Dear Editor and Reviewers,

We are grateful to you for taking the time to handle and review our paper. Herewith we would like to submit our revised manuscript, entitled “A global hydrological simulation to specify the sources of water used by humans” for consideration for publication in Hydrology and Earth System Sciences. We have made the corrections and modifications suggested by the reviewers as shown below. We hope you will find the modifications are satisfactory and that the manuscript is now suitable for publication in Hydrology and Earth System Sciences. Please let us know if any further clarifications are necessary.

Sincerely yours,
Naota Hanasaki (on behalf of authors)

Comments from Editor

I have received reviews from the two of the original reviewers of this manuscript. Both are favorable reviews. Congratulations! Reviewer #2 provides additional comments for further clarification. I encourage you to please respond to those comments and revise the manuscripts accordingly. Once I receive the revised manuscript I'll send it to the reviewer #2 for a speedy review. Also I'd encourage you to submit revised manuscript with track changes or at least provide the page and line numbers that are revised. This will help expedite the second round of review.
Thank you and I look forward to seeing the revised manuscript.

> Thank you for your positive comments. We have modified the text to fully dispel the concerns of Reviewer 2. We provided page and line numbers that were revised, together with some screenshots showing the revised parts with track changes.

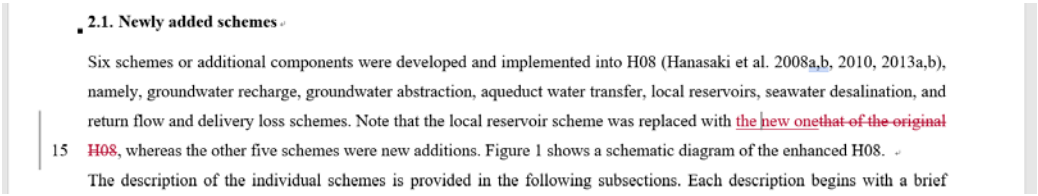
Reviewer 1

I very much thank the authors for taking the time to answering all my questions in details and even doing an additional simulation with their model. For the vast majority of questions, I am very satisfied with the answers. Still, some small issues remain:

Thank you for taking the time to further investigate our manuscript.

R1-S2/S8: It might be me, but I still don't get this part. Logically, I assume that your newly developed local reservoir scheme replaced or modified the one already existing in H08. This means your new local reservoir scheme is used, but the one from the original H08 is not (although the new might be based on the old). However, you keep phrasing it the other way around: '… the local reservoir scheme was replaced with that of the original H08 model …' (in contrast to: … the local reservoir scheme replaced that of the original H08 model…), which implies your newly developed local reservoir scheme is not used in the model.

Finally we understood the point. You are absolutely correct: now the text is read "the local reservoir scheme was replaced with the new one" (Page 3, lines 14). We are totally sorry that our simple grammatical mistake has bothered you for a long time.



2.1. Newly added schemes

Six schemes or additional components were developed and implemented into H08 (Hanasaki et al. 2008a,b, 2010, 2013a,b), namely, groundwater recharge, groundwater abstraction, aqueduct water transfer, local reservoirs, seawater desalination, and return flow and delivery loss schemes. Note that the local reservoir scheme was replaced with the new one~~that of the original~~ ~~H08~~, whereas the other five schemes were new additions. Figure 1 shows a schematic diagram of the enhanced H08.

The description of the individual schemes is provided in the following subsections. Each description begins with a brief

If this would be really the case, there would be no point in describing the new scheme at all. Sorry for picking at this point, but considering the values in the newly provided table S4, it seems to be important to know exactly which scheme was used.

We used the new scheme throughout the study. As shown in Supplemental Text S4, exceptionally, the ORIG simulation reproduced the original (i.e. old) scheme.

As shown by your numbers, for river discharge in heavily human affected basins, even NAT simulations slightly outperform the ORG simulations. Thus, a reader would want to know whether the improvements in ALL result from modifications of the local reservoir scheme itself, by balancing its error with your new, additional schemes or by emergent effects of using all of the schemes together.

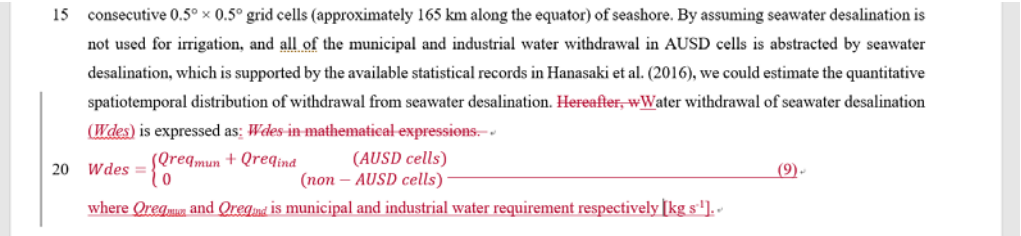
The latter is the case. Let us summarize again the simulation settings (all is noted in body and this is just for your reference).

	Land surface sub-model	Human sub-models (global/local reservoir operation, water abstraction aqueduct water transfer, desalination)
ALL	New (including gw)	Including all in new configurations
NAT	New (including gw)	Excluding all
ORIG	Old (excluding gw)	Including all in old configurations

The change in performance between ALL and NAT is attributed to inclusion/exclusion of the aggregated effects of all human sub-models. A comparison between NAT and ORIG requires additional care since the land sub-model was also different (i.e. inclusion/exclusion of the groundwater recharge scheme).

R1-S9: In my view, a complex mathematical relation is rather a reason to publish it than to skip it. I see how you don't want to confuse readers by adding it to the main text, but I would urge you to consider adding it to the appendix or supplements.

We have newly added the Equation (9) in body (page 9). After consideration, it turned out that the equation can be expressed extremely simple (see the screenshot below for quick reference). In the previous round of revision, we were worrying about how to mathematically express the key conditions (i.e. seawater desalination is only available for regions meeting three economic and geographical conditions; and when it is available, it shuts out water abstraction from other sources), but we finally found that such conditions can be omitted from the equation since they are already written in text. Again, thank you for encouraging us to show in a mathematical form.


consecutive 0.5° × 0.5° grid cells (approximately 165 km along the equator) of seashore. By assuming seawater desalination is not used for irrigation, and all of the municipal and industrial water withdrawal in AUSD cells is abstracted by seawater desalination, which is supported by the available statistical records in Hanasaki et al. (2016), we could estimate the quantitative spatiotemporal distribution of withdrawal from seawater desalination. ~~Hereafter, w~~Water withdrawal of seawater desalination (*Wdes*) is expressed as: ~~*Wdes* in mathematical expressions.~~

$$Wdes = \begin{cases} Qreq_{mun} + Qreq_{ind} & (AUSD\ cells) \\ 0 & (non-AUSD\ cells) \end{cases} \quad (9)$$

where $Qreq_{mun}$ and $Qreq_{ind}$ is municipal and industrial water requirement respectively [kg s^{-1}].

Reviewer 2

The authors have addressed all of my concerns with the previous version of the manuscript,

and I am happy to recommend the paper for final publication.

We are grateful for your positive evaluation. We truly appreciate your constructive comments during the review process.