

Interactive comment on “Shallow groundwater in sub-Saharan Africa: neglected opportunity for sustainable intensification of small-scale agriculture?” by J. Gowing et al.

Anonymous Referee #2

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I agree with ‘Anonymous Referee #1’ that the paper makes a good case for the potential of sustainable shallow groundwater use for small-scale irrigated agriculture in sub-Saharan Africa. However the paper would be improved by extending the case beyond the study site cited. There is a very large body of work by the National University’s, CGIAR centres, and NARs throughout SSA on Ag-water options and potential, including shallow GW. Some of this is referenced (de Fraiture/Pavelic/MacDonald) but as much of this work remains in local journals and grey literature/national level reports, I do feel that it is important to bring the ‘Northern’ literature up-to-date on the issue. I also agree with the referee that the paper is not particularly innovative in methods or approach, but I recommend that the paper should be accepted by HESS with consid-

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eration of the following points:

- With regard to recharge and groundwater potential and sustainability in Ethiopia, the study should consider the work of Steenhuis et al / Cornell-Barhidar University teams, on rainfall-runoff in the Ethiopian highlands. (e.g. line 474?)
- The paper should draw more on other case studies regionally, to scale-out their own findings and explore the potential of shallow-GW beyond the one sub-catchment studied.
- There is no/very limited discussion of the cultural / non-technical limitations to the expansion of more formalized shallow-GW development in Ethiopia. Lack of secure tenure and farm size remain a major limitation to any improvement / investment in infrastructure (line 562 mentions typical farm size – it could be useful to indicate that this is often less than 1ha). There is a tradition of GW use for domestic use (over 70% of the population use GW for domestic use – see Macalister/Pavelic in Awulachew et al, 2012), including springs used widely for drinking water and even bottling (see Ambo in ET highlands), and for livestock watering (the famous Borena in the south) but irrigation is typically low intensity and localized. The study did provide a very good example of community engagement and this could be made much more of.
- There is mention of the potential for drip irrigation which has had limited success in SSA outside of large commercial horticulture (including the Foreign Direct Investment projects in the Ethiopian Rift Valley) and low efficiency surface methods still dominate. Any recommendation of more efficient methods, where likely supply rates are low, should also give consideration to the capacity/skill to source and maintain equipment. Certainly in the past, there was a shortage of functional drilling rigs in addition to affordable pumps (cost of pumps is mentioned). And though this is likely to change with the proliferation of more affordable Chinese equipment, there is still a skill/capacity and institutional support gap to be filled to maintain such equipment. Without digressing from the topic too much there is a large body of work on the success and failure factors

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of drip irrigation in SSA (eg. Garb and Friedlander), even very recent (2016 – Yami / Venot / Amjath).

- Given the low capacity of manual/draft powered irrigation (where pumps remain a limitation), and that small-holder production in the ET highlands is predominately rain-fed, one recommendation could be that shallow well irrigation could be introduced as supplementary irrigation during dry spells, which are a major threat that is growing more frequent and severe in the changing climate.

- Line 537 mentions the potential for a small irrigation revolution in ET/SSA as a means to poverty reduction through cash crop production, drawing comparison to the Asian experience. Caution should be used when applying an Asian model to agricultural markets in SSA, particularly with poorly connected Ethiopian small holders. Access to market and value chain development is a major constraint on any cash crop potential, and there are many longstanding development projects with volumes of research that highlight this issue (e.g. the ILRI Improving Productivity and Market Success of Ethiopian Farmers program). Mention of cash crop potential should necessarily also refer to these constraints.

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