

Interactive comment on “Estimating net anthropogenic nitrogen inputs (NANI) in the Lake Dianchi Basin of China” by W. Gao et al.

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We thank you for your time and suggestions on our manuscript. We response to these comments in detail below.

Comments: “The contents in this paper is interesting and it is not so difficult to imagine how hard work you did to make this paper. However, the title and object is not clear and the conclusion is not acceptable. I understand the object of your paper is to clear or estimate the purification capacity in this area. In order to estimate this capacity, you used two NANI methods, area-weighting and land use-weighting, to compare the Nitrogen riverine export amount. So, two figures in fig. 5 are most important one in this paper. My wondering point is why you used date of catchment 4, 8 and 14 to make this figure. The catchment of 4, 8, and 14 are exactly different to others in

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population density and the percentage of urban area. Further, in these catchments, the distance from water treatment plan to water sampling point looks too close to discuss the purification capacity. If you make figure 5 without these three catchments, you will find more good fitting line between NANI and Riverine Export in Fig. (b). Also you will find different value of slope, and y-intercept of the linear fit function. For my roughly estimation, the slope value looks around 0.2 that is not so different value in North America and Europe (the last line of page 6). Also, intercept of X axis might be shifted to small value. If so, your discussion in page 7 will be no point. This is a reason that I cannot accept your discussion and conclusion. I think that your mistake to make Fig. 5 with all catchment data itself is showing one kind of important reminder or carefully point for using NANI to small area. Another small point that is needed to check is as follows. In Table 1, total Area is 2920.0. There are 15 catchments, so average value might be 194.7 km². This value is not fit the value in manuscript that is 175 km², for example line 24 in page 2. In Fig. 4, the unit of Area basis should be changed from kg km² yr⁻¹ to kg km⁻² yr⁻¹.”

Specific comments and response

(1) “My wondering point is why you used date of catchment 4, 8 and 14 to make this figure. The catchment of 4, 8, and 14 are exactly different to others in population density and the percentage of urban area. Further, in these catchments, the distance from water treatment plan to water sampling point looks too close to discuss the purification capacity. If you make figure 5 without these three catchments, you will find more good fitting line between NANI and Riverine Export in Fig. (b). Also you will find different value of slope, and y-intercept of the linear fit function. For my roughly estimation, the slope value looks around 0.2 that is not so different value in North America and Europe (the last line of page 6). Also, intercept of X axis might be shifted to small value. If so, your discussion in page 7 will be no point.”

Authors' response: Net anthropogenic N inputs (NANI) is calculated from four typical human-induced N sources: fertilizer use, legumes fixation, atmospheric NO_y deposi-

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tion and food & feed imports. While it is true that these three watersheds have the highest population density and proportion of urban land, the aim is to use a single methodology to estimate N inputs irrespective of the character of the landscape, and to eliminate these watersheds would remove the urban end of the spectrum from the analysis. For the three catchments, the high percentage of human population density and urban area indicate that human activities in these areas are very intensive, which is consistent with their high NANI values. If, as you suggest, we delete these three catchments from figure 5 (please see the attached figure 2), a poorer rather than better fitting line results. The slope is still very high (0.61) and the intercept is negative ($p < 0.05$), which is consistent with our current results. Instead, we have chosen to examine the effect of estimating the untreated riverine fluxes for these relatively urban watersheds (see reply to comments of reviewer 1), and feel that this approach supports our conclusion about the importance of waste treatment in such systems.

(2) "I think that your mistake to make Fig. 5 with all catchment data itself is showing one kind of important reminder or carefully point for using NANI to small area."

Authors' response: While we agree that dealing with relatively small watersheds is a challenge, we note that watersheds 4, 8 and 14 are not the smallest in the set considered. As noted above, we believe it is important to include the urban watersheds in the analysis even if the high resulting loads influences the result. Further, we think that we have identified an issue perhaps as important as scale in the relationship between NANI and riverine N flux: the extent of N removal in waste treatment in areas of high population density.

(3) "In Table 1, total Area is 2920.0. There are 15 catchments, so average value might be 194.7 km². This value is not fit the value in manuscript that is 175 km², for example line 24 in page 2."

Authors' response: It is true that the total area of Lake Dianchi Basin is 2920 km², but this includes the area of the lake itself as well as the land area of its catchment.

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The lake area is about 300 km², which is about 1/10 of the total area. To calculate average area of the 15 catchments, lake area should not be included. Therefore, the correct calculation should be: $(2920-300)/15=175$ (km²). So, the average area of the 15 catchments is 175 km². We have clarified this in the text, in Table 1 "Total basin" was changed to "Total basin (including Lake Dianchi)", and in Page 4126 Line 21 "not including the Lake Dianchi" was added at the end of the number 175 km². Thank the reviewer for noting this point.

(4) "In Fig. 4, the unit of Area basis should be changed from kg km² yr⁻¹ to kg km⁻² yr⁻¹."

Authors' response: Thank you for the correction. The figure had been corrected during typesetting process, thus the newest version online is correct.

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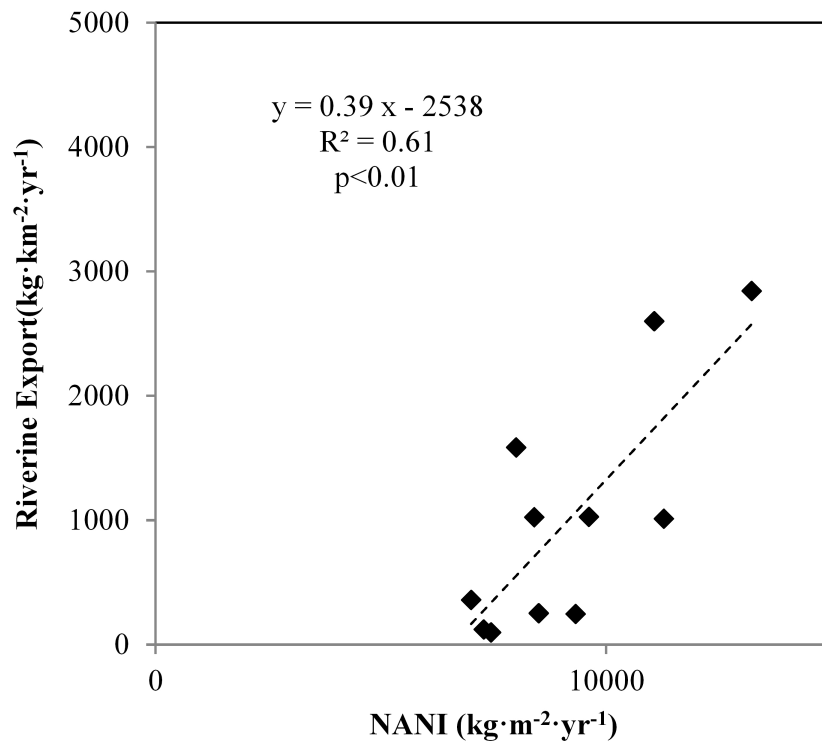


Fig. 1.

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