Hydrol. Earth Syst. Sci. Discuss., 12, C2923–C2926, 2015
www.hydrol-earth-syst-sci-discuss.net/12/C2923/2015/

Hydrology and Earth System Sciences
Discussions

Interactive comment on "Effects of mountain agriculture on nutrient cycling at upstream watersheds" *by* T.-C. Lin et al.

T.-C. Lin et al.

riverhuang@ntu.edu.tw

Received and published: 2 August 2015

Anonymous Referee #1 Received and published: 3 June 2015 Overall comments, Although the impact of agriculture on river water quality has been well studied around world, the case study in a subtropical tea plantation is still limited at this point. I recognize, therefore, this manuscript provided valuable information on N input-output for mitigation of anthropogenic N loss to river system from the watershed covered by tea plantation. However, I found some inadequate discussions and structures to be revised as mentioned below.

Major comments Comment 1. Impact of agriculture on rainfall chemistry Although rain water chemistry indicated some significant or marginal differences of concentrations

and fluxes between A1 and F2, it would be still doubtful that this differences are certainly caused by fertilizer from the surrounding agricultural area. When the spatial variability of rainfall chemistry in a landscape scale is taken accounted, the simple analysis of the difference in Figure 3 is not enough to confirm your discussion. Regarding with the ion flux in rainwater, you should also discuss the difference of rainwater amount between two sites (A1>F2, described in Line 27 of Page 4793). I would sat that you need more site replication of rainfall observation and further evidences to discuss the impact of agriculture on rain water chemistry onsite. I recommend deleting the all discussion on the impact of agriculture on rainwater from the manuscripts.

Reply: We agree that additional site replication on rainfall data would strengthen our discussion on the effect of agriculture on rainfall chemistry. However, we found that concentrations of all ions analyzed were higher at the watershed with high tea plantation than the one that was almost completely forested. Although the significant differences in Na and Cl could be related to spatial variation of oceanic influences, the significantly higher concentrations of N and K provide good indication of agriculture influences. The effect of N from agriculture activities (fertilization) on atmospheric deposition has been reported (e.g., van Breemen et al., 1982). To avoid over-statement from only one-pair of watersheds, we modified the language in the text to be more conservative. Despite the somewhat limited spatial replication, this manuscript provides one of the first data sets pointing to the potential effects of agriculture on rainfall chemistry, amongst the rich literature on how agriculture affects watershed nutrient cycling through streamwater chemistry.

van Breemen N., Burrough P. A., Velthorst E. J., van Dobben H. F., de Wit T., Ridder T. B., and Reijnders H. F. R.: Soil acidification from atmospheric ammonium sulfate in forest canopy throughfall, Nature, 299, 548-550.

Comment 2. Data presentation and method description: The budget analysis is very important for your discussion (Figure 5). The text of the methods and assumption for Figure 5 (from page 4797 line 24 to page 4798 line 19) should be described in the

methods section, “2 Material and methods”. The information of fertilizer application (page 4798 line 8) should be described in the “2.1 Study site”. Furthermore, data explanation of the input and output budget in Figure 5 should be described in the result section, “3 Results”.

Reply: We moved the assumptions and other details about the calculations to “Materials and Methods”. The information of fertilizer application was added to the “Study site” with more details provided in the “Materials and Methods”. We also described the N and P fluxes more explicitly in the “Results”. With the restructuring and added information we believe that the discussion is now clearer and easier to follow.

Comment 3. Tea plantation Although tea plantation is one of the dominant agriculture activities around the study site, this is not a representative of all agriculture as a whole. The uniqueness of this study would be “tea plantation” as an agricultural land use with much fertilizer than other crop. Therefore, I recommend revising the manuscript title from “mountain agriculture” to “mountain tea plantation” to inform this case study correctly. Also, abstract, discussion and conclusion need to convert “agriculture” to “tea plantation”.

Reply: We agree that using “tea plantation” instead of the more general “agriculture” is a good way to highlight the uniqueness of this study and to draw readers’ attention to a rarely studied agricultural system. Therefore, we have made the language changes accordingly throughout the manuscript title and its text.

Editorial comments Comment 4. Figure 2 and 3; Please indicate the meaning of “X100” or “”X10” in the caption correctly. We added the meanings of these symbols in the caption.

Comment 5. Figure 3; Table presentation would be much valuable for these data with the water flux data rather than figure. We replaced the figure with a table (Table 3).

Comment 6. Figure 5; Explain which figures are N and P in the caption. In the figure,

difference of N output was 101 (=106 – 5.6) between two sites, while the manuscript indicate 90 (page 4796 line 17). Which is correct? After considering the comments made by all reviewers we decided to make the figure only for N. As for the numbers, we have double checked the calculations and put the numbers into a table for clarification (Table 4).

Comment 7. You often use “topology” in the text. It might be “topography”. We replaced “topology” with “topography” throughout the manuscript.

Comment 8. I couldn’t understand the meaning of “should A1 has 100% agriculture lands" (page 4796 line 20). Reword it The phrase is changed to “Should A1 is 100%, instead of 22%, covered with tea plantation”.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 4785, 2015.