

Date: 13th April 2022
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Subject: Letter to the Editor



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Dear Editor,

We would like to extend our appreciation for the comments received from the reviewers as well as for your facilitation and management of the review process. Kindly find enclosed the responses to the comments and suggestions received from the reviewers.

In addressing the comments made, we have prepared the following:

1. A track-changes version of the final manuscript has been provided and,
2. The detailed responses to the reviewers (#1 and #2) have been included below.

We hope that the adjustments made will satisfy all concerns and improve the overall quality of the manuscript. Special attention was paid to the comments provided by both reviewers and we ensured that all the primary sources were properly cited throughout the paper. In condensing the report, as suggested by one of the reviewers, other revisions were also made and these were captured in the track-changes. We tried to maintain the papers' applicability to a view range of environmental modellers as well as the replicability of the study.

We look forward to hearing from you.

Sincerely,

Dear Edward Anthony,

Thank you for your comments and suggestions as well as the time spent during the review process for the manuscript. It's most appreciated and refined the quality of the overall paper. Kindly see the text below for our detailed responses to each comment/suggestion.

Warm regards,

Uwe

On behalf of the co-authors

Detailed responses to the comments of Reviewer #1

- The article proposed by Best et al. is appropriate to support the publication of a data set aimed at assessing the potential of mangrove restoration works in Guyana, where largescale removal has been followed by a mangrove restoration project. This dataset is diversified and multi-facetted with complimentary items and corresponds to a state-of-the art acquisition and treatment of information on waves and their attenuation across muddy substrates and mangroves, the associated sediment properties of the substrate, as well as mangrove characteristics and vegetation density. The dataset proposes some common standards for comparison and the establishment of interesting new norms of determining mangrove vegetation density. The dataset is significant, unique, and useful. There are no inconsistencies in the dataset and the supporting article and the dataset itself are of good quality, especially in the light of the difficult muddy environment of the Guianas.

We would firstly like to thank you for the validation of the value of the dataset along the Guyana coastline. Given your expertise in coastal morphodynamics and applications along the Guianas coast, we are pleased by your overview of the acquisition and the findings of the measurement campaign. Indeed, the use of common standards was intentional to allow for comparisons to similar sites regionally and internationally.

- My comments are minor and essentially concern better referencing with due attention to previous works that have been forerunners on the theme developed within the dataset:

Line 55-58: the significant removal of mangroves on the Guyana coastline and the potential deleterious effects on coastal risks and stability were treated by Anthony and Gratiot (2012)* who noted in particular the potential difficulties and pitfalls of mangrove restoration following removal. In a similar vein, the large-scale removal of mangroves in French Guiana, which lies on the mud-bank belt updrift of Guyana, has been shown to result in a considerable reduction in the capacity of mud banks to become attached to the coast (Brunier et al., 2019)*, a process

important in attenuation of wave energy, thus further strengthening the rationale for this dataset paper.

*Anthony, E.J., Gratiot, N., 2012. Coastal engineering and large-scale mangrove destruction in Guyana, South America: Averting an environmental catastrophe in the making. *Ecological Engineering*, 47, 268-273. <https://doi.org/10.1016/j.ecoleng.2012.07.005>

*Brunier, G., Anthony, E.J., Gratiot, N., Gardel, A., 2019. Exceptional rates and mechanisms of muddy shoreline retreat following mangrove removal. *earth Surface Processes & Landforms*, 44, 1559-1571. <https://doi.org/10.1002/esp.4593>

Thank you for highlighting the connections to the mentioned articles which are certainly key references for the implications of mangrove removal and the importance of mangrove restoration. We have reviewed the entire article for the inclusion of similar works and have included the works mentioned above.

- Other minor points:

Line 173: Satellite coverage is not the only alternative remotes-sensing method for monitoring bed level elevation within mangroves in the Guianas. Proisy et al. (2009)* used dense clouds of data points generated by LiDAR to monitor bed topography under mangroves in neighbouring French Guiana.

*Proisy, C., Gratiot, N., Anthony, E.J., Gardel, A., Fromard, F., Heuret, P., 2009. Mud bank colonization by opportunistic mangroves: a case study from French Guiana using lidar data. *Continental Shelf Research*, 29, 632-641. <https://doi.org/10.1016/j.csr.2008.09.017>

Thank you for mentioning this. Definitely, the use of LiDAR techniques have been quite instrumental in progressing the bed topography capture within mangrove fringes. However, the intent behind line 173 was to justify the use of one particular ‘traditional surveying’ instrument (Precision Automatic Level / theodolite) over another (Differential GPS). We have amended the sentence to ensure the meaning is made clear and the reference mentioned has been included.

- Lines 181, Lines 303-310: Sediment samples (instead of soil samples, and mud substrate instead of soil). The study does not have a pedological objective.

This is most helpful. We agree and have adjusted the text within the document accordingly.

Dear Reviewer,

Thank you for your comments and suggestions as well as the time spent during the review process for the manuscript. It has been most appreciated and quite useful. We have reviewed the overall structure and content of the manuscript and made the necessary adjustments. Additionally, kindly see below our detailed response to each comment/suggestion.

Warm regards,

Uwe

On behalf of the co-authors

Detailed responses to the comments of Reviewer #2

Wave attenuation potential, sediment properties and mangrove growth dynamics data over Guyana's intertidal mudflats: assessing the potential of mangrove restoration works

This is an interesting topic and important for the literature. In addition, this is a well organized study from a region where there is a paucity of this type of research. This makes the data presented here worthy of publication. The methodology and design of the research project is acceptable. No comments and suggestions are given for further improvement. Manuscript is quite long. Summarize it. So, highly recommended to summarize the text of this manuscript. Finally, I suggest "accepting" this manuscript with "minor correction".

We highly appreciate that the reviewer considers the data set of wide utility. We accept the suggestion to summarize the highlighted sections and have strived to achieve this.

- Introduction (general comment A)

I feel that the introduction is quite long and you can reduce text by 10-20%. Carefully think and revise considering repetition of meaning. In the Introduction, you need to clearly state what is the scientific question you are addressing? And how you will do it? Why is it important for international readers to care about your manuscript? What is the novelty of your manuscript. These points should be addressed in the Introduction.

Thank you for your suggestions. We have reviewed the content of the introduction with your mentioned points in mind. We have also reiterated the value to the international community while summarizing the text where possible.

- Lines 35-40 [C1]: "Mangroves belts are key ecosystems residing in the intertidal area of tropical and sub-tropical coastlines and a key component in the discussion of green-grey infrastructure (Blankespoor et al., 2017; Kg et al., 2017; Horstman et al., 2014; Beck, 2016; Borsje et al.,

2011; Bao, 2011).” Please refer the journal guidelines and follow the reference in alphabetical or chronological order (check authors guidelines). Consider this comment here after.

Thank you. It has been set to the chronological order.

- Lines 40-45 [C2]: “in the intertidal area: tidal flooding, exposure to waves and varying degrees of salinity(Mazda et al., 1997; Mazda et al., 2006; Hogarth, 2015; Willemsen et al., 2015)”. You can refer this recent article in Journal of Coastal Conservation 22, 1191–1199. <https://doi.org/10.1007/s11852-018-0628-7> for understanding how seasonal and tidal influence for water quality changes (e.g. pH, temperature, ORP, conductivity/salinity)along the mangrove covered coastal aquifer.

This is a very interesting study. Thank you for sharing. We have included this in the revised text.

- Lines 50-55 [C3]: “Therefore, there is a vital need to explore in depth the physical contribution of mangroves locally to reducing coastal vulnerability to hazards such as sea level rise and extreme waves in order to adequately optimize the project planning and designing phases for green- grey infrastructure.” You can read/refer this case study published in Geoenvironmental Disasters 7, 17 <https://doi.org/10.1186/s40677-020-00154-y> for understanding sea-level inundation and risk/vulnerability assessment in coastal areas.

Thank you for sharing. We have included the recommended reference as well as the study by ‘van Zelst, V., Dijkstra, J. T., van Wesenbeeck, B. K., Eilander, D., Morris, E. P., Winsemius, H. C., ... & de Vries, M. B. (2021). Cutting the costs of coastal protection by integrating vegetation in flood defences. Nature communications, 12(1), 1-11’.

- Lines 12 and 53 [C4]: You have mentioned sea-level here. Refer Palaeogeography Palaeoclimatology Palaeoecology 465, 122–137.

<http://dx.doi.org/10.1016/j.palaeo.2016.10.024> This study investigated how mangrove react with sea-level changes. This paleo study suggested mangrove spread widely with initial sea-level inundation in coastal areas during the middle Holocene sea-level stand about 7500 Cal. years BP, based on biomarker proxies (e.g. taraxerone) in sedimentary organic matter.

Most interesting study indeed! However, we do believe that the citation is not best suited in the specified lines. Moreover, the study by the IPCC, ‘*Masson-Delmotte, V., Zhai, P., Pirani, A., Connors, S. L., Péan, C., Berger, S., ... & Zhou, B. (2021). Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change. IPCC: Geneva, Switzerland.*’ and by ‘*van Zelst, V., Dijkstra, J. T., van Wesenbeeck, B. K., Eilander, D., Morris, E. P., Winsemius, H. C., ... &*

de Vries, M. B. (2021). Cutting the costs of coastal protection by integrating vegetation in flood defences. Nature communications, 12(1), 1-11, are better suited in this context.

- Lines 70-85 [C4]: It is very long chapter with having a single reference of Bovell (2019) for supporting your statement (Bovell, O.: Setting the foundations for zero net loss of the mangroves that underpin human wellbeing in the North Brazil Shelf LME: Review of the effectiveness of existing coastal restoration efforts in Guyana., 2019). I also feel that this is not peer reviewed index journal publications. Consequently, to address why is it important for international readers to care about your manuscript? you can refer (1) Expert assessment of future vulnerability of the global peatland carbon sink. Nature Climate Change 11, 70–77. <https://doi.org/10.1038/s41558-020-00944-0> for predict present and future condition of carbon sink, and (2) The Anthropocene Review 5, 28–68. <https://doi.org/10.1177/2053019617740365> for elaborating/showing evidence of first human impacts and responses of aquatic systems in the world.

Thank you for your feedback. However, the intention behind lines 70 – 85 is to describe the system dynamics specific to the Guianas and to provide context for the project site where the measurements were collected. Unfortunately, the references you provided do not add to this regional context. The Guiana's is a major mangrove coastline from a global perspective and shares many ecological (mangrove species habitation) and morphological (transitioning coastline with migrating mudbanks) similarities with other coastal mangrove fringes regionally and internationally. Therefore, the applicability to an international reader is certainly based on these similarities as well as in the case study of the wave dynamics along a restored mangrove fringe. The references provided in this section are based on the published works of Pieter Augustinus (1978) and one of the deliverables (by Bovell, 2019) from the regional project “Setting the foundations for zero net loss of the mangroves that underpin human wellbeing in the North Brazil Shelf LME” (which comprised both local and international experts in the field).

- Lines 110-115 [C5]: “2.1 System characteristics”: the term study area is better (I feel).
Thank you for your feedback. However, the entire section 2 refers to the study area, whereas section 2.1 describes specifically the hydrodynamics and morphology of the area (hence the use of ‘system characteristics’). This we feel better describes the section in question.
- Lines 125-130 [C6]: 120m – 400m: Need a space between value and unit. Consider this comment here after. I found that such several formatting issues. Consider it during revision of your manuscript.

This is most helpful. We agree and have adjusted the text within the document accordingly.

- Lines 128-138 [C7]: a. “tidal range fluctuating between 1.17 m during an average neap tide and 2.5 m during an average spring tide”, b. “The strongest winds occur in the period December – March/April and vary between 3 - 8 m/s from a predominant northeast direction”, c. “The measured currents, at 25 m depths offshore, have a magnitude between 0.1 and 0.5 m/s and a direction varying between 240 °N and 360 °N.”, You need to include supportive evidences/references for those statements. In this manuscript, you need to consider this comment here after, such direct statements with values.

Thank you, this is most helpful. We have adjusted the text accordingly.

- Data collection field site (general comment B)
Again, I feel that “2.1 System characteristics” is quite long and you can reduce text by 10%. Carefully think and revise considering repetition of meaning. Similarly, sections from 2.2 to 2.7 are also quite long and you can reduce text.

We have revised the heading for section 2 to ‘Field site & data collection methodology’. Section 2.1, has been revised with your comments in mind. However, sections 2.2 to 2.3 (in updated version, previously 2.2 – 2.7) detail the layers of the methodology for all individual datasets. This is a requirement of the journal for all data papers and allows for replicability among the scientific community.

- Line 160 [C8]: “Data Collection and Processing” It is separate sub-sub section? 2.2.1????
This has been revised to 2.3 with sub headings 2.3.1 – 2.3.5.

- Results (general comment C)
Results part is well written. However, you have to define abbreviations at its first appearance (e.g. ASTM). Consider this comment here after.

Noted with thanks.

- Discussion and conclusions (general comment D)
D1: The authors must separate Discussion and Conclusions.
D2: You have already discussed your discussion under chapter 3. Results, 4. Wave attenuation potential for mangrove belt, and 5 Data availability.

Consequently, you can follow the recommended/standard format of 1. Introduction, 2. Study area and Methodology, 3. Results, 4. Discussion, and 5. Conclusions.

Noted with thanks. We have made the necessary adjustments: (1) section 3 has been renamed ‘Mangrove characteristics and environmental conditions’ and provides jointly the results and

discussion aspects. (2) There is now a separate conclusion section. We have adopted the format outlined in the journal requirements.

- References (general comment E)

I have observed that only few references are from the recent literatures. Consequently, I highly recommended to add few additional recent literatures which are published during few years. Researchers must be up to date and updatable. I have suggested few references as well.

Regional Studies in Marine Science 30, 100726.<https://doi.org/10.1016/j.rsma.2019.100726>

Regional Studies in Marine Science 46, 101884.<https://doi.org/10.1016/j.rsma.2021.101884>.

Noted with thanks. In the revised version at least one third of the references are within the last 6 years.

- Figures (general comment F)

F1: Figure 1: I can't read some text in even 139% magnification (see location names in A and B images). I can't get any relevant information from Figure 1C (must increase the size)

F2: You must improve the quality of photographs such as 3, 4, 6, 12. But, I don't know whether it is technical error during the generation of PDF from your world file.

Thank you for your feedback. All figures have been prepared separately to the required resolution as stated by the journal. These figures will be included in the final stages of the review process. They have been reviewed with your comments in mind. Additionally, Fig.1 C as mentioned in the caption shows only the development of the spatial extent of the fringe 10 years post-restoration.

- (general comment G)

There are too many errors in the structure of the manuscript. See several comments above (but, I did not mention every point). The author must carefully revise the manuscript. In my conclusion, the manuscript has several repetition, many basic errors, no clear discussion.

I very strongly suggest that the authors have their manuscript revised by a qualified scholar or carefully revise it.

I hope the review a revised version of this work (if necessary).

Thank you for your feedback. It has been most useful. We have reviewed the overall structure and content of the manuscript and made the necessary adjustments.