Hydrol. Earth Syst. Sci. Discuss., 6, C2052–C2056, 2009
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Hydrology and Earth System Sciences Discussions

Interactive comment on "Consumptive water use associated with food waste: case study of fresh mango in Australia" *by* B. G. Ridoutt et al.

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Received and published: 17 September 2009

This paper gives and interesting new angle on the issue of waste and while the actual case study product (mangoes) is quite small and somewhat benign in the overall picture of food waste, it is still an interesting contribution to the area. The paper is well written and referenced; however I find the underlying tension between two water measurement communities will not be reconciled by this work. I suggest that the final results are highly assumptive and lose critical granularity to water management decision making. In this sense the numbers cited represent not real water, but weighted and assumptive amounts based on unclear criteria. This maybe useful for product life cycles but is not useful to address the water management challenges outlined in the introduction.

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My main reservations with this paper however remain the redefinition of the water footprint concept and the weighting elements more akin and applicable to Life cycle-assessment (and product life cycles) than the water footprint as has been defined previously. The ongoing debate between these two communities (WF and LCA) is failing to reach any agreed boundaries, and this paper blurs them further.

This paper requires clarification and corrections on the below points before being accepted.

P 5087, 14 The sentence, 'That is, there is no verifiable return flow' should be clarified with the previous sentence to explicitly refer to the area where water is consumptively used. In essence there is no verifiable return flow to the place where water is evaporated.

P5087, 22 Green water is described as being derived from rainfall, where the literature more commonly describes green as water in soil moisture. This might require consistency in definition.

P5089, 19 The first reference here is to water footprinting to assess the impact. The WF has explicitly been defined as water volume, with subsequent analysis adding impacts into an impact assessment stage. This is implying the impact must be part of the water footprint, which is contrary to the definition of Hoekstra and Chapagain. Clarification of this sentence as to the intent of the 'new' water footprint technique needs to be spelled out. What are the authors implying here, and how is this different, better, or more relevant to water issues than the last 8 years of water footprint literature? Why is the impact assessment stage of the WF (as defined by Hoekstra) not desirable?

P5089, 23 Yang and Zehnder made this observation (correct at the time) in 2007. Since then there have been numerous studies that have addressed their critique (see Chapagain and Orr, 2009; Aldaya and Hoekstra, 2009) in the sense of going beyond national level study to regional elements. The inference here is that this paper uses data that is not from national data bases, or that might be crude. This is not the case

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as this study relies on national statistics as well. If the inference is that this study uses local climate data, than it should say so, but also recognizing that other studies have also done this.

P5091, 21 The sentence beginning 'In contrast. . .' should clarify in contrast to what. Chapagain and Orr, 2009 rectified this in their study. What is this paper doing that is somehow different in this respect?

P5092, 20-30 Here there is confusion over the VWC of various studies and the VWC of 'products'. To my understanding the green, blue and grey elements of the WF are almost always differentiated, except in advocacy numbers. The inference here on the non-differentiation is confusing, and then goes to set up a 'strawman' of advocacy numbers as opposed to studies of specific crops and places. There is a clear difference between the two, but it is somewhat disingenuous to set up this paper's arguments and new techniques using the advocacy numbers (16,000 litres for kilo of beef) as a critique, as opposed to the outputs or findings, and methodological specifics, of regional studies.

P5093, 1 I find the reference of a 'revised water footprint calculation' as problematic as it redefines the water footprint concept. Here we do not refer to volumes, which distinguish between sorts of water and are explicit in time and space, but rather to a new WF method with in-built impact assessment. Here the argument between two communities seeking to evaluate water volumes and impacts is getting confused. As argued in Milai-Canals et al, 2009, these two communities and approaches should evolve separately and be allowed to assess water impacts in their own way. This approach does not recognize this on-going debate, fails to explain the desirability of incorporation of impacts, fails to recognize impacts work on-going in WF reports and papers (WWF, 2008, WFN, 2009), and perpetuates confusion over the needs of two different measurement communities and the issues, audiences and problems they are trying to address.

P5093, 4 It is not clear how a product may 'contribute to water scarcity', or how this could be evaluated without knowing the other uses of water in that region, the oppor-

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tunity costs, the amount needed for the environment, or what any 'saved' water would be used for (i.e. growing other crops).

P5093, 10 Without re-examination of the methods used here, it is very difficult to evaluate the weighting and assumptions made in the final calculation. Again, this single number weighting may be useful for one measurement community but it may not generate meaningful actions if the numbers are unclear, overly assumptive or biased. There is not way to evaluate this claim here.

P5095, 10 Average numbers used here are in direct opposition to earlier criticisms in this paper of averaged numbers in other WF studies.

P5098, 4-7 Here another reference that production of this good contributed to water scarcity. This is highly assumptive and rather facile from a water management perspective. Next the comparison with weighting factors against products with multiple inputs creates confusion. Are we talking about real water from real rivers and fields, or assumptive and weighted numbers that lack separation of green and blue, location specificity and time scale? These numbers are not applicable to a water decision making framework. In this sense, how is the information generated by this new method useful?

P5099, 4 Reference from 1999 may not be as relevant today, especially after the water issues Australia has dealt with in the last ten years.

P5100, 5-7 The numbers generated by the new method are not easy enough to comprehend in order to make this claim. It is hard to know how to interpret the resulting figures. The method here generates numbers that may give misleading information if not fully understood, recognized for their assumptions and implicit trade-offs, agreed upon weighting factors etc, for this to be the case. In this sense, how would a water footprint assessment of volumes, type of water, spatial and time considerations tell you less? Or arrive at the general conclusions of improved efficiency in irrigation as a response? This analysis would be helpful, while also comparing with WF impact

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assessment methods and would add greatly to the debate over ways forward.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5085, 2009.