

Interactive comment on “Comment: Getting the Methodology Wrong for Analysing the Hydrological Changes in Watersheds” by Nitin Bassi et al.

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Responding to C. Harman’s comment on Bassi et al. (2018) on the paper by Penny et al. (2018), it appears that Herman has missed the basic premise for Bassi et al.’s comment. The article by Penny et al. presumes that not much reliable and consistent hydrological data are available for small river basins (like Arkavathy) for analysing the hydrological impact of land use changes. Bassi et al. (2018) by providing several facts and figures pertaining to availability of hydrological data, scientific methodologies, has systematically challenged this and had also cited several research studies showing how such analyses had been undertaken by scholars in the past for some of the river

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basins.

Any scientific research begins with intellectual curiosity, and that intellectual curiosity has its genesis in the belief that something is unknown. This ‘unknown’ can be relationship between two sets of phenomena, establishing ‘causality’, methodology for solving a problem, etc. This needs to be first established as a fact methodically through a proper review of available scientific literature and that becomes the motivation for embarking on a new scientific enquiry. When abundant technically validated data on certain phenomena are available (in this case surface and groundwater hydrology of Arkavathy watershed), one finds it difficult to understand the motivation behind ignoring these data sets and collecting enormous amount of primary data representing tiny geographical areas within that large watershed in the garb of developing a spatial understanding of the watershed, yet not being able to generate anything which is representative of the changes occurring in the entire hydrological unit. This was the primary concern raised by Bassi et al. (2018).

Unlike claimed by Harman, Penny et al (2018) did clearly imply that their work is the first of its kind on this topic in India. In page 596, the article says: “There is little research that addresses the emergent effects and heterogeneity of human-driven hydrological change across the watershed scales at which management decisions must typically be made”. An associated concern is the serious omission in reporting about similar research studies done in the past in India (as pointed out by Bassi et al. (2018) and lack of discussion on the methodologies used in those studies, which is a serious lacuna.

Introducing a new method to solve a problem, which does not lead to actually cracking it, but instead consumes huge amount of resources (which in this case is acquiring and processing remote sensing data at time scale), does not make it “novel”. It is merely a costly proposition and not an alternative for the much-tested conventional methods. It is like digging the entire mountain to catch a rat. As Bassi et al. (2018) has revealed, there are three stream-gauging stations in Arkavathy watershed and several

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rain-gauging stations, which are adequate enough to capture the spatial variability in surface flows. In the middle Cauvery sub-basin, there are 60 gauging stations. Using the historical data of rainfall and stream flow for selected catchments in Arkavathy watershed, superimposed with temporal data on land-use, a more accurate relationship vis-à-vis the impact of land use change on surface flows could have been derived as such an approach would help segregate the effect of rainfall.

What is even more surprising is the invalid assumption in Penny et al. (2018) about absence of spatial variation in rainfall, which had formed the basis for their argument about spatial variation in the hydrological changes in Arkavathy watershed. Bassi et al (2018) with the analysis of rainfall data in different locations proved this wrong.

Contrary to the claim by Harman that Penny et al. (2018) had not reported about groundwater condition in Arkavathy, page 605 says: “Although few data exist to describe historical declines of the water table, contemporary farmers typically have to drill new borewells to depths exceeding 100m to reach any groundwater.” It will be a sad commentary on our research, if data collected painstakingly by our technical agencies spending large sums of money and time are not used for any scientific analysis by our scholars. In this particular case, groundwater level data are available for 64 stations within Arkavathy watershed and 600 stations in middle Cauvery basin, but do not even find a mention in the paper by Penny and others except a claim in contrary that groundwater data are not available for the watershed. If the scholars claim the available official data to be unreliable or inconsistent, that should be proven through the use of relevant analytical tools and reported accordingly. Herman need not carry the brief for Penny et al. with an apparently emotional verbiage.

On behalf of the authors

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