



EGUsphere, editor comment EC1
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Comment on egusphere-2022-796

Christian Stamm (Editor)

Editor comment on "Influence of climate change, land use land cover, population and industries on the pollution of Ganga River" by Sneha Santy et al., EGU sphere, <https://doi.org/10.5194/egusphere-2022-796-EC1>, 2022

Dear authors

it seems that there was a technical issue with the comments by Reviewer 2 such that not the entire feedback was available. To make sure that all comments are communicated, I add the text by Reviewer 2 below:

Comments by Reviewer 2:

"This paper has integrated hydrological, LULC, and water quality data with the climate change simulation models to derive projections on water quality in one of the most polluted stretches of the Ganga river around Kanpur. While the concept and idea of the paper are sound, the paper is not very coherent and organized. There are also several issues with the language several sections need a thorough rewriting. The figures are very bad, and they need to be redrawn. My specific comments on different sections are as follows:

Abstract: The abstract starts by saying that they have analysed the 'most' polluted stretch of the Ganga River but the definition of the stretch comes much later. In any case, this definition of the 'most' polluted stretch (Kanpur) may be debatable, and it may be better to replace this with 'one of the most polluted' stretches. There are minor language issues that I have marked.

Introduction: The introduction sets the background and motivation well but lacks comprehensive referencing. The Ganga river has been studied quite extensively for water quality including modeling efforts by Indian workers. It is suggested to include a short review of these papers and more importantly presents a summary of water quality data to justify the pollution level of this stretch vis-à-vis global standards. Interestingly, the authors do not present the actual number of WQ parameters anywhere except in the plots with modeling results. It would be useful to let the readers know the pollution status of the river early in the paper.

Study area and Methodology: This section is generally okay but again the authors use subjective assessment of WQ parameters such as BOD, Chemical oxygen demand (COD), solids, TN, chromium, sulphate, sulphide and chloride without providing any data. Figure 1 is very badly drawn and does not reflect the rigour expected for a manuscript. The Ganga basin map is directly taken from the website, and the subbasin maps lack details of the

site, drainage network, major locations etc. The schematic diagram is very poorly drawn and various symbols have not been explained. It is also not clear how this diagram was prepared and the data source for this figure should be cited. Similarly, Figure 2 is poorly formatted and it seems to be a part of some report rather than a manuscript figure. This needs to be simplified and made legible – the idea of this figure should be to provide an overall view of the methodology and details of different kinds of models and specific parameters can be minimised. Also, this can be shortened a bit by improving Tables 1 and 2 and avoiding duplication of information between text and tables.

Results and discussion: The results section is generally well-written and the interpretations are clear. However, the figures need a lot of improvement to make these publishable and to bring clarity. In Figure 4, the plots are too small to see the different classes and there is too much blank space. You can also combine the legend. Parts e and f might be better represented as column graphs.

Some specific comments are as follows:

Line 373 says that the effect of landuse changes on stream flow is more pronounced at sub-basin level but there is no analysis done at this scale. Therefore, I am not sure why this statement is required here. Also, I am not convinced about the statement itself. River basins are completely hierarchical and impacts should be visible at all scales. In fact, you are analyzing at sub-basin scale only. You must explain why the impacts of LULC changes on stream flow are not visible at this scale. This is rather contrary to the previous work done in several basins (see e.g. Ocgoa-Tocachi et al., 2016, Hydrological Processes; Buytaert et al., 2004, HESS) including the Ganga basin.

Line 410-412 again says that LULC alone does not lead to higher pollution but together with climate change it can aggravate it. I really do not understand this and this finding is also quite different from the earlier work done in the same area by Shukla et al. (2018). It is very surprising that the authors have not even cited this paper even though this work is exactly in the same area and on a similar theme. You may or may not agree with the results but omitting such directly relevant papers is not a good practice.

Shukla, A. K., Ojha, C. S. P., Mijic, A., Buytaert, W., Pathak, S., Garg, R. D., and Shukla, S.: Population growth, land use and land cover transformations, and water quality nexus in the Upper Ganga River basin, *Hydrol. Earth Syst. Sci.*, 22, 4745–4770, <https://doi.org/10.5194/hess-22-4745-2018>, 2018.

In general, none of these findings are new in terms of science. The impacts of LULC, population, and industry on water quality are well established. The impact of climate change on some of the specific WQ parameters such as N and P on the Ganga river has also been modelled (e.g. Whitehead et al., 2015, 2018; Jin et al., 2015). So, the authors should clearly highlight what is different in this paper and what new information has been provided. In a broader sense, the findings do not seem to be different from the previous works although the quantum of change etc. might be different. However, this needs to be highlighted clearly in this manuscript.

Another weakness of the paper is that it lacks any serious discussion on the trends and results obtained from the modeling. All it has presented is different trends and numbers but the process understanding of these projected changes attributed to climate change is missing.

The conclusions section brings out some good points, particularly about the STPs and segregation of wastes which was demonstrated by the model. However, I think that this section can be sharpened and made more precise. Since most of these points have already been discussed in the main text, this section should be short and crisp.

Overall, this manuscript presents some good ideas, but it needs significant reorganization and restructuring. The writing as well as the figures need to be improved significantly before it becomes publishable. "

Please consider these comments by Reviewer 2 for providing your response to all feedback.

Christian Stamm, Editor HESS