Reviewer 1

Substantive Comment	**Response**
...this paper is simply too long. It is commendable the quantity of work that the authors have undertaken, but it does strain a reader to consume the quantity of verbiage presented.	Reviewers 1, 2 and 5 asked for a reduction in the length of the paper. The paper length has now been reduced by 14% based on the framework suggested by Reviewer 1 (Coopersmith).
Page 28, 1st Paragraph. The authors are making a fair point regarding the flaws of assuming stationarity, but seem to be painting the literature as having uniformly ignored non-stationary hydrologic systems. Recent work has discussed changing hydro-climatic regimes in the US and elsewhere. Acknowledging these efforts would be appropriate.	Agreed. Several additional references have been added to substantiate the recent literature in this area: Arrigoni et al., 2010, Barnett et al. 2008, Wang et al. 2011, Zhang et al., 2013.

Reviewer 1 Minor Comment	**Response**
Page 26, Line 15: "…*the* TG Halli reservoir."	Corrected
Page 27, Lines 18- 25. This is too long to be divided only by commas and colons. Consider listing the three issues, then beginning a new sentence. I.e. "…(iii) inadequate original scientific research. As a result, water management and policy decisions are…."	Corrected
Page 28, Line 25. Not sure if this sentence was meant to end "…on watershed hydrology" (no 'the') or "…on the watershed's hydrology."	This sentence no longer exists in the revised version.
Page 29, Line 15. A space is needed in 'basinsundergoing.'	Corrected.
Page 30, Lines 5-10. All models necessarily exclude (inadvertently or intentionally) certain hydrologic features. An acknowledgement of this inherent limitation of all modeling (not merely those cited) would seem appropriate.	Agreed. The Introduction has been considerably edited. We hope this point is clearer now.
Page 30, Line 21. "gauged" is misspelled.	Corrected
Page 30, Line 24. The oxford comma is needed after "…basins of interest"	Corrected
Page 31, Lines 16-19. Again, I would add the missing oxford comma.	Corrected

Page 32, Line 11. "…*the* TG Halli…" Page 33, Line 1. See above. Page 33, Line 12. See above (there may be other small omissions of definite articles that I was unable to catch).	Corrected
Page 33, Line 17. "…*the* livelihoods…"	Corrected
Page 33, Line 22. "…we rely *upon* meetings with *government* officials…"	Corrected
Page 33, Line 25. "…*the* TG Halli catchment…" Page 33, Line 27. See above. Page 34, Line 1. See above. Page 34, Line 3. See above (further missing definite articles will not be pointed out, just please clean up these issues in the revised manuscript)	Corrected
Page 34, Line 12. Missing oxford comma. Lists of three should be "a, b**,** and c."	Corrected
Page 34, Lines 12 and 24. "check dam" should either be hyphenated in both cases, or neither. Page 38, Line 6. "rain-fed." Page 38, Line 19. "…a once-connected, flowing river has *been*	Corrected
Page 40, Line 8. "…and *a* survey of…" Page 40, Line 27. Add the appropriate oxford comma.	Corrected.
Page 45, Line 9. "To do this**,** the lower envelope…"	Corrected
Page 50, Line 8. A period is missing after 'zone.'	Corrected
Page 50, Lines 9-16. On one hand, the authors argue that since 1992, there has not been a month in which baseflow into the reservoir occurred. On the other hand, the caption of Figure 2 suggests the bars are counting months in which 100% of flow was derived from baseflow (a much higher standard than "a month in which baseflow occurred." Please clarify.	Agreed. This is a higher standard, and this point has been made in the paper when describing the two approaches.
Page 50, Line 22. Please correct the misspelling of "plantations."	Corrected
Page 51, Line 25. Two commas should flank the word 'however.'	Corrected
Page 53, lines 4-6. If the agencies have not made any "concerted *and* substantive" efforts, does that imply that they have made concerted *or* substantive efforts? Nit-picky, I admit, but probably worth a minor correction.	Sentence is changed in the revised version.

<table>
<tr><td>Page 53, Line 15. I believe this should read “human feedback.”</td><td>Corrected</td></tr>
<tr><td>Page 54, Line 4. Again, “human feedback.”</td><td>Corrected</td></tr>
<tr><td>Page 54, Line 5. Note sure the comma between “catchment” and “often” is needed.</td><td>Sentence is changed from original, kindly check this</td></tr>
<tr><td>Figures
Figure 2. Consider adding some vertical lines at the boundaries of each decade for easier viewing.
Figure 2A. Rather than report the mean (which seems to be influenced by a couple years of extremely high flows), why not report the median, which better reflects the water to which stakeholders might expect to have access in a ‘typical’ year?</td><td>Comparison given below. Figure has been changed and clarified in text.
<table><tr><td></td><td>Mean (ML/yr)</td><td>Median (ML/yr)</td></tr><tr><td><1970</td><td>140,000</td><td>108,000</td></tr><tr><td>1970 – 2000</td><td>5,200</td><td>4,900</td></tr><tr><td>2001-2013</td><td>2,400</td><td>2,500</td></tr></table></td></tr>
</table>

Reviewer 2

Comment	**Response**
Line 18 on page 30: “is not a sufficient reason”?	Corrected
Line 9 on page 32: Delete one “TG Halli”	Corrected.
Line 10-11 on page 32 Delete “commonly known as TG Halli reservoir”	Sentence has been simplified.
Line 18 on page 32: “storage capacity”?	Corrected
Lines 9-10 on page 45: The lower envelope is also corresponding to the flow component from groundwater, minimizing quick flow component.	Agreed. We have added the text: “and to focus the analysis on the groundwater response” to clarify this point.
Line 14 on page 49: Did the recession parameters (595 and 0.57) change from pre-1970 to post-1970 significantly?	While we haven’t conducted a formal uncertainty analysis on the recession parameters, the recession characteristics (as indicated by the dQ/dt versus Q plot) overlap completely for the two time periods suggesting no significant change in the recession behavior itself.
Line 3 on page 51: “1.35 km-2”	Corrected.
Line 14 on page 51: It may be better to say “groundwater pumping and expansion of eucalyptus plantations: : :” because “expansion of eucalyptus plantations” can also contribute to “groundwater decline” indirectly.	Agreed. Done.

Reviewer 3

Substantive Comment	**Response**
....I am also inclined to agree that there exist many documented attempts that focus too strongly on modelling, and that those attempts are very prone to neglect processes that are not represented in the model, thus leading to some form of "modeller myopia".	We like the terminology the reviewer has used and have used the term “modeller myopia” with due credit to the reviewer.
The authors pose the issue too black and white, contrasting "developed world models" to "developing world data scarcity", or, as I interpret it, an approach based on a-hydrological-model-that-happens-to-be-available, versus a conscious identification of the issues at hand and the appropriate complexity of analysis as a function of available data. As such, I see the paper not so much as a first step towards a new scientific approach, but rather an excellent example of "best practice" of bottom-up hydrological problem solving...	The referee argues that our approach is a general best practice and not restricted to developing country situations. Also India isn’t really a developing country by many indices. Everywhere in the world people use off-the-shelf models which restrict which processes are modelled. So the referee asks instead that we present our model as a good example of “bottom-up” hydrological modelling rather than developing country hydrology. We have changed our language accordingly.
Another reason that I am a bit uncomfortable with the "us v. them" tendency of the problem statement, is that rejecting the use of complex models also has implications for the analysis.	We agree. We don’t think we intend to reject complex modelling at all. The first step we refer to in the paper is meant to be not a first step towards a new hydrology but rather a first step to engaging in primary data collection and modelling at a specific site. We see this paper as a starting point to inform for more complex modelling. We are in fact already engaged in a significant amount of primary data collection (instrumentation of the watershed) and modelling. But our research questions, hypotheses and therefore instrumentation design were based on this initial analysis. This has been clarified in the paper in the Abstract, Discussion and Conclusions sections
In particular, it makes it impossible to look at interactions between each of the hypotheses. For instance it is not unlikely that an increase of evapotranspiration from Eucalyptus may have reduced groundwater recharge, thus further aggravating the impact of extraction. The authors	This is an extremely good point and we think this should be explained in the paper. As requested, we have now added a paragraph in the Discussion Section explaining the interactions between the hypotheses.

discuss this to some extent in section 5 and emphasize the need for further research, but give little explanation about how this can be done without the use of the models against which they argue in the introduction of the paper.	First, to clarify, the third hypothesis is not groundwater depletion but groundwater over-extraction. In other words, we deliberately split up the blue and green water components of human activity – although both deplete groundwater and reduce baseflows. Second, likewise, obstructions along the stream channel (in the Million Puddle Theory) convert surface water to groundwater and in fact these enable groundwater extraction to persist at the observed levels. However, we deliberately only looked at the "pure evaporation" component when evaluating the impacts of these – to avoid double counting.

Minor Comment	**Response**
p27/10: According to most rankings, India is not a developing country any more. Perhaps the entire concept of a developing country is getting a bit outdated, or at least a vague denominator given the enormous diversity it encompasses. Especially from a water resources perspective I would prefer to be more specific on why regions such as the study region are challenging: they combine data scarcity with strong pressure on water resources, fast environmental and socio-economic change, and an urgent need to improve local livelihoods.	Agreed. We have eliminated the "developing versus developed" framing altogether. The whole Introduction Section has been edited to clarify the class of problems we are addressing-human-dominated, data scarce regions (which makes it difficult to assume stationarity, apply the PUB approach OR develop new models from scratch).
p27/19: traditional, developed world models: also here, I think that this is a bit too contentious to be appropriate. I don't think that such as thing as a developed world model exists. Yes, a lot of models have been developed for temperate regions and require a lot of data, but there is such a wide spectrum of data models, and catchments that it is not a matter of developed v. developing regions.	Agreed. We have removed the word "traditional developed world models". Instead, we only refer to the danger of misapplying off-the-shelf models. We liked the reviewers term for this "modeller myopia" and have used this in the paper with due credit to the reviewer.
p32/10: "TG Halli TG Halli": remove duplication	Corrected
p36/24: evaporaion: correct	Corrected
p53/22: this sentence would seem to throw away	This sentence has been edited. We do not mean to

the baby with the bath water. Hydrology is an applied science and I think that traditionally it has been dealing pretty well with human interactions, but of course bad examples exist (as in any scientific discipline). Indeed, none of the methods presented in the paper is all too novel and again I think it is mostly an issue of stimulating good practice than preaching a revolution.	dismiss the whole field of hydrology but rather simply emphasize the role of direct human drivers.
Table 1: Meterological -> Meteorological?	Corrected
Table 1: ideally be more specific. periods of data availability, spatial resolution of maps, number of wells, ...	Agreed. Done.

Reviewer 4

Comment	**Response**
I am concerned about the link to water security, not so much because the case and analyses presented do not speak to this challenge, but rather that the authors do not seriously engage with the expanding literature on water security. I suggest looking into some of these, or dropping the water security framing of this paper.	We agree. The term water security is not really needed to frame the arguments in the paper. Referencing this literature would be a distraction and therefore this framing has been dropped altogether.
27/15-25: There is a lot here that should be further developed and clarified, especially assumptions of prediction/ predictability leading to sound policies and the i, ii, iii "issues not addressed by : : : hydrologic models". I would suggest you separate iii (policy based on other non-scientific factors) from i and ii (which are, following your logic and sentence structure, issues that models at least attempt to address).	Good point. We have considerably edited the Introduction sections to address this. We hope the distinctions between challenges that arise from the nature of the system (multiple drivers) and from researcher challenges (data, time and cost of engaging in primary research) are clearer now.
28/21: cite more recent Vorosmarty (2010) piece	OK.
28/24: remove "could", i.e., "actions of millions of small water users have significant impacts"	Sentence is modified.
29: section 1.1.2 – excellent	Thank you!
30/15: suggest you expand in a sentence or two on	The policy debate section has been edited considerably. While some of the local detail has

"policy relevant knowledge gaps"	been removed on the suggestion of other reviewers, we hope the argument is now clearer.
31/16: good multiple working hypotheses, but following your own notion and Buytaert's that knowledge is dispersed, how were these five hypotheses arrived at? Were others considered and discarded?	Actually no hypotheses were discarded upfront. However, policy debate section has been rewritten to explain how the hypotheses were arrived at. The section has also been shortened and made into a list.
32/17: tanks not takes	Corrected.
32/20-25: any estimation of volumetric storage capacity in top 20 and 60 meters (as a means to check the hypothesis that groundwater depletion reduces streamflow)? Your analysis of this on p. 46 seems inconclusive.	On the contrary, the analysis suggests that the observed declines in surface and deep aquifer levels are of the correct magnitude to explain the changes in flow.
35/22: "five SUCH hypotheses" (added emphasis) appears somewhat offhand. How were these arrived at? Were some grouped?	The introduction to the five hypotheses has been completely edited. The section now clarifies that ALL hypotheses were retained and the section was rewritten to clarify that the hypotheses are mutually exclusive.
36-38: excellent!	Thank you
38: do plantations (negatively) affect potential ET via wind speed (reductions resulting from surface roughness, windbreaks) and relative humidity (locally, due to transpiration)? Do none of the plantations get irrigated?	The eucalyptus plantations do not get irrigated (or 99% of them do not). This is now stated in the paper. Other plantations – particularly coconut, arecanut and orchards have been increasing and are irrigated. These are included under groundwater irrigation. The effects of shifting from seasonal (short-height) crops to plantations on wind speed and therefore on ET are not known, but in our judgement are likely to be at a secondary or tertiary level in comparison with the primary effect of greater ET due to whole year ET and deep-rooted vegetation.
41/20: how have "groundwater levels changed in the last four decades"?? Fig. 3c is the closest thing you have, but does not to me directly indicate that "groundwater is now accessed at great depth". In fact, with the exception of the 2013 spike at 400m, these data are inconclusive or show the opposite that 2013 depths were the same or marginally less than 2012 or 2011 depths. No doubt, depth bored	We have presented detailed well census (primary) data to demonstrate this. These data clearly show the massive decline in groundwater levels since the 1970s.

in a given year is a result of many factors, not solely (even primarily?) actual depth of groundwater.	

Reviewer 5

The authors use a multiple hypothesis approach to investigate the main factors contributing to the decrease in flows to the TG Halli Reservoir. The multiple hypothesis approach is an innovative way towards hydrologic problem solving that identified the dominant drivers contributing to the observed decrease. Specifically, groundwater pumping and eucalyptus plantation were identified as the two strongest controls. I enjoyed reading the paper.	Thank you.
I would hesitate to blame one model SWAT for the developing worlds modelling woes. SWAT is used as extensively in the developed world as it is in the developing world, and often in regions ignoring groundwater surface water interactions. The problem that the authors identify is valid, and due to the complexities in using the coupled groundwater surface water models, they are more infrequently used....	Agreed. To avoid giving the impression that we are blaming the SWAT model in particular, we have edited out references to specific model names. Indeed it is not only SWAT, but VIC, MODFLOW and many other off-the-shelf models have been implemented to ignore groundwater-surface water interactions. So the citations remain but now the text only refers to the misapplication of "off-the-shelf" models. (See Section 1.1 Pre-existing perceptions).
The paper would benefit some compression – mostly the introduction and section 2.3	Both the introduction and Section 2.3 have been shortened. The length of the paper has been reduced by about 14%.