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# ***Interactive comment on* “Extreme dissolved organic nitrogen fluxes in the human impacted Pamba River, Kerala, India” by S. Elizabeth David and T. C. Jennerjahn**

## **Anonymous Referee #2**

Received and published: 9 January 2014

I appreciate the opportunity to review the manuscript titled “Extreme dissolved organic nitrogen fluxes in the human impacted Pamba River, Kerala, India” by S. Elizabeth David and T. C. Jennerjahn. This manuscript provides DON values for a highly impacted river in a region of the world where data are lacking. While the analyses are not especially novel, the extraordinarily high DON values and attribution to different sources are worthy of publication. The influence of pilgrims on DON is interesting and the recommendations for improvements are warranted. This river is clearly an endmember for riverine DON and I believe these values will be well cited in the future.

General Comments:

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In several places there are statements indicating that DON has been largely ignored (e.g., Page 2, Line 9; Page 4, Line 3). This may have been true 15 years ago, but since then there has been progress in measuring and monitoring DON. I think these comments should be toned down, for example by stating that DON has received less attention than inorganic N.

The authors refer to “pilgrims” several times before much of a description is given. It would be helpful to briefly explain what is meant by the term “pilgrim” where it is first mentioned.

It would be useful to attach some values to statements made in the abstract. (Sewage is a major source of DON; The pilgrim event accounts for most of it; DON makes up a significant portion of anthropogenic nitrogen.)

The authors state that they were unable to quantify all the N losses in the segmentwise calculations, which resulted in negative load values in some cases. Nevertheless, they went on to report loads for segments I, II, and IV. Even though values from these areas were positive, it seems like they could be underestimated for the same reasons they were negative in other areas. The unbalanced budget indicates that the uncertainty in the estimates is very large.

The calculation of DON produced by pilgrim waste assumes that all the N makes it to the stream. I think it is safe to assume that much of it is retained in the soil. The authors should at least mention this.

DON values recorded after the pilgrim event are lower than the values recorded during (and even before) the event. This suggests that the systems are fairly resilient.

In the conclusions, it could be stated that there are methods for better evaluating sources of DON. For example using methods such as optical properties and molecular size. This is a burgeoning field of research that could shed light on the sources of DON.

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The writing needs considerable work. I attempted to address these errors below, but may have missed some.

Specific comments:

Page 2, Line 9. Even though it is in the title, it would be good to restate that the Pamba River is in India.

Page 2, Line 14. Fertilizer application and inadequate sewage treatment are not really land use practices.

Page 2, Line 25. Delete the word “of”

Page 3, Line 1. Change “i.e.” to “e.g.”

Page 3, Line 13. Delete the word “the” before “ecosystem functioning”

Page 3, Line 18. Change “lead” to “leads”

Page 3, Line 20. Change “algal bloom” to “algal blooms”

Page 3, Line 23. Insert a comma after “activities”.

Page 3, Line 24. Insert “source of” before “N contributing”

Page 3, Line 27. Insert “the” before “microbial”.

Page 4, Line 10. Replace “from” with “for”

Page 4, Line 16 Insert commas before/after “, including India,”

Page 4, Line 17. Insert “water” after “drinking”

Page 4, Line 20. Insert a period after the citation.

Page 4, Line 21. Change to “Water resources in many parts of India are getting depleted because of the rapid increase in the population and increasing demand for water used in irrigation and human and industrial consumption.”

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Page 4, Line 27. Change to “A unique feature of the Pamba River catchment is the Sabarimala temple, the largest pilgrim center in the world. In addition to pilgrim activity, other major anthropogenic sources of N in the catchment are agricultural land use practices, livestock farming, and sewage effluent.

Page 5, Line 2. Relationships between what?

Page 5, Line 14. “into” is one word

Page 5, Line 16. Replace “making up” with “comprising”

Page 5, Line 19. Replace “is obtained” with “occurs”

Page 5, Line 25. Consider changing to “ The major land use category in the Pamba basin is forest, comprising 44% of the total land area.”

Page 6, Line 2. Insert “The” before “Sabarimala” Insert a comma after “world”

Page 6, Line 7. Replace “comprises” with “are located in”

Page 6, Line 8. This seems redundant with Line 6 because both sentences indicate that this type comprises 14% of the land area.

Page 6, Line 15. Change “comprises of” to “is comprised of”

Page 6, Line 23. Change “is the main land use” to “are the main land uses”

Page 7, Line 8. Insert a comma after “analysis”

Page 7, Line 11. Replace “in a” with “with a”

Page 7, Line 15. Insert “a” after “using”

Page 7, Line 17. Replace “were” with “was”

Page 8, Line 6. Till?

Page 9, Line 18. Insert a comma after “April”

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Page 9, Line 18. Replace “displayed” with “recorded”

Page 11, Line 23. Change “comprising” to “comprised”

Page 12, Line 1. Change to “, for instance in Latin America, Africa, and Oceania, BNF comprises 85% of the total N. . .”

Page 12, Line 2-5. These sentences are unclear and need to be rewritten.

Page 12, Line 11. Change to “Various activities were observed such as bathing with soap, discarding trash, and urinating and defecating on the river banks.”

Page 12, Line 15. Replace “was taken” with “took”

Page 12, Line 16. Change to “took part in ritualistic bathing in the river, which led to. . .”

Page 13, Line 5. Delete “the” before “DON”

Page 13, Line 25. Delete the term “considered as”

Page 14, Line 6. Replace “comprised” with “reported”

Page 14, Line 7-10. These sentences are poorly formed and need to be rewritten.

Page 14, Line 13. Delete “the” before “rainfall”

Page 14, Line 18. Not sure what is meant by “natural calamity”

Page 14, Line 21. State where the Guadalquivir catchment is located.

Page 14, Line 25. Insert “of DON” after “source”

Page 15, Line 18. Delete “thereby”

Page 15, Line 19. Change “fowls” to “domestic fowl”

Page 15, Line 19. Delete the word “is”

Page 16, Line 15. Delete “to this”

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Page 16, Line 24. This sentence is poorly written and needs to be reworded

Page 17, Line 18. Comma should be before “thereby” rather than after

Page 17, Line 24. Comma should be before “thereby” rather than after

Page 18, Line 11. Change to “Domestic sewage inputs, despite being high, do not balance. . .”

Page 18, Line 19. Insert “a” before “high”

Page 18, Line 20. What is meant by “adjusted” human water security threat?

Page 18, Line 22. Insert “a” before “high”

Page 18, Line 27. Insert a period at the end of the sentence.

Page 18, Line 27. Delete “the” before “sewage”

Page 19, Line 6. Capitalize “Export”

Page 19, Line 19. Replace “is concluded” with “appears”

Page 19, Line 24. Insert a comma after “before”

Page 19, Line 27. Change “It comprised of” to “DON from pilgrim activity comprised”

Page 20, Line 6. Change “. It amounts to” to “, amounting to”

Page 21, Line 3. Change to “sufficient toilets to accommodate the pilgrims. . .”

Page 21, Line 5. Sentence needs to be reworded.

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Interactive comment on Biogeosciences Discuss., 10, 16137, 2013.

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