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Hydrology and Earth System Sciences Discussions

Interactive comment on "Water Accounting Plus (WA+) – a water accounting procedure for complex river basins based on satellite measurements" *by* P. Karimi et al.

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Referee Comment should be structured as follows: an initial paragraph or section evaluating the overall quality of the discussion paper ("general comments"), followed by a section addressing individual scientific questions/issues ("specific comments"), and by a compact listing of purely technical corrections at the very end ("technical corrections": typing errors, etc.)

General Comments:

This paper and its companion are important and novel contributions. A clear and well-

documented framework is presented as a basis to improve our understanding of water resources use and management; the approach makes extensive use of satellite information sourcesâĂŤwhich are generally in the public domain and often freely available, which allows significant elements of the analysis to be undertaken independently of access to “ground” information, which in contentious cases is often kept secret. The potential thus exists to facilitate (or force) more open debate about water sharing between countries, regions and sectors.

Specific Comments: 1. In the opening section, reference is made to Molden’s substantial contributions (1997, 1999, 2007), and also to Perry (2007), which was the result of consultations within ICID. The paper suggests that neither provided the basis for intersectoral, basin-scale analysis. I do not believe that is a fair comment. The abstract of the last paper states “Based on the work of various previous writers, an analytical framework and associated terms are proposed to better serve the needs of technical specialists from all water-using sectors, policymakers and planners in achieving more productive use of water...”. It would certainly be fair to say that nobody has tried as hard as the authors of this paper to achieve that goal, but the discussion could better be focussed on what this paper (WA+) adds to the earlier contributions in terms of defining different land classes and types of use.

2. I believe the paper erroneously criticises the UN-SEEAW approach. The issue is that the example presented in SEEAW pays inadequate attention to irrigation, and NO attention to rainfed agriculture, forestry and other water consuming economic activities. That is a flaw in the example, NOT a flaw in the SEEAW accounting process, which I believe is sound on “flow” accounting, but demonstrably inadequate on “stock” accounting. The authors might look at Chapter 10 of the recent Inclusive Wealth Report (http://www.unep.org/pdf/IWR_2012.pdf) for an expansion on these points. In my opinion, the approach presented in WA+ could substantially strengthen the SEEAW approach, and the SEEAW approach similarly provides a well documented way of presenting links to non-agricultural elements of the economy. Since SEEAW is “official”,

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joining it might be better than fighting it.

3. My main criticism of the paper relates to terminology, and I would strongly urge the authors to reconsider, conclude (either following the suggestions below, or not), and then EDIT the report for consistency and the minimal use of alternative terms. Terminological inconsistency and vagueness has plagued water resources discussion for decades. One problem is the confusion of “use” with “consumption”; another is the assumption that an increase in efficiency “saves” water. All this is well documented in the references mentioned in para 1, above. In this paper, the terms “consumption”, “utilisation” and “depletion” are used interchangeably. “Net withdrawal” is also used. Furthermore, “utilisation” is applied both to water and to land.

I recommend

(i) to use CONSUMPTION as the only term that implies conversion of water into water vapour (E, or T); The point is best made using a quote from the second paper: ““Landscape ET” (depletion directly from rainfall) was 344 km3 (69 % of total consumption). “Blue water” depletion (“utilized flow”) was 158 km3 (31 %).” What is gained by calling the same “transaction” in the accounts (liquid water converted to water vapour) by four different terms (ET, depletion, consumption, utilisation)? The reader assumes there must be distinctions, but there are none...

(ii) use DEPLETION to refer to reductions in storage (aquifer or reservoir). I believe most people would distinguish between “consumption” as something funded either by their income, or “depletion” of their savings. The following definitions of depletion are available from Wikipedia (http://en.wikipedia.org/wiki/Depletion) Depletion may refer to: Depletion (accounting), an accounting concept Depletion region, a concept of semiconductor physics Depletion width, a concept of semiconductor physics Grain boundary depletion, a mechanism of corrosion Oil depletion, the declining of oil supply Overdrafting, extracting groundwater beyond the equilibrium yield of an aquifer Ozone depletion, a decline in the total amount of ozone in Earth’s stratosphere]] Resource depletion, the

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exhaustion of raw materials within a region

NONE relates to consumption, so why try to use it that way here?

(iii) Consider carefully whether the distinction between blue water and green water helps or confuses the debate. Hydrolgists, in my experience, do not like the term. Here, what does it add? Is water that evaporates in-situ from a landscape blue or green? Is water that went to a fossil aquifer a thousand years ago blue or green? DOES IT MATTER? Basically in hydrology we have in situ ET (landscape ET as called here); runoff, and infiltration to aquifers. These are clear concepts, and the blue/green distinction adds nothing to them. (iv) Utilisable flow is a tricky concept. It varies as you construct infrastructure, and some "utilisable flow" – floods in the Ganges/Brahmaputra, for example – are certainly not "utilisable" in any realistic perspective.

While I believe these represent significant presentational issues (and recommended revisions), they do not reflect on the underlying science, and I strongly recommend publication.

Technical comments:

I have "marked up" the pdf with many small comments and suggestions. This has been forwarded to the authors and I will upload it here if possible.

Please also note the supplement to this comment:
http://www.hydrol-earth-syst-sci-discuss.net/9/C5696/2012/hessd-9-C5696-2012-supplement.pdf

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 9, 12879, 2012.