

Interactive comment on “High-frequency monitoring reveals nutrient sources and transport processes in an agriculture-dominated lowland water system” by B. van der Grift et al.

Anonymous Referee #1

Received and published: 28 September 2015

This study investigates the internal phosphorus and nitrogen dynamics within an impounded polder river system, using a combination of traditional grab sampling and sub-hourly data using auto-analysers and probes. The high-frequency nutrient data provided important information on nutrient sources, and how the system is effected by pumping management. It is an interesting paper, and worthy of publication, once the issues listed below have been addressed. This paper may not have wide international appeal due to the highly managed and artificial nature of the polder system, but some of its findings will be transferrable to more natural river systems.

Major comment

C3891

The study is about how to manage potential eutrophication in a highly-managed Polder system, using high-resolution monitoring. Unfortunately, this monitoring was only carried out from October to April, and so they have completely missed the period when high nutrients may pose a threat by impairing the ecology or causing algal problems. This issue needs to be addressed. What are the implications of not monitoring during the period when bloom risk, biological nutrient uptake and denitrification are at their peak? This seriously reduces the impact of this study.

Minor comments

8338.4. I'm not sure that this study is highly relevant. It is very site specific.

8338.11 Change to “losses via field drains after intensively...”

8338.18. Change to “The rainfall induced. . .”

8338.20. Change to “but this may be then buffered”. This study does not directly monitor the drain outputs and the data does not fully support this statement.

8338.22. Change highly to primarily.

8339.1. Change loads to concentration

8339.3. Reference needed.

8339.5. Change to “Aim to improve water quality”

8339.7. What other sources? Sewage effluent is a major one that doesn't get mentioned in throughout the paper.

8340.20 “has revealed the presence”

8340.23. Managed, rather than human controlled?

8340.26. A scientific paper shouldn't really be referencing Wikipedia as an information source,

C3892

- 8341.9. Algal growth is another potential mechanism for nutrient retention.
- 8342.15. A confining layer of what? Nearly nil? How long is the main river channel?
- 8342.19. Is ripening an accepted term? I haven't heard it before.
- 8343.22. Why didn't they do high-resolution monitoring through the spring and summer months? This is a major omission.
8344. The method descriptions are overlong and need to be reduced.
- 8345.7. Change Transparency to turbidity?
- 8348.14. Seasonal, rather than mid-term?
- 8348.20. This is where summer data would really strengthen the paper.
- 8349.10. Change to decreased during wet periods to a concentration of approximately.
- 8348.15. There is an increase in TP concentration during low flow. What are the sources? This may indicate that there are point inputs. Does the polder receive any sewage effluent from septic tanks and wastewater treatment plants? Whether they are present or not, this should be mentioned in the site description.
- 8351.3. The increase in TP during cold weather is a really interesting observation. It may also be due to river biofilms detaching from surfaces and entering the water column. This was observed in the River Frome, UK in Bowes, M.J., Smith, J.T., Neal, C., 2009. The value of high-resolution nutrient monitoring: A case study of the River Frome, Dorset, UK. *J. Hydrol.*, 378(1-2): 82-96.
- 8354.5 Natural or urban areas. Could the decrease be due to denitrification?
- 8355.20. Is it really all agricultural? Could there be any other potential NO₃ inputs from sewage?
- 8356.28. Delete levels

C3893

- 8357.10 and 11. Change from half to mid November.
- 8357.27. If the nitrate is being transported rapidly via interflow and tube drains, why does it take 5 days to get maximum NO₃ concentrations? Doesn't this imply that nitrate delivery to the pumping station is via a much slower route? The Lage Vaart river stretch appears to be only approx 12km long, so the nitrate signal at the pumping point should occur extremely rapidly after rainfall. I'm therefore not sure that your conclusions about tube flow are correct.
- 8362-3. Very wordy. Lots of repetition.
- Figure 1 is very unclear and needs improving. The town names are illegable. It is unclear that the area to the north of the map is lake / sea. The numbered monitoring points are not referred to in the text. Do these towns have wastewater treatment works? If so, please add them to the map.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 12, 8337, 2015.

C3894