

## ***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: 24 July 2009

This is a relevant and useful paper that extends the debate about food consumption and its impacts on the natural environment through the application of water footprinting methodologies to an interesting case study. The issue of food waste and its implications for water resources has not been dealt with before at this level of detail and the paper provides a methodological basis for similar studies in other places and for different food products.

However, I have a few comments over the methodology employed to calculate the virtual water content of mangoes.

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In relation to the green water, the method equates green water use to “effective rainfall”. The methodology states that the CROPWAT software was used to estimate effective rainfall, however, CROPWAT has several options for effective rainfall estimation. Customarily, the USDA (1969) method has been used for water footprinting studies and if this is the case, it should be cited.

I would argue that the USDA method is very crude, and being based on only 22 experimental stations in the US may not be the best method to use. The USDA method does not account for local characteristics of storm intensity, number of rain days, soil or slope conditions. Effective rainfall is also influenced by irrigation. Under supplementary irrigation, un-irrigated crops have a higher effective rainfall (and hence higher green water use) compared to irrigated crops, as some of the irrigation water is used to maintain soil water conditions during dry spells resulting from irregularities in precipitation, rather than absolute water shortage. The authors point out the value of using local met data and a more locally relevant estimate of green water use would have been useful.

The blue water (supplementary irrigation) use has been estimated from government irrigation surveys. It is not made clear if this data refer to net or gross irrigation water use. It is a moot point whether the gross or net irrigation should be used in the water footprint calculation, and I would argue, it depends on the local context of abstraction. What is usually reported in irrigation surveys is the volume of water abstracted from the source, yet the definition of blue water use that is widely used is the volume of water consumed in ET. In the same way that non-effective rainfall does not contribute to the green water, irrigation “losses” do not contribute to the blue water. We are not told what systems are used to irrigate mangoes in Australia, but we would assume that these are quite efficient and that losses would be relatively low however, some elaboration of these issues would be of value to the paper.

Although it makes very minor difference to the results or conclusions, the methodology used to estimate land use impacts on blue water resources is inconsistent. The pro-

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portion of precipitation “consumed” by mangoes has been estimated from the effective rainfall (CROPWAT) whereas that from forest has been assumed to be equivalent to ET (Zhang et al.). Whilst the approaches of both methods are similar, they are not the same. Why did the authors not estimate effective rainfall under forest from the USDA method as they did for mangoes? There may have been good reasons for this and, if so, they should be elaborated.

The paper is very well written and readable. Some (very) minor corrections would be advised.

5095 – line 3 states “As expected, the mango orchards intercepted less precipitation than the forested ecosystems they replaced.” The use of the term “intercepted” is misleading here. What is referred to as “intercepted” water is effective rainfall or ET for mango and forest respectively. This is in conflict with the usual hydrological definition of “interception” which usually means precipitation that held on the canopy.

5109 – table 3. Similarly, the use of the term “loss” in table 3 is confusing. This is simply the green water use expressed as a percentage of precipitation.

5095 – line 11. The proportions of green and blue water quoted here are slightly different to those in table 4.

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

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