

## ***Interactive comment on “Water balance of selected floodplain lake basins in the Middle Bug River valley” by J. Dawidek and B. Ferencz***

### **Anonymous Referee #1**

Received and published: 25 September 2013

A. Summary of the Manuscript. The manuscript presents an interesting hypothesis that the vertical and horizontal water balance elements of floodplain lakes are linked to the type of hydrologic connection between the lakes and the main river. Water balance terms for several floodplain lakes in Poland are reported. The study systems show contrasting types of surface/subsurface hydrologic connections to the river, including connections that change over time. Terminology is proposed for the different types and positions of the water inflows, which sustain the lakes. The manuscript is novel mainly because it deals with complex aquatic systems that in some cases are hybrids between lakes and rivers, so do not fit well into conventional frameworks, and are not as well understood in terms of hydrology.

B. Overall Comments. The manuscript has correctly identified an important area of  
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needed research (hydrology of floodplain lakes) but is not sufficient for publication in HESS-D in its current status. Major revisions are required in order to be sufficient for publication. First, the manuscript requires a stronger connection between the results and the stated hypothesis. The hypothesis seemed interesting, but I didn't see enough arguments about whether the results are consistent or inconsistent with it (there was a light treatment in first paragraph of discussion, but more is needed, with stronger linkages to this nice data set). Another problem is that the discussion section (where I expected to see such arguments) is dominated by one very long paragraph that was over 30 sentences long, and was difficult to follow. Even if the hypothesis had been more about the results actually presented here, there is still an issue that the results need to be better organized, in order to distinguish the major points from the supporting details. So there is an overall need for better organization of the findings around central ideas.

Currently, I think the most interesting aspects of the paper are actually of a conceptual nature (classification of different types of floodplain lake hydrology), but for that I still struggled to interpret the meaning and value of the proposed terminology. Independent of some questionable choices for the floodplain lake terminology, which appears to be new and is not straightforward (“confluent recharge” and “contrafluent recharge”), there are other language issues that hinder communication elsewhere in the manuscript. In one case, a language issue is downstream of a larger conceptual problem: the term “recharge” is incorrectly used throughout the manuscript to indicate a gain in the lake system, when the convention is that recharge refers to a gain in the groundwater system. Consequently, when limnologists and hydrologists use the term “recharge lake” they are actually referring to a water body that delivers surface water into the ground water system. To avoid this mixup, the water inputs to floodplain lakes should be described as discharges from rivers and groundwater, or perhaps just “water inputs.” Nonetheless, it is clear that the manuscript touches on some interesting subjects, and I encourage the authors to continue working on them.

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## C. Figures and Tables.

### Fig 1

There are interesting concepts about lake classes in this figure, but I am not a fan of the proposed terminology, for several reasons (relates to above):

-There is the above issue of “recharge” being misused, when it is actually river and groundwater discharge that is filling the floodplain lakes. Needs to be fixed.

-“Confluent” makes me think of the word “confluence” which refers to rivers that flow together. But what we really have in all classes of floodplain lake is water flowing out of the river (through surface/subsurface distributaries, essentially the OPPOSITE of confluence).

-In accordance with the hypothesis, the word “connection” needs to be somewhere in this figure caption. -Instead of confluent/contrafluent recharge, what about forward-filling and back-filling (or reverse-filling)? Those seem way more straightforward. I do realize there are other features of the floodplain lakes that need to be taken into account too, so maybe some of these words could help: parallel, terminal, forward, backward, transient, fluvial, seepage, drainage, surface, subsurface. I am fine with the idea of a “profundal” connection, makes sense.

-This figure does not show an exhaustive list of the types of connections possible. That is fine, but if the goal is to only represent the types of connections found in the study area, then this needs to be clearly stated somewhere in the manuscript. Two things that may help here: a clearer emphasis in the manuscript body (and linked to this figure) that one study system may fall into different classes under different flow states; provide examples of other potential types of hydrological connections that are possible, but not found in the study area, and therefore not shown in Fig 1

### Fig 2

This map shows the locations of the lakes, but I don't really care about the locations.

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What I want to see are the lake morphometry and flow network, and possibly, something more about the types of connections. But the lakes and flowlines are too small to see these things.

Fig 3

If the y axes are in units of depth, how can the difference between the depth of inflow and depth of outflow be equal to the change in  $Q$  (volume per time) as labeled? That is not making units sense to me. Also I don't understand what the two smaller panels below panel B are showing

Table 1

-Replace "genetic type" with something more appropriate. Lake form?

Table 2

-How do all these numbers relate to the types of connections? A figure would show that better and it seems like that is a missing piece of this manuscript. How stable are the connections? I understand the need to classify the "on average" lake state, but I suspect in most cases the lake type changes with the flow conditions, and is probably a hybrid some of the time. It seems like this information is needed to justify the classifications assigned to each floodplain lake.

D. Line-by-line Comments.

Abstract

Overall- Where are statements about the results? What are the conclusions? This does not look like an abstract.

Line 4 and elsewhere- the association between confluent lakes and upstream connections is not clear yet (too soon) but also I think is the wrong path (see above)

Line 5-6- the association between contrafluent lakes and downstream connections is

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not clear yet, too soon

5-“only possible” is too informal

19- please be more specific than “intermediate features”

Intro

Line 9- definition of “hydrological” is unusual

Hypothesis statement at end of intro: There are interesting ideas in here. I encourage continued work on this, although the horizontal vs. vertical components of the hypothesis need to be set up better

Study Area and Methods

Equations 4 &5: Please distinguish between the two I (inflow) terms and the two O (outflow) terms. They are not identical values so additional notation is necessary, as well as explanation of the notation thereafter.

Page 10068 line 5: rephrase “territorial research”

Page 10068 line 8: rephrase “atmospheric supply”

Page 10068 line 24-27: condense and relate to change in storage, as that is what is being calculated in equation 6

Results body Line 22: “clearly” is not necessary

Conclusion and Discussion

-Page 10072, line 21-24: This is a key line, and it just isn't true, especially when stated so universally. My point is that according to Table 2, in some cases Evap (a vertical component) is LARGER than the sum of all inflows (a horizontal component)(see Lake Orchowek), which is the opposite of what is stated at this part of the manuscript. Even when Evap is not quite so large, there was still enough of it be of major importance to the floodplain lake hydrology and ecology. These are important and interesting aspects

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of how the water balance elements are linked to the type of hydrologic connection, in other words they relate directly to the intended focus of this paper, so should not be glossed over.

-Middle paragraph: Far too long (>30 sentences). The ideas need to be organized into a few paragraphs in order to be understood.

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 10061, 2013.

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