

Interactive comment on “Lacustrine wetland in an agricultural catchment: nitrogen removal and related biogeochemical processes” by R. Balestrini et al.

Anonymous Referee #3

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This paper addresses a crucial question for management of lakes and rivers. In view of considerable fertilizer inputs in agricultural land, it is important to predict how different types and extent of riparian vegetation can remove nutrients before they enter surface waters. This study provides a detailed description of hydrological and biogeochemical changes observed along a transect going from cropland to a small lake of North-Western Italy. The results span over more than a year comprising dry and rainy periods. Such sampling effort cannot be carried out over many transects. This is unfortunate because results gathered along one transect cannot be generalized to the entire lake basin or to other lakes.

The decrease in nitrate observed over few meters in the poplar subunit is remarkable. The inverse relationship between alkalinity and nitrate concentrations observed in this study is intriguing and potentially a novel indicator of denitrification activity. However, as the authors report (page 3510, lines 25-26), this relationship was not observed in a similar study. It would be worthwhile to do a more accurate literature search to try to identify the environmental feature related to the presence/absence of this alkalinity-nitrate relationship.

I was surprised that phosphorus was completely ignored in this study. From the point of view of lake management, it is crucial to know the inputs of both nutrients. If the wetland is more effective at removing N than P, it could lead to an unbalance in the N:P ratio and to cyanobacterial blooms.

It would be interesting to discuss in more details the implications of the strong increase in NH₄-N observed in the reed zone. The concentrations were higher than near the cropland. The NH₄-N inputs can stimulate phytoplankton growth since this form of N is the most readily available to algae.

The paper is clearly written but could benefit from copy editing to correct punctuation and style.

Some more detailed observations: - Page 3504, lines 25-26. Agricultural land, forest, grassland, and urban areas cover 88% of the basin. What there is in the remaining 12%? - Page 3506, line 25. The detection limit for NO₃-N is rather high. - Page 3510, lines 12-15. The sentence "In the present study;..;" is not clear. It should be recast. - Page 3527. "poplar subunit"; instead of "reed subunit";. - Figs 8, 9, and 12. The regression equation, n, and p should be stated in the legend. - Figs. 5, 6, 10, and 11. The lettering is too small.

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