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Interactive comment on "Modelling freshwater quality scenarios with ecosystem-based adaptation in the headwaters of the Cantareira system, Brazil" *by* Denise Taffarello et al.

Anonymous Referee #1

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Review report for Manuscript ID HESS-2017-474 entitled "Modelling freshwater quality scenarios with ecosystem-based adaptation in the headwaters of the Cantareira system, Brazil"

General comment The paper compares freshwater quality scenarios under different land-use/land cover changes in the headwaters of the Cantareira system, Brazil. Soil and Water Assessment Tool (SWAT) is used to model water yield, nitrate and total phosphorus loads, and sediment yields. The Hydrological Service Index is developed for 20 sub-basins by considering the grey water footprint for nitrate, total phosphorus and sediments yield in order to assess the sustainability of the hydrological services.

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The study reported restoration of forest cover conversion scenario through ecosystem-based adaptation in protected areas foreseen additional best management practices at the headwaters of the water supply systems. The paper is interesting and suitable for publication after major revisions. The main changes should be done in how the SWAT model is representing the study area especially during drought years. One of the main reasons for the discrepancies between monitoring data/existing literatures and model simulations might be the weakness of SWAT model to capture extreme flows or water yields. Besides, how the model parameters are selected for the calibration and validation of SWAT model. Improve the Tables and Figures to be more informative to the reader (Please see on specific comments part below). The specific and thechnical comments are as follows: The abstract section could be concise. 1. Line 55 (Colombia, 2015, 2014, 2010). 2. Lines 58 to 66 "Hoekstra et al., 2011" is over cited. Could be rephrased. 3. Line 141 run from 2009 to 2014. 4.Line 153 "three data collection platforms" their geographic locations could be indicated on the study area map. 5. Line 156 the type of secondary data could be clearly indicated. 6. Lines 252-255. Besides adopting from the existing literatures, implementing sensitivity analysis could be recommended in order to select model parameters. 7. Lines 276-279. It is known that SWAT model is not for extreme flows and hence water quality parameters. 8. Line 299 could be moved to line 298. 9. Line 310 could be moved to line 309. 10. Line 322 could be moved to line 321. 11. Line 455 to 456 should be written with appropriate multiplication sign. 12. Line 514. It would be useful to relate spatially the sub-basins in which the differences in land-use/land-cover are the greatest and the water yield, nitrate, total phosphorus and sediments yield differences are evident. For instance providing maps which indicate temporal changes in LULC and corresponding changes in water quality parameters considered. 13. Line 533. Reason for selecting the two sub-basins among the 20 sub-catchments? 14. Lines 535. Any statistical relationship between the changes in LULC classes and grey water footprints. For instance multivariate statistical analysis. 15. Lines 544 to 555. As one-third of the SWAT simulation are low-flow or drought years. It is known that SWAT model is weak in capturing extreme flows.

One of the reasons for the discrepancy between monitoring data and model simulation might not the weakness of the SWAT model to represent low-flows? 16. Table 1. It might be better to replace sub-basin coordinates with key modelling results and/or field observations. 17. Table 2. Possible reason for model underperformance for some sub-basins? 18. Table 3. The selected SWAT parameters are not exhaustive unless sensitivity analysis is conducted. 19. Table 5. I would like to see additional column indicating the Hydrologic Services Index. The symbol used for the sub-basins 10, 15, 17 and 19 is not defined. 20. Figure 2. Sensitivity analysis is missing after SWAT-CUP. 21. Figure 4. Why the upper and lower bound of coef. of PBIAS is only $\pm$ 0.15, though the model performance for some sub-basins are more than $\pm$ 0.15. 22. Figure 6. How representative is the sampling of only 8 months for turbidity? 23. Figure 12a. Legend for y-axis has typo error. 24. Figures 13, 14 and 17. The legends and axis values are not readable.