

Biogeosciences Discuss., author comment AC1
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Reply on RC1

Alan Gomes Mendonça et al.

Author comment on "Influence of land use and occupation on the water quality of a microbasin in the southwestern Amazon" by Alan Gomes Mendonça et al., Biogeosciences Discuss., <https://doi.org/10.5194/bg-2020-485-AC1>, 2021

The manuscript presented the results from a basin-scale water quality survey conducted through four seasons in the southwestern Amazon. Continuous progression of anthropogenic disturbance in the area has developed serious deterioration of water environments and scientists are highly expected to provide insights for resolving and managing/controlling the problems. In this context, the authors only reported the measured values for several parameters, failed to identify research questions based on knowledge previously accumulated (known and unknown) and, accordingly, were unable to emphasise the impacts of this study on academia and society. Hence, I evaluate the manuscript is not at the level of publication in Biogeosciences as an original article with a decision of Rejected.

Major comments:

- In Abstract and Introduction, what do you mean by "diagnose"? The objectives have not been specified due to lack of establishing the research question.

The basin diagnosis refers to the state of land use and occupation of the Igarapé Nazaré basin and its influence on water quality. This diagnosis is a methodological step taken from the Brazilian National Water Resources Policy to classify bodies of water into classes. In order to fit a body of water in a certain class, a complete study of the hydrographic basin is necessary, where the diagnosis of the basin is the first stage of this process.

- Explanation on the methodology introduced by the authors to analyse "influence of land use and occupation" is critically insufficient and illogical throughout the manuscript.

The method used to analyze the influence of land use and occupation, was to establish a relationship between the form and the characteristics of use within the basin under study. The basin had its natural area converted into an urban and rural area. Then, the most significant point sources of pollution were identified, among other information, and data from an article already published by the same author and on the same basin according to the DOI were used: <https://doi.org/10.22478/ufpb.1981-1268.2020v14n3.52610> relating the use and occupation data with the water quality data found for the basin. The process is carried out in this way due to the methodology defined by the Brazilian National Water

Resources Policy for framing water bodies. This study was carried out in view of the need to improve water management in the Amazon region, which does not have a framed river, as determined by the National Water Resources Policy. Thus, it was analyzed whether the characteristics of use, are affecting or not the water quality of this stream from the data of use and occupation of the soil and the quality parameters analyzed in the stream in different periods.

- L130-142: What is this analysis on temperature for in the relationship with the following water quality parameters?

The analysis of the temperature variable is extremely important in studies that analyze the presence / absence of vegetation cover in a basin, considering mainly that this variable is strictly related to environmental variables such as dissolved oxygen and depth, and with a high influence on the aquatic biota.

- L148, 197, 230, 251, 259: For all of transparency, phosphorus, nitrite, EC, Chl.a and bacteria, no significant seasonality was examined. Was it as the authors expected or unexpected before the analyses? What does "objective of identifying possible temporal variations" mean by? What was the hypothesis originally?

As a main result, the authors expected that differences in water quality parameters would show differences between the hydrological periods analyzed. Thus, we inserted a hypothesis at the end of the introduction section in order to better present the results of this research.

"we hypothesized that the water quality parameters vary between the seasons of the hydrological cycle, in a microbasin in southwestern Amazonia. Following the premise that for each period of the hydrological cycle, the environment changes its environmental conditions due to differences in water volume and depth, which consequently influences the concentration and availability of limnological variables."

- L148-152, 168-173, 184-185: The authors tried to discuss on the pollution source by using concentration data only, however, need another analysis on pollutant loading (concentration and river flow) for that purpose.

For this manuscript, the objective was to present data on water quality and the influence of land use under them in the Igarapé Nazaré watershed. However, we believe it is very important studies that, through flow data, can contribute to a better understanding of the dynamics of pollutants in this basin, which was not possible in this research.

- L153-155, 238-240: Those descriptions on phosphorus and Chl.a are not discussions deduced from the obtained results in this study, and should not appear in Discussion section.

The portion of the text in question has been removed as requested.

- L193-196: What would be a logical relationship between "significant increase in the LW for ammonia" and "highest nitrate in HW and HW/LW"? I do not understand the mechanism of "a longer time interval for contamination".

One of the consequences of being a microbasin with a strong anthropic influence, is that we are unable to observe the chemical transformations of chemical substances (nitrate, nitrite and ammonia) as in a non-anthropized environment. In the Nazaré stream microbasin, effluents are discharged with different concentrations of nitrogenous substances, which makes some interpretations of the results unfeasible over a hydrological cycle. Because regardless of the flow, the effluents continue to be released.

- L208-2009: I do not agree “As can be observed” and “This result can be correlated” in Figure 5a.

P4 is the sampling point where the values observed for dissolved oxygen were the lowest. For the last three sampled periods (HW / LW; LW; LW / HW) the presence of dissolved oxygen was not identified in P4, pulling the lower limit of the box-splot graph downwards. However, the values of Electrical Conductivity and Turbidity for the same point and period will be added in the text for better visualization and interpretation.

- L210-212, 221-224: For insisting those conclusions, the authors need to present TOC and its correlation with transparency.

It was not possible to perform this analysis.

- PCA in L260-272: The meanings/interpretations for Axis1 and Axis2 are necessary at minimum in basic discussion on PCA. The two obvious groups (P1,P2,P3 and P4) should be first assessed by comparing to the interpretations for the axes. “These results are similar to those reported” makes no sense without detailed discussion.

The discussion was expanded to better characterize the results of this article with other articles in the same area, as follows:

These results are similar to those found by Toledo and Nicolella (2002) and Oliveira et al. (2017) where for microbasins with rural and urban influence they presented the highest values of correlation coefficient between the same variables presented in this axis. The authors observed a great influence downstream of the analyzed streams, after urban areas, of extensive cattle breeding on water quality and the influence of heavily impacted tributaries, as is the case of the P4 analyzed in this research.

We emphasize that the sampling points were grouped and purchased with the indications for each axis of the PCA.

Minor comments:

- L85 “using 95% ethanol”: Not explaining the correspondent analytical method appropriately.

For the analysis of chlorophyll a, a volume of 100mL of sample was filtered through a glass microfiber filter, 0.45 µm porosity (Whatman AP – 20). Subsequently, the filters were added to Falcon tubes protected from light, and 5mL of 95% ethanol was added. The tubes were then taken to a water bath until reaching a temperature of 75 ° C, and kept under these conditions for 5 minutes. Then the tubes were cooled and kept protected from light for 6 hours. Subsequently, the samples were centrifuged, removing the supernatant from which the spectrophotometric measurements were obtained at 664 and 750nm ((Kasuaki, IL-226-NM).

- “3.1 Land use and occupation” should be moved to Study Area in Methods section.

The cited section will be removed to the study area.

- L108: figure 3 > Figure 3

The correction will be accepted and changed in the article.

- Figure 2: What are “Colorful Composition RGB” for? This figure can be combined with Figure 1.

The caption indicating the composition R (RED) G (GREEN) and B (BLUE), indicates the coloring process of the satellite image used. It is preferred not to combine the two figures due to different information contained in the maps, Figure 1 addresses the water sampling points and Figure 2 highlights the main point sources of pollution, identified within the hydrographic basin, which would make the map “polluted” with so much information.

- Table 2: Errors should be added for each.

A new table will be added with the errors, as requested, with a new title: Table 2: Environmental variables (mean \pm SD) in the Igarapé Nazaré microbasin for the four periods sampled. Depth (cm) and transparency (cm).

- Table 3: What is this figure for?

These values serve as a comparison for results observed in hydrographic basins close to the Igarapé Nazaré basin, and which have similar characteristics of use and occupation.

- Figure 6: Please confirm if F1 and F2 were switched.

They were not exchanged. F1 (38.86%), F2 (13.01%).