Comment on hess-2021-476

Anonymous Referee #2

Referee comment on "Influences of land use changes on the dynamics of water quantity and quality in the German lowland catchment of the Stör" by Chaogui Lei et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2021-476-RC2, 2021

The study aimed at understanding the effects of land use and land cover changes on the dynamics of water quantity and quality in a plain watershed. A sophisticated watershed model and statistical techniques are employed to discern the relationships. This article includes three storylines or parts: one is about the hydrology and water quality simulation, the second is about the land use and landscape pattern and its dynamics, and the third is the relationships between the landscape settings and watershed hydrology & water quality. Each of them was complicated and can become an independent study. From this perspective, the research represents a lot of work, with additional information that the studied period has encompassed around 30 years.

However, for such a work associated with many storylines, it is challenging to balance the details and key findings. The main flaws of this study are related to these aspects. My comments are as follows:

1) The arrangement of the structure of the manuscript is inappropriate. For example, in the introduction, the authors intensively highlighted the importance of LULC. And in most lines, the authors never mention the SWAT model, particularly on why the model is suitable for a lowland watershed. In the following text, however, the authors have intensively described the results of the SWAT model. This arrangement is confusing and would greatly weaken the reasonableness of this study.

2) Most of the information is redundant. For example, many of the lines were given on the model results, especially on the daily simulation. But in fact, the simulated data used in the following analysis (e.g., section 3.4) were on an annual scale. I think some of the information could be removed or at least should be moved to the supplementary materials. Thus, the manuscript could be more concise and shortened.

3) The descriptions of model calibration and verification are unclear. For example, the author has collected land use data for three calendar years. How these data were used in the simulation? Instead of lengthy and confusing descriptions, maybe use a simple table to summarize the data (or other details) used in the SWAT simulations?

4) The authors claimed that the studied watershed is characterized as lowland or plain, but I have not found any special findings related to such geographical characteristics.

5) The sections of the abstract and conclusion need to be rewritten. The current abstract is lengthy with many details and lacks a summary. The conclusion part is similar, it appears to me that it is just a simple repetition of the results. I would suggest that the authors carefully summarize the main findings of the results and shorten them appropriately.

6) It would be necessary to add some comparisons, e.g., with some hilly and plain watersheds, on the effects of land-use changes on water quality & quantity. This is expected to expand and deepen readers' understanding of the land use effects of the watershed being studied.

Other specific comments:

1) L19, L21, and other lines in abstract, too many details, I suggest deleting and shortening appropriately.

2) Too much general information was given on the first paragraph in the Introduction, which could be compressed. Some of the lines are confusing. For example, e.g., L41, why land use patterns (not changes) can alter surface roughness?…

3) L98-101, an awkward sentence, please rehearse.

4) L106, the first objective was coming suddenly, maybe because the model was not well introduced in the above text.

5) L163, it is confusing given that the following lines stated that different land use data

were used for calibrating.

6) L181, I would mention that suspended sediment is different from sediments as noted in L107.

7) L196, why TP/TN and sediments were calibrated for different years?

8) Table 2 could be moved to the supplementary material.

9) L221, More details should be given on how the land use data were used?

10) L239, it is confusing on "between 1987, 2010, and 2019", please clarify.

11) L246, what's mean of "by world's criterion"?

12) L268, it is a weak statement. Have you ever evaluated the performance of the model on a monthly scale?

13) Fig.3, should use different colors to better show the curves of simulated and measured data.

14) L301, what is the meaning of " agricultural grasses"?

15) Fig. 6, should add the legend of the box plots.

16) Fig. 7, maybe better to show the data in percent of change?

17) L376, "rural landscape patterns" is confusing? Why does this matter?

18) L394, should denote the means of "AIa", "CONTIGAWa"….

19) L448-449, this sentence is not well fit with the paragraph, as the above lines are mainly related to management.

20) L473 and following lines, I don't think it is necessary to highlight the methodology, as the methods adopted here were not novel.