

We thank this reviewer for her/his thorough review and their pertinent comments and suggestions. We incorporated nearly all suggestions in the revised paper. Our detailed responses to the each comment are provided in this bold font (below each comment).

General comments: The main scientific contribution of this paper is the use of a conceptual rainfall-runoff model to explore whether forest regeneration has had a demonstrable impact of metrics of high, average and low streamflows from basins in Puerto Rico. This is a very worthwhile exercise, since forest and water managers alike are increasingly faced with questions related to the implications of land use change for streamflow from relatively large drainage basins (greater in size than the experimental basins that have generally been used to explore hydrological response to land use change). The modelling approach used in the paper to estimate the "pre-change" condition is appropriate given the challenges of conducting a traditional "paired-basin" study at these spatial scales. I found the jackknife approach to estimating the deviation between observed and model-predicted streamflow behaviour to be particularly interesting and appropriate. I also feel that the authors did a very good job of deriving estimates of the key drivers (precipitation, evapotranspiration) for the modeling of several relatively large basins. However, given that 7 and in some cases 8 model parameter values had to be estimated via calibration, I was surprised to not see any mention of the issue of model equifinality and its implications for the estimated deviation between observed and predicted streamflow behaviour. The authors might want to consider including a brief discussion of this issue in the paper. The paper also presents a valuable review of the possible reasons why no clear impact of forest regeneration on streamflow could be detected. The paper is generally well-written (although I have some very minor suggested editorial changes noted in my specific comments) and well-argued, and I feel that it makes a worthwhile contribution to our understanding of the issue of streamflow response to land use change at fairly large spatial scales.

Since the model parameters are not directly used in the analysis it is unlikely that our approach is confounded by equifinality (i.e., the phenomenon that different model parameter sets yield near-identical simulations). Additionally, as the analysis is based on the 30 'best' streamflow simulations the analysis is not dominated by a single, possibly distinct streamflow simulation.

Specific comments:

Page/Line 3048/20 Not sure of the appropriateness of the word "solid".

We have replaced "solid" by "unique".

3048/21 Sentence beginning "This is a relatively high-quality long-term hydroclimatic records : : ." is a bit awkward.

We have rephrased this sentence to: "The tropical island of Puerto Rico provides a unique opportunity to study the impacts of natural forest regeneration on Q at

the meso-catchment scale, as relatively high-quality and long-term hydro-climatic records and sequential land-cover data are available”.

3052/19 Sentence beginning “Daily P from the Global Historical Climatology Network-Daily : : :” is incomplete.

We have added “were used” to complete the sentence; thank you for pointing this out.

3052/21 Use “the” rather than “The”.

3055/1 Use “by” rather than “times”?

3059/16 “data” are plural – thus, “are” rather than “is”.

We have corrected all these.

3063/6 Sentence beginning “Figure 6 shows regressions between : : :” – I would reorganize this sentence such that it is the dependent variable (the cumulative change in D) being regressed on the independent variable (the change in the amount of urban and forest area)

Agreed, we have made this change here and elsewhere in the paper where we used a similar sentence structure.

3066/13 Sentence beginning “Additionally, given that the Rio Fajardo catchment : : :” – I take the authors’ point that this catchment may be an outlier; however, the preceding discussion is in terms of Q_{tot} , and this catchment is an outlier for dry-season flow and $Q_{0.05}$, not Q_{tot} according to Figure 6.

Catchment H (Rio Fajardo) is only an outlier in terms of Q_{p5} (see Figures 6e and 6f of the original paper). However, this likely indicates problems with the Q data which makes us wary of making inferences for any Q characteristic (including Q_{tot}) for this catchment.

3066/14 No comma needed after “(Figs. 6e and 6f)”.

Fixed.

3066/28 Should be “around $3.0(\pm 0.1)$ mm d⁻¹”.

This has been changed throughout the revised paper.

3067/20 It is not clear to me how the authors arrived at the values of -340 (± 480) mm yr⁻¹; when I scale up the response from 26% forest cover to 100% forest cover I get values of -330 (± 477) mm yr⁻¹. Is the difference between the two values due to the change in urban land cover? Regardless, I think a bit more detail on how these values were obtained is needed.

The difference between the reported values and the values calculated by the reviewer can be attributed to rounding. For clarity, we have changed the calculation in the revised paper using the rounded numbers, leading to minor changes in the cited values. Additionally, we now specifically mention “+100 %” in the text to make it clear that we extrapolate from the +26 % forest-cover change situation to the +100 % forest-cover change situation.

3068/7 “However, this explanation does not apply to the present study, since the catchments were exploited as pastures or agricultural fields for a sustained period of time prior to their abandonment and subsequent forest regeneration” – I am not clear as to how this points negates the idea of rapid forest regeneration after abandonment. Are the authors arguing that long-term use of the land for agricultural practices precludes rapid forest regeneration? If so, this point should be backed up with reference to the literature.

This sentence refers to the time period that the catchment was under non-forest cover. In many cases the rapid forest regeneration occurring after initial deforestation may not leave a mark in the streamflow record because the period under non-forest cover is relatively short. By contrast, in the present case the catchments had been under non-forest cover (agriculture and/or pasture) for extended periods (see Figure 4 of the original paper) prior to forest generation which is much more likely to be detected in the streamflow record.

3070/27 Fig. 5g should be Fig. 6g?

Yes, corrected.

3071/22 “generation of Q” rather than “Q is generated”?

Yes, corrected.

References

These need to be in a consistent format.

We have checked and corrected the formatting.

Table 1 Footnotes: “Van Dijk, 2010” should be in parentheses.

Done.