Short Paper

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Abstract

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It consists of two paragraphs.

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Introduction

Introduction

There has been an long and on-going discussion in the hydrologcal literature around the impact of forests on streamflow (Andréassian, 2004; Brown et al., 2013, 2005; Jackson et al., 2005; Zhang et al., 2017). The historic work highlights provides a general consensus that if forest areas increase, streamflow decreases and vice-versa. The most dramatic result in relation to this, is Figure 5 in Zhang et al. (2011) indicating (or Australian watersheds) a 100% decrease in stream flow for watersheds with 100% forest cover. However, on the other end of the spectrum, in a series of French watersheds (Cosandey et al., 2005), there was no change in streamflow characteristics in 2 of the three watersheds studied in relation to deforestation.

There have been several review papers aiming to summarize different studies across the globe, in relation to paired watershed studies (Bosch and Hewlett, 1982; Brown et al., 2005) and more generally (Jackson et al., 2005; Zhang et al., 2017). These studies are aiming to generalize the individual findings and to identify if there are global trends or relationships that can be developed. The most recent review (Zhang et al., 2017) developed an impressive database of watershed studies in relation to changes in streamflow due to changes in forest cover based on a global data set. This dataset, that covers over 250 studies are described in terms of the change in streamflow as a result of the change in forest cover, where studies related to both forestation (increase in forest cover) and deforestation (decrease in forest cover) were included.

The conclusions of the paper (Zhang et al., 2017) suggest that there is a distinct difference in the change in flow as a result of forestation or deforestation between small watersheds, defined as < 1000 km^2 and large watersheds > 1000

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km^2. While for small watersheds there was no real change in runoff with changes in cover, for large watersheds there was a clear trend showing a decrease in runoff with and increase in forest cover. Their main conclusion was that the response in annual runoff to forest cover was scale dependent and appeared to be more sensitive to forest cover change in water limited watersheds relative to energy limited watershed (Zhang et al., 2017).

Encouraged by the work presented by Zhang et al. (2017) and the fantastic database of studies presented by these authors, we believe we can add to the discussion by presenting further analysis of the data and by adding further watersheds and enhancements to the data base.

In particular, the main method in the work by Zhang et al. (2017) is using simple linear regression. And the main assumption is that the threshold at 1000 km^2 is a distinct separation between “small” and “large” watersheds. Given the fantastic data set collected, the analysis can be easily expanded to look at interactions between the terms and to test the assumption of a distinct threshold at 1000 km^2.

In particular, the objective of this paper is to 1) enhance the data set from (**???**) with further watersheds and spatial coordinates and 2) to analyse the possibility of non-linear and partial effects of the different factors and variables in the data base using generalised linear (GLM) and generalised additive models (GAM Wood (2006)). Finally we hope to point to further research that can expand our work and that outlined Zhang et al. (2017) to better understand the impact of forest cover change on streamflow.

Front matter

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