

Review of
**“The hydrodynamic and environmental characteristics of tributary bay
influenced by backwater jacking and intrusion of main reservoir”**

by X. Li et al.

This paper reports on an investigation of the effects of water level fluctuations in the Three Gorges Reservoir on a tributary bay on the Tangxi River, the focus being on a number of water quality parameters. The study is based on a numerical simulation using the width-averaged vertically two-dimensional model CE-QUAL-W2. It was conducted for the year 2017 and water quality data collected at the Tangxi River Bridge located 18 km upstream from the confluence was used for validation.

Major comments

1. While the results address an important problem they are rather limited in scope. The paper could be enhanced, for example, with a discussion of how sensitive the results are to the model forcing, e.g. winds and air temperature. Are the distributions/variability in the water quality parameters driven solely by the water level fluctuations in the reservoir or do the forcings make a contribution?
2. The model validation is limited to comparisons of water quality parameters at a single point: the Tangxi River Bridge. These measurements do not include measurements of currents so there is no validation of the circulation patterns shown in figure 5 or of the two-dimensional distribution of the water quality patterns. This should be commented on and ideally addressed somehow.
3. The title has some grammatical errors: “The hydrodynamic and environmental characteristics of a tributary bay influenced by backwater jacking and intrusions from a main reservoir”
4. The introduction should include a background discussion on what backwater jacking is and what intrusions from the main reservoir are and the conditions under which they occur. It does not have to be long.
5. The abstract is very long. Seems too long to me.
6. Line 14. “ ... is the key ...”. Is it really true that this is the one and only key to solving eutrophication or is it one more several. I find it hard to believe that it is the only key to solving these problems. Similarly on line 74. Saying “is a key” seems more accurate.
7. The introduction is very focussed on the Three Gorges Reservoir. The paper could be enhanced by adding a discussion of tributary bays in other parts of the world which would help put the work in a wider context.

8. Line 152. Here it is stated that the water density is affected by concentrations of solids (should be 'suspended solids') but equation (6) for the density is a function of temperature only – it does not depend on concentrations of suspended solids. Were these concentrations included in the model somehow? If so this should be explained. If not this should be made clear.
9. What shortwave absorption model was used in this study? A two- or three-band model, or otherwise? With what attenuation coefficients? Fixed or a function of suspended sediments? In parts of the domain (e.g. figure 5) the water is shallow at some times of the year. Does shortwave radiation reach the bottom? If so how is it handled. Does it reflect off the bottom or is that heat absorbed by the bottom potentially creating unstable stratification?
10. I suggest adding a figure showing some of the meteorological forcings: air temperature and wind in particular. The only information on winds and air temperature are the monthly averages in table 1. Why are averages enough? What was the temporal resolution of the forcings used to drive the model: hourly, daily? Were the monthly averaged values used to driving the model? If so why not more frequent values? No diurnal cycle in the forcing? Is the solar radiation in table 1 a combination of long and short wave radiation? These should be reported separately because shortwave radiation penetration penetrates into the water column and longwave radiation does not.
11. Lines 192–193. The percentage error does not seem like a useful metric. A 25% error for a temperature of 4° is very different from a 25% error for a temperature of 20°.
12. Figure 5. The left side of the region plotted in each panel varies with month of year. How is this left boundary determined? The ranges of x values plotted also varies from month to month which makes it a bit difficult to compare results from different months. The panels are also too small. I find them difficult to read. I suggest full page figures with two columns, all using the same range of x values. Also, the red curve that is the boundary between Zone 1 and Zone 2 is difficult to see because there is not enough contrast with the colours of the other contour lines. They should be very different. In figures 7 and 9 the curve separating the zones is in black. It would be best to use the same colour in all figures. Same comments for other similar figures.

Minor comments

1. Line 9. "... by backwater ..." (delete 'the').
2. Line 10. "intrusions from the main reservoir". The main reservoir is not intruding into the bay, it is water from the main reservoir which is intruding.
3. Line 15. "... relevant to the water environment"

4. Line 17. "... by backwater jacking and intrusions from the ..."
5. Line 19. "... and water quality model ..."
6. Line 23. When the water level dropped where? In the main reservoir?
7. Line 24. What is a 'quality concentration boundary'?
8. Line 38. "200 m or even 300 m" is a bit redundant. If dams are 300 m high then it is not necessary to say they are over 200 m high.
9. Line 40. Delete 'However,' and 'the': "These dams block fish and change fish communities..."
10. Line 51. "... thus forming water areas ... to lakes known as a tributary bay"
11. Line 90. "... to a rise or decline in chlorophyll content depending"
12. Line 91. Do you mean 'Past studies have paid ...'? If you mean the present study (i.e. this paper) then the grammar is incorrect.
13. Line 96. "by backwater jacking and intrusions from the main ..." This needs fixing in many places.
14. Line 96. The sentence "How the tributary bay?" needs to be revised. Perhaps "There are many open questions regarding the functions of these types of systems: How does the operation of the main reservoir affect tributary bays?; How do hydrodynamic forces and the water environment of tributary bays respond to backwater jacking and the intrusion of water from the main reservoir?; What controls the water environment of tributary bays?"
15. Line 103. "... by backwater jacking and intrusions from the TGR ..."
16. Line 106. " and water quality ..."
17. Figure 2. The figure caption could be more informative, describing what is shown in each panel.
18. Line 131. "The vertical two-dimensional ...W2 solves the width averaged equations and is appropriate from simulating flow in long narrow water bodies. It was adopted for ..."
19. Line 135. What density current? This is the first mention of a density current.
20. Line 136. "... results using this ..."
21. Line 140. Delete 'listed'.
22. Lines 156–158. This information should appear directly below equations (1)–(5).
23. Line 183. "... was used to ..."

24. Line 200. What does “usually exhibits characteristics” mean? I do not understand this.
25. Line 215. How far away from the tributary bay was the meteorological data collected?
26. Line 216. “ sources were calculated and included as inputs to the numerical simulations”
27. Line 265. “... nutrient status of ...”
28. Line 277. Correct grammar.
29. Line 278. Delete “With the water level fluctuation through the whole year”
30. Line 283. “... length of the backwater ...”
31. Line 285. “... main reservoir was between 160 and 175 m and the ...”
32. Figure 4 caption. “The relationships among reservoir water level, length”. The caption should say what the curves are and what the filled in regions are.
33. Line 302. What is ‘water from the tail’?
34. Line 316. What does ‘directly flowed to the confluence’ mean? Flowed along the surface? This should be clarified. Where is the confluence in the figure?
35. Figure 7. The red contours in the figure should be explained in the caption.
36. Figure 9. Revise caption: “Distribution of COD ...”.
37. Line 462. “... was generally higher ...” (it was not higher in every month).
38. Lines 506. I don’t understand what the authors are trying to say here: “brought serve vertical”
39. Line 507. What is meant by “could contrapuntally be proposed”?