins)? How can professionals and decision-makers benefit from some of the new observation technologies? Hessel Winsemius in his comment starts to give some interesting answers. We hope more experts will share their experiences.

By way of conclusion, our general feeling from the responses received so far is that there is less disagreement regarding our conclusions than about whether we have reached these conclusions in a scientifically sound manner and what these conclusions

C361

imply for the future. This we feel is very much in line with the kind of response we expected when we wrote this essay. We were provoked to do so by our perception of biases. We supported this with a bibliometric analysis. The response we have received heightens our conviction that we should continue this exercise to make it into a strong scientifically supported analysis to justify political steps to address this bias in the water sciences.

But the most important is to create space for critical self-reflection and debate. Suggestions how to practically organise this are welcome!

---

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 1411, 2009.