Hydrol. Earth Syst. Sci. Discuss., 6, C1859–C1862, 2009
www.hydrol-earth-syst-sci-discuss.net/6/C1859/2009/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Nitrogen retention in natural Mediterranean wetlands affected by agricultural runoff" *by* V. García García et al.

Anonymous Referee #1

Received and published: 17 August 2009

General The paper makes a useful contribution to the scope of HESS and provides some interesting insights into the functioning of natural ephemeral wetland streams to assist in the control of Nitrogen (N) from agriculture. The paper is generally well written and structured, although there are some minor improvements that could be made with English grammar. Some suggestions are listed against page and line numbers below. There is one major technical issue with the paper that needs to be addressed, which in turn reflects on the strength of the concluding remarks. The conclusions state there are clear reductions in N delivery from agricultural catchments due to these wetland streams. The data generally supports these claims, but could better represent the conclusions using some suggestions presented below. For example, the authors calculate the mean retention efficiencies by setting any negative retention values to zero.

Whilst this discounts these negative values, a better solution may be to report median retention efficiencies. This better reflects on the source/sink character of wetland systems. Additionally, the authors report N species retention efficiencies, concentrations and loads. Whilst these measurements are important to understand these systems, catchment managers are mainly interested in Total N retention and efficiency. It would not be a difficult task to include Total N retention efficiencies, concentrations and loads, and this should then better support the authors claims Use abbreviation for Nitrogen (N) after first instance (line 23 p5342) The authors should differentiate between wetlands and wetland streams - the latter of which is the focus of this paper as it is not always clear in the text. Perhaps the term wetland-streams should be the default term for this study.

Specific Comments p5324 line 18 improve rather than improves line 19 remove “a”

p5343 line 9 diffuse pollution is less easily controlled line 24 has been extensively studied “in conjunction with agricultural drainage and wastewater treatment systems”...

p5345 line 6 An understanding of rather than To gain an understanding of... line 21 Refer to Table 1 as well as Fig 1 here line 24 ephemeral rather than temporal

p5346 line 23 How shallow was the water? What chance was there of sample contamination if the water was shallow? line 25 - 26 Were the samples from each transect combined, or from each sampling combined? If so what was the rationale behind sample combination?

p5348 line 21 - 22 Why were negative retention values set to 0% when calculating mean retention efficiency? If negative retention values influenced the mean retention value significantly, then why not report the median value?

p5349 line 25 Perhaps a seasonal response is not evident due in part to how the data is presented in Fig 3. Discharges are measured and displayed on approximately a monthly timestep whereas rainfall is shown daily. Perhaps monthly rainfall totals would

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better match the timescales of measurement of discharge and may show a lagged seasonal response. Given the ephemeral nature of these systems various hydrological sinks in the catchments may need to fill prior to being realised in inlet discharge, resulting in a lag between rainfall and inlet discharge.

p5350 line 2 Table 2 reports mean values. Often data acquired from biological systems is not normally distributed, and skewed. Perhaps some non-parametric measures may better represent the central tendency values. For example, medians and 10th and 90th percentiles may provide more robust measures. line 20 The overall N retention efficiency should be reported as catchment managers are most often interested in this than the N species. N speciation is still useful in understanding how the wetland streams function and which species are retained the most.

p5352 line 1 Table 4 shows the results of the Spearman correlations “performed” rather than Table 4 shows the results of the Spearman correlations “done” line 23 - 24 This study shows... runoff “can remove N from water”. Prove is a bit strong

p5353 line 9 agricultural runoff rather than agricultural runoffs line 10 better performance in this study may be due to setting negative retention values to zero. Reporting mean values whilst including extreme negative values may result in a negative outcome for natural wetlands. Extreme values influence the mean significantly. If all of the values are accepted on face value rather than set to zero if they are negative, a median will only apply equal weight to all of the values - in other words it is not influenced by outliers in the same way as the mean

p5358 line 7 - 11 Given how the data was treated, ie, setting negative wetland responses to zero, and hence discounting the possibility that wetlands may behave as sources under certain conditions, I would be cautious in claiming that wetland streams control nitrogen fluxes when using the retention data. What is clear is that the wetland streams are sinks under some circumstances, and sources under others. A complete N mass balance would be required to support the claim that these wetland streams

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can control N fluxes from agricultural land. This can be done with the existing data by summing the N species data or using the Total N data (not presented), and integrating the input and output N loads, or at least summing them for the study period. Given that the NO3 concentrations represent the largest fraction of the Total N, and this is where largest differences are evident in supporting the claim of N retention, the positive benefits of NO3 retention should significantly override any N release from the wetland streams. line 11 is always of "better" quality than that entering them rather than is always of more quality than that entering them line 20 Whilst these wetlands may be a natural tool for processing nutrients from agriculture, doesn't that place these systems under threat? Artificial wetlands are essentially sacrifice areas that would reduce the nutrient pressure on these natural systems.

p5369 Table 4 probabilities can be removed from the table since the asterix signifies whether the R value is significant or not.

p5375 Fig 6. This figure is not essential as it is described by the Multiple Linear Regression (MLR) equation. If it was retained however, the figure would be more valuable if the data points that were used to derive the surface were included in the 3D plot. This would allow the reader to discern whether the responses were truly linear or whether they were more likely to be curvilinear, and whether the data was heteroscedastic. A curvilinear response seems more likely given that the NO3-N retention efficiency should plateau at 100%. In its current form, the MLR regression equation suggests that the wetland streams can retain more than 100% of the NO3-N inputs

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Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5341, 2009.