

Interactive comment on “Effects of a deep rooted crop and soil amended with charcoal on spatial and temporal runoff patterns in a degrading tropical highland watershed” by H.K.

Bayabil et al.

H.K. Bayabil et al.
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General comments

Please consider the suggested amendments and revise the paper. Thereafter, we should be in a position to accept it for publication.

Response

Dear Prof. Graham Jewitt,

We would like to thank you for your efforts and taking the time to review our paper. We have addressed all the suggested amendments and revised the paper. We have also referred additional studies from West and South Africa that deal with similar issues. Our response to specific comments is included below in blue and new added text or modifications are in blue in the manuscript itself. For clarity we did not include the text taken out.

With regards,

Haimanote K. Bayabil and Tammo S. Steenhuis

Specific comments

I know that “charcoal amendment” is quite well understood in soil or biochemistry literature, but for HESS, I think you should be a bit clearer e.g. is a better title Effects of soil amendment with charcoal - it is the soil not the charcoal that is amended. Please consider this

We modified the title and reads as:

Effects of a deep rooted crop and soil amended with charcoal on spatial and temporal runoff patterns in a degrading tropical highland watershed

Page 1, line 20. Change “charcoal amendment” to “charcoal amendment of soil”
Suggested change has been made

Page 1, line 25. Change “was” to “were” (to be consistent with your use above)
Suggested change has been made

Page 2, line 3. change “Especially” to “In particular”
Suggested change has been made

Page 2, line 12. Change “their placements” with “their optimal placement”
Suggested change has been made

Page 3, line 19. who (and link with previous paragraph)
Suggested comment has been addressed

Page 3, line 21. of the Debra Mawi?
No, Chemoga watershed

Page 3, line 27. do you mean and lower percolation to the sub soils?
Yes, we have changed the wording to “lower percolation to the sub soils”

Page 4, line 17. Change “charcoal amendments” to “charcoal soil amendments”
Suggested change has been made

Page 4, line 23. Change “do not exist to our knowledge” to “to our knowledge, does not exist”
Suggested change has been made

Page 5, line 18. Change “m” to “m.a.s.l”
Suggested change has been made

Page 6, lines 15-17. This needs to be better explained. Based on what is described and shown in the figures, I don't think that you can claim that this is a true factorial design. What you seem to have is a factorial design if you consider all plots i.e. Figure 1, but it's certainly not truly factorial at every landscape position.

We agree and we have modified this sections and reads as:
A randomized block experimental design type using transects as blocking factors was used during installation of plots, with the effect of charcoal and a deep-rooting crop assessed at every landscape position.

Page 6, lines 18-19. Add “at each landscape position (Figure 1)”
Suggested phrase was added

Page 7, line 22. So its mixed in - not just placed on the surface
Yes, charcoal was manually mixed with the top 20 cm soil and this is reflected in the manuscript.

Page 8, line 8. Change “belowground” to “below ground”
Suggested change has been made

Page 8, line 9. Change “aboveground” to “above ground”
Suggested change has been made

Page 8, line 19. Change “station in” to “station situated in”
Suggested change has been made

Page 9, line 3. From here i.e. the section below, you change from passive to active voice i.e. “we obtained” whereas above.g. “was measured”. The abstract also mixes active and passive voice -

so above, it's not clear who the investigator is. I think it would be better to be consistent in these sections

We have addressed the issue and we use "active voice" throughout the manuscript

Page 10, line 21. resolve the issue - the events can't be solved!

Suggested change has been made and "did not solve these high runoff events" was changed to "did not resolve the issue"

Page 11, line 15. Is this the original reference for Eqn 2? - I don't think so. This equation does not actually appear in Steenhuis 1995.

We agree that Steenhuis 1995 is not the original reference for Eq. 2, and the original reference (Rallison, R.E., 1980) is cited.

Page 11, line 16. Change "-0.8S" to "+0.8S"

Suggested change has been made

Page 13, lines 1-2. So is the final argument that this is a function of high spatial rainfall variability and that rainfall at the plot is much higher than the gauge for these cases?

Our argument here is one rain gauge located at the outlet did not catch the spatial variability of the rainfall in the watershed, which in turn resulted in higher runoff coefficient for the runoff plots.

Page 14, line 1. Change "base flow" to "baseflow"

Suggested change has been made

Page 14, line 3.?

"the runoff from the hillsides infiltrates to lower slope position as interflow"

Page 14, line 27. The supplementary material goes up to E1 (8 pages). There is no F - is something missing?

The supplementary materials uploaded on 26 Sep 2015 contains Supplementary material F and has 9 pages. We have included the supplementary material F.

Supplementary material F: Lupine crop root



Figure F1. Lupine crop root morphology

Page 15, lineS 1-3. You mention soil moisture in the abstract. I think this should be shown - at least in the supplementary material.

We agree with the suggestion, and have included soil moisture readings as Supplementary material G.

Supplementary material G: Soil moisture content

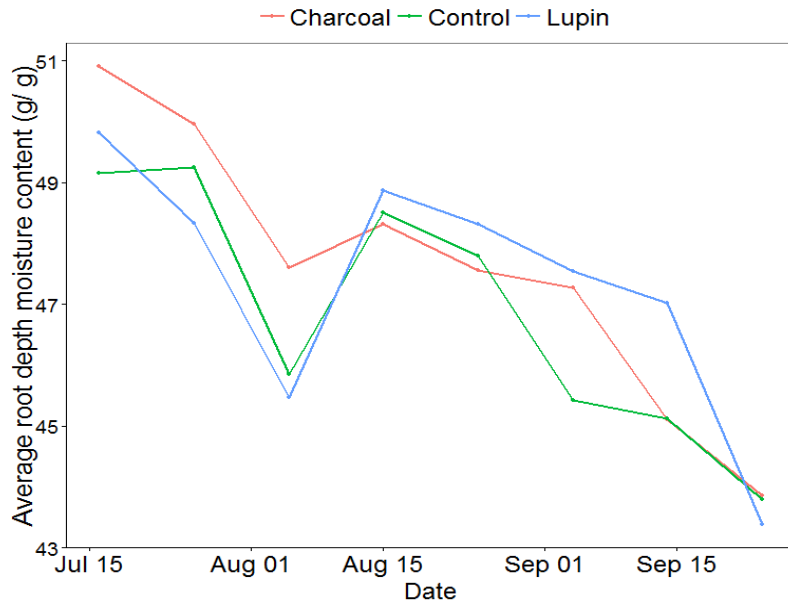


Figure G1. Average root depth gravimetric moisture content of plots with different treatment

Page 15, line 21. Change “base flow” to “baseflow”
Suggested change has been made

Page 20, line 2. Consistency - Elevation in this figure m - Table above has m.a.s.l (which is correct). In Figure 000 has a comma - e.g. 2,400 in Table not e.g. 2438

Suggested change has been made and “m.a.s.l” is used throughout the manuscript.

Additional references cited

- Mutema, M., Jewitt, G., Chivenge, P., Kusangaya, S., Chaplot, V., 2015. Daily Surface Water and Sediment Fluxes in Thukela River, South Africa. *Phys. Chem. Earth Parts ABC*. doi:10.1016/j.pce.2015.10.001
- Orchard, C.M., Lorentz, S.A., Jewitt, G.P.W., Chaplot, V.A.M., 2013. Spatial and temporal variations of overland flow during rainfall events and in relation to catchment conditions. *Hydrol. Process.* 27, 2325–2338. doi:10.1002/hyp.9217
- Rallison, R.E., 1980. Origin and Evolution of the SCS Runoff Equation, in: *Symposium on Watershed Management*. American Society of Civil Engineers.
- van de Giesen, N., Stomph, T.-J., Ajayi, A.E., Bagayoko, F., 2011. Scale effects in Hortonian surface runoff on agricultural slopes in West Africa: Field data and models. *Agric. Ecosyst. Environ.* 142, 95–101. doi:10.1016/j.agee.2010.06.006