KORESPONDENSI PAPER

Judul : Mangrove above ground biomass and carbon stock in Karimunjawa-Kemujan Islands estimated from Unmanned Aerial Vehicle-imagery

Jurnal : Sustainability / MDPI (Q1)

No	Aktivitas	Tanggal	Keterangan	Lamp.
1	Submission	15/09/2021	[Sustainability] Manuscript ID: sustainability-1401714 - Submission Received	1
2	Hasil review ronde 1 : Rejected but encourage to resubmit	05/10/2021	[Sustainability] Manuscript ID: sustainability-1401714 - Declined for Publication - Encourage Resubmission after Revisions Rejected but encourage to resubmit dengan 2 reviewer	2
3	2nd submission	20/11/2021	[Sustainability] Manuscript ID: sustainability-1495057 - Submission Received Balasan komentar reviewer terlampir	3
4	Hasil review ronde 1	31/12/2021	[Sustainability] Manuscript ID: sustainability-1495057 - Minor Revisions Minor revision	4
5	Revision round 1 submitted	05/01/2022	[Sustainability] Manuscript ID: sustainability-1495057 - Revised Version Received Balasan komentar reviewer terlampir	5
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General Response

We thank to both reviewers for the constructive comments, questions and suggestions that can improve the quality of this manuscript. In this revised manuscript, we have rearranged the structure and add more explanation following the reviewer's suggestion. The modified parts are highlighted in yellow.

Reviewer 1

The manuscript discusses the Unmanned Aerial Vehicle (UAV)-based estimation of the above-ground biomass (AGB) and carbon stock in Karimun Jawa and Kemujan Islands in Indonesia. The methods used in the manuscript are well-established, with many papers discussing the workflow to utilize the offthe-shelve UAV for topographical/ vegetation measurement. The Canopy Height Model (CHM) derived from the UAV Structure from Motion (SfM) Photogrammetry was translated to AGB and above-ground carbon via Lorey's height. The AGB and above-ground carbon were estimated using the allometric equation for the South East Asia and East Asia mangroves.

In general, the manuscript provides a nice overview of the carbon stock in Karimunjawa-Kemujan Islands, which have been likely influenced by the anthropogenic activities in Central Java and the terrestrial flow that probably influenced the nutrient of the Java Sea towards the Islands (Fig 1). The novelty in the manuscript is not in the methods, instead of in the finding of the carbon stock, which the authors argued is essential considering the role and the feedbacks between the Java Sea and the mangroves (Introduction paragraph five). However, I do not see the discussion of the roles of the Karimunjawa-Kemujan Islands' mangroves as a contra role of the Java Sea. Furthermore, it will be interesting to explore the connection the anthropogenic activities in the hinterland (Central Java), that probably affect the waters and circulates to the mangroves' ecosystem in the islands.
R: Thank you very much for your comments and suggestions. Actually, we also provide an update in the method. Although the application of UAV for estimating mangrove AGB has been already established, we are the first who applying Suwa et al. [34] equation; the allometric equation which has considered the local characteristic of mangrove in the Karimunjawa-Kemujan Islands on UAV's estimated CHM. Thus, this becomes the first high-resolution UAV-based mangrove AGB map which considers the Hm -AGB relationship developed from local characteristic (L129-130). To emphasize the role and the feedbacks between the Java Sea and the mangroves, we have added simple mathematic calculation in the discussion (L393-409). However, we do not discuss the connection with the anthropogenic activities in the hinterland of Central Java since it is too far.

Currently, the manuscript focuses on the usage of UAV as the tool for AGB measurement, which has been discussed thoroughly in other papers and cited by the authors. However, the discussion of the roles of mangroves is lacking. I suggest the authors add this in the discussion section since the novelty of the manuscript is on this topic.
R: Thank you very much for your suggestion. The discussion of the role of mangrove in storing carbon as a contra role of Java Sea as a carbon sources has been added in L393-409.

The authors used the UAV Photogrammetry technique to derive the DSM and later was extracted with the DTM to get the CHM. This technique gives a solid surface height estimation (centi-to-decimetre accuracy, not until 1.25m, except satellite imagery) as long as it follows the rules such as: the flight altitude, overlap percentage, and visibility of the mangroves related to tides and sun

direction. Several papers that used UAV Photogrammetry presented that the flight altitude is around 40-60m to get a proper representation of the individual trees. I see that the authors' objective is to derive the DSM only, which with 250 m is still fine, given the 5.38cm resolution of each pixel. But with a quick check with Drone Deploy with the 250m altitude, a Phantom 4 camera will give 10.7cm/pixel, Phantom 4 Advanced Camera, Phantom 4 Pro, and Phantom 4 Pro V2 will give 7.5cm/pixel; please check again. However, in this current manuscript, you omit to explain the processing procedures of the photogrammetry, especially the correction processes. I assume the authors know that the "raw" DSM created in photogrammetry still contains noise, either low or high noise. Therefore, following this process is important. I see that the authors have cited several papers that presented the complete cleaning processes, it can be a good start.
R: Thank you very much for your corrections. After rechecking to our drone operator, the flight altitude was 200 m, with the final resolution for orthophoto and DSM is 5.38 cm. This resolution is comparable with the result of Harnina et al. (2019) : http://sinasinderaja.lapan.go.id/files/sinasja2019/prosiding/11_Analisis%20Tinggi%20Terbang%20Drone%20dan%20Resolusi%20Untuk%20Pemetaan%20Penggunaan%20Lahan%20Menggunakan%20DJI%20Phantom%204%20Pro.pdf . We also has added the detail processing procedures of photogrammetry including the filtering process (L162-170). The RMSE of calculated Loreys's height which is until 1.28 m may come from the low accuracy of handheld GPS for mangrove sampling. In this study, spot selection for mangrove survey is crucial. Since the accuracy of handheld GPS for mangrove survey is much lower than the GNSS used for UAV photogrammetry reference, we selected the trees with similar height in each spot to reduce the possibility of the point mismatch between handheld GPS and GNSS (L205-209). However, since the distribution of Lorey's height in the study area ranges from 1 to 15 m, RMSE 1.28 m is still acceptable.

To my understanding, Lorey's height (Hm) is a measurement that quantifies the stand height via the tree height and basal area, which comes from the angle count sampling. In my opinion, Lorey's height can be a good proxy if one measures the mangroves in the plot and estimate the whole forest, based on the known plots. However, it should not be necessary to acquire a detailed canopy height model. Furthermore, please see my comments regarding the authors' Lorey's height implementation in the commentary for line 209.
R: Thank you very much for your comment. The index of height used in the present study is Lorey's height, the basal area weighted height of all trees. Basal area weighting of tree heights increases the importance of the largest trees in a stand and represents the height of the stand's tallest trees [45, 46]. The stand biomass (Mg / ha) depends mainly on large canopy trees having taller trees and Lorey's height can be good proxy for estimating the stand biomass. Therefore, many previous studies applied Lorey's height for estimating biomass [e.g., 32, 33, 34]. Suwa et al. [34] also confirmed that Lorey's height showed better fit to biomass data instead of arithmetic mean tree height (unpublished data). Thus, in the estimation of canopy height, Lorey's height has been known as one of the best indices (L225-233). Thus, we converted the arithmetic height estimated from the UAV into the Loreys height.

The authors present the species variation in the Karimunjawa-Kemujan Islands' mangroves in the manuscript. In my opinion, rather than use the global allometric relationship from Suwa, et.al., 2021 the authors can utilize the species-specific AGB allometric relationship. The example of the allometric relationship in Indonesia can be found in Murdiyarso, Daniel, et al. 'The Potential of Indonesian Mangrove Forests for Global Climate Change Mitigation'. Nature Climate Change,

vol. 5, no. 12, Dec. 2015, pp. 1089–92. Crossref, https://doi.org/10.1038/nclimate2734. In that sense, the objective to study the contra role of the mangroves as oppose to the Java Sea can be discussed in detail.
R: Thank you very much for your suggestion. The allometric equation at Mudiyarso et al. [61] is species dependent equation. Therefore, this equation cannot be applied in the present study since we did not investigate the detail mangrove species distribution in the study area. We used Suwa et al. [34]'s allomeric equation which was made by considering the local characteristics of mangroves in the Karimunjawa-Kemujan Islands. Thus, Lorey's height becomes the main input for obtaining mangrove AGB in the present study.

Introduction : The authors mentioned the Karimun Jawa Islands and the Java Sea lines 65-95. I suggest moving this to the Materials and Methods section, and you can create the Study Area section there. The paragraph in lines 103-128 is not relevant; you can shorten this part since the point of this paragraph is to mention that the site-specific mangrove height-AGB relationship should be considered, which was emphasized again in lines 140-149. You can move Fig 1 to Chapter 2, since it is related to the study area; thus, it will fit Materials and Methods. The introduction part is important, don't distract the readers' attention by cutting the information by graph/ figure with no relation with the texts.
R: Thank you very much for your suggestions. We have rearranged introduction part following your suggestion and added "Study Area" subsection.

Fig. 1: The authors mentioned Mangrove sampling spots for algorithm tuning. However, I can't see any explanation of the usage of these spots (or maybe points) anywhere in the manuscript.
R: Thank you very much for your correction. We have added the usage of these spots in L216-218.

Line 84: It will be better to give more information, what in situ measurements had been conducted, the method, and the results of it.
R: Thank you very much for your suggestion. It is added (L66-68)

Line 157 : I suggest using UAV Photogrammetry instead of Aerial Photography. Please discuss further how did you derive the DSM with SfM Photogrammetry. A workflow graph will be helpful to describe the processes.
R: Thank you very much for your suggestion. We have added the detail process of Sfm photogrammetry (L162-170) with workflow (Fig. 2).

Line 160 : Orthoimagery is not really standard, please refer to ISPRS Orthophoto/ Orthomosaic.
R: Thank you very much for your corrections. It is done.

Line 209 : I don't understand, why did the authors use Lorey's height to adjust the CHM? CHM is the primary dataset and has been appropriately corrected in the processing part (photogrammetry). If it is already corrected with the GCPs, one can show the total error based on the GCPs. Later on, you can use the observed tree height as the

validation of the CHM. Instead, you can use the corrected CHM to adjust the Lorey's height since it calculates the weighted mangrove stands.
R: Thank you very much for your comment. For applying Suwa et al. [34], Lorey's height is needed instead of the arithmetic height for obtaining mangrove AGB. Thus, we converted the arithmetic height estimated from the UAV into the Loreys height.

Line 226 : It describes the result, however, there is no accuracy measurement of the UAV-based DSM compared to the GCP and another ground-truth dataset. The authors already have the mangrove height dataset based on the field survey on 27-30 September 2020. The resulting UAV-based CHM should be corrected or validated based on this dataset.
R: Thank you very much for your question. Since our final target is Lorey's height, the validation process was conducted for the Lorey's height (Fig. 3b) with the bias and error are 0.004 m and 1.28 m, respectively. The validation of CHM is meaningless since CHM is not used for calculating mangrove AGB.

Line 340 : The relation of distribution of mangrove species and AGB-carbon, in my opinion can be one of the main contributions. Not many manuscripts have this analysis, thus with the hi-res CHM and species distribution map, the authors can provide a detailed AGBcarbon and the dynamics with Java Seas or surrounding waters.
R: Thank you very much for your comment. In the present study we omit species dependent on the calculation of AGB biomass following Suwa et al. [34]. The previous studies have suggested that the difference of Lorey's height-biomass relationship among species is mainly explained by differences in DBH, wood density and tree height [47, 48]. In the case of stand biomass estimation method in mangrove, Suwa et al. [34] tested if the Lorey's height - biomass relationships differ among different mangroves and found that the Lorey's height - biomass relationships differed significantly between canopy-closed and canopy-open mangroves, but the Lorey's height - biomass relationships did not differ among different typed mangroves within closed canopy forest types. Thus, Eq. (3) is applicable since the mangroves in the Karimunjawa-Kemujan Islands is a closed canopy forest. (L234-232).

Supplement: The aerial photo is not useful if the authors did not display it in a proper map, with coordinates (either geographic or projected), scale, north sign, etc. Other than that, you can share the aerial photo as a georeferenced TIF file. If the file seems too huge, authors can consider sharing the file in research cloud storage, e.g., Zenodo or https://www.geonadir.com
R: Thank you very much for your suggestion. We have added the high resolution orthophoto in the supplemental material.

Reviewer 2

The manuscript „Mangrove above-ground biomass and carbon stock in Karimunjawa-Kemujan Islands estimated from Unmanned Aerial Vehicle-imagery" calculates mangrove forest canopy height and the related above ground biomass and carbon stock, based on high resolution UAV images. A better knowledge on the amount of CO_2 stored in mangroves is essential for both global mangrove carbon stock estimations as well as for raising awareness for the need of protecting the remaining mangroves, as these forests are much larger carbon sinks per area unit than any other forest ecosystems on earth. So, this makes for a relevant contribution, however I see a couple of points for improvement, which should be addressed by the authors prior to publication. My remarks are structured in some general notes and some specific comments.

General notes

The statement, that the mangroves of these two tiny islands "play a vital role in absorbing and storing the releasing carbon from the Java Sea" (L25-26 and L371) is probably too general and should be formulated a little bit more moderate . For a vital role int the Java Sea as a whole the mangroves of the two Islands are probably way too small. Nevertheless, protecting the remaining mangroves in the area are key for maintainig this important function.

R: Thank you very much for your suggestion. We have specified the area of CO2 release from the seas surrounding Karimunjawa Islands to compared with the role of mangrove to store mangrove in the discussion session (L393-409). To make it not too general, we also have stated that mangrove in Karimunjawa-Kemujan Islands will play an important role in sequestering **parts of** carbon release from the Java Sea (L415-416).

Increase of fossil fuel use, land-use change and cement manufacture increased the CO2 in the atmosphere (L44-45) not only over the last decade but since the beginning of the era of industrialization.

R: Yes, it is correct. However, Friedlingstein et al. [1] highlighted the **rapid increase** occurred during the last decade.

In L75-76 figures for true and associate mangrove species are given. What a true mangrove species and what an associate mangrove species is, however is not universally handled, so please provide a reference on which this statement is based.

R: Thank you very much for your comment. True and associate mangrove species are common phrases in mangrove subject, e.g., Tomlinson, P.B. 1986, The Botany of Mangrove.

An interesting point for the discussion section would be, how mangroves as sink areas compensate CO2 released from the Java sea as source area (L92-94), or better what are the respective amounts of source and sink areas.

R: Thank you very much for your question. To emphasize the role and the feedbacks between the Java Sea and the mangroves in the Karmunjawa-Kemujan Islands, we have added simple mathematic calculation in the discussion (L393-409).

How were the height measurement performed please give some information in chapter 3.2 Mangrove survey. In addition, I could imagine that tree height alone is not a reliable proxy for estimating above-ground biomass of mangrove. For example Rizophora species have a completely different growth form than other mangrove trees, what should have an effect for biomass estimation. How do you deal with those differences in growth forms? This is particularly important, if a species is dominant in a particular zone, and another species in another zone. So, the same canopy height could result in totally different AGBs. Please discuss in the methods section how you treat this possible bias.

R: Thank you very much for your question. The previous studies have suggested that the difference of Lorey's height-biomass relationship among species is mainly explained by differences in DBH, wood density and tree height [47, 48]. In the case of stand biomass estimation method in mangrove, Suwa et al. [34] tested if the Lorey's height - biomass relationships differ among different mangroves and found that the Lorey's height - biomass relationships differed significantly between canopy-closed and canopy-open mangroves, but the Lorey's height - biomass relationships did not differ among different typed mangroves within closed canopy forest types. Thus, Eq. (3) is applicable since the mangroves in the Karimunjawa-Kemujan Islands is a closed canopy forest. (L234-232)

Figure 5a and 5b show exactly the same pattern. I recommend to use only one of the cartographic presentations and to explain in the figure caption that the C biomass stock is 50% of the AGB stock

R: Thank you very much for your suggestion. It is done

Please give some general remarks on species zonation and a short discussion on possible reason for stunted growth forms in the interior, either in the discussion chapter or in the description of the study area.

R: Thank you very much for your suggestion. The species zonation has been discussed in L371-392. While the possible cause of stunted mangrove has been added in the discussion (362-370).

Specific comments

L 47: better use measure instead of success.

R: It is done

L52: better : mangroves, seagrass meadows, and salt mashes (i.e. plural)

R: It is done

L61: mangrovecarbon: space missing

R: It is done

L77: Formations instead of formation

R: It is done

L78: C. tagal : Please provide the fulnam at least at the place where it is mentione first. In general the species names should be carefully checked throughout the manuscript, as there a many typos (e.g. Lunmitsera insteda of Lumnitzera in L78, 80; Ryzophora in L81, Ceriop in L343, …)

R: It is done

L145: canopy instead of canopty

R: It is done

L162: of aerial photos is double occurrence

R: It is revised

L173: southwestern and northeastern wig areas instead of southeastern and northwestern wings areas

R: It is done

L183: DTM is also can: delete is

R: It is done

L220: distribution of DSM: unclear wording. Does the distribution vary from 2 to 24 m or the height???

R: It is the elevation of DSM. We change into : Based on the distribution of DSM, the elevation of mangrove area varies from 2 m to 24 m (Fig. 3a).

L224-225: seaside is both in the North and in the South of the “tail”, please clarify

R: we have changed into : The highest canopies are observed along the northwest edge of the southwestern wing area and the tail area near the seaside.

Check the list of references, there are some wrong upper case letters (L531) remove the grey shading (L533-534), and double check that the right MDPI style is used.

R: It is done

Lampiran 4

[Sustainability] Manuscript ID: sustainability-1495057 - Minor Revisions

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Date: Friday, December 31, 2021, 08:57 AM GMT+7

Dear Dr. Wirasatriya,

Thank you again for your manuscript submission:

Manuscript ID: sustainability-1495057
Type of manuscript: Article
Title: Mangrove' above ground biomass and carbon stock in Karimunjawa-Kemujan Islands estimated from Unmanned Aerial Vehicle-imagery
Authors: Anindya Wirasatriya *, Rudhi Pribadi, Sigit Bayhu Iryanthony, Lilik Maslukah, Denny Nugroho Sugianto, Muhammad Helmi, Raditya Rizki Ananta, Novi Susetyo Adi, Terry Louise Kepel, Restu N. A. Ati, Mariska A. Kusumaningtyas, Rempei Suwa, Raghab Ray, Takashi Nakamura, Kazuo Nadaoka
Received: 19 November 2021
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Please do not hesitate to contact us if you have any questions regarding the revision of your manuscript or if you need more time. We look forward to hearing from you soon.

Kind regards,
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Lampiran 5

[Sustainability] Manuscript ID: sustainability-1495057 - Revised Version Received

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Date: Wednesday, January 5, 2022, 03:43 PM GMT+7

Dear Dr. Wirasatriya,

Thank you very much for providing the revised version of your paper:

Manuscript ID: sustainability-1495057
Type of manuscript: Article
Title: Mangrove' above ground biomass and carbon stock in
Karimunjawa-Kemujan Islands estimated from Unmanned Aerial Vehicle-imagery
Authors: Anindya Wirasatriya *, Rudhi Pribadi, Sigit Bayhu Iryanthony, Lilik
Maslukah, Denny Nugroho Sugianto, Muhammad Helmi, Raditya Rizki Ananta, Novi
Susetyo Adi, Terry Louise Kepel, Restu N. A. Ati, Mariska A. Kusumaningtyas,
Rempei Suwa, Raghab Ray, Takashi Nakamura, Kazuo Nadaoka
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We will continue processing your paper and will keep you informed about the
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Reviewer 1

Supplementary file: Please recheck anything that is not in English.

R: Thank you very much for your notice. We have changed "skala" into "scale"

L196 : The authors provide the RMSE error of the DTM. The DSM's RMSE is not yet provided in the manuscript. It is important, since the CHM is created from subtracting DSM to DTM. You can follow the accuracy assessment of the spatial dataset with the guidelines by the NSSDA Part 3: National Standard for Spatial Data Accuracy.

R: Thank you very much for your suggestion. However, we have provided the RMSE of DSM (i.e., 0.17 m) based on the 7 GCPs. (L186-187)

L 197 : Please be careful with this statement. Kung et.al showed the horizontal accuracy dependent on the ground resolution, wherein Fig 5, he stated with a ground resolution of 5-10 cm the accuracy is up to 0.2 m. As of the application in the coastal environment, several papers —with the latest software and workflow— reported the horizontal and vertical accuracy is up to 0.1 m (Casella et al., 2020; Mazzoleni et al., 2020; Moloney et al., 2018; Otero et al., 2018). In relation to that, in the authors' response, the RMSE of 1.28m is undoubtedly high. I would appreciate it if you could elaborate more on the accuracy assessment of the DSM vs. the GNSS-based GCPs. Assuming the horizontal and vertical accuracy of the DSM falls within the range of 0.1-0.2m, the error range of the CHM would be around 0.3 m (0.08 m DTM + 0.2 m DSM). In relation to that, I believe that Fig 4a and 4b will show differently, and the RMSE will be decreased. Otherwise, I suggest rechecking the Photogrammetry workflow and doing the masking procedure. Clip the certainly high error in the DSM and only use the area with high accuracy.

R: Thank you very much for your comment. We have added the accuracy of DSM the GNSS-based GCPs (i.e. 0.17 m). Noting that, the GCPs represent the ground surface, not the mangrove surface (L186-187). Thus, it is not as simple as the accuracy of CHM is the sum of accuracy of DTM and DSM. The weak point in the present study is we used handheld GPS for mangrove sampling, thus the horizontal accuracy of the observed canopy height is low which lead to the mismatch positions between the estimated Lorey's height from UAV and observed Lorey's height. This may cause the high RMSE of the estimated Lorey's height. However, since the maximum of Lorey's height in the present study is ~15 m, the RMSE of 1.28 m is still acceptable. (L270-280)

L244: What is the meaning of red and black lines in the figure? Please provide the explanation.

R: Thank you very much for the question. The red and black lines have been explained in the captions of Fig. 3, 5, 6.

L265: x is missing in the equation

R: x is already in the equation $y = 1.5614e^{0.1153x}$

L270 : UAV-based and SRTM-based Lorey's height is not comparable since they are different in resolution (5.8 cm vs. 30 m). I would suggest finding other references or do not use this comparison.

R: We have added the proper comparison with the UAV based CHM. (L273)

L285 : The Lorey's height conversion was conducted with 22 observed Lorey's height plots and additional 17 plots from Suwa et., al. With Suwa et..al. was submitted in December 2019, the one-

year difference of the mangrove growth is likely, not significant. In relation to my previous suggestion, the figure can be different if the authors have corrected and adjusted the DSM until reaching an accuracy up to 0.2 m. I have a question regarding the current figure. If the CHM as a proxy to Lorey's height as the arithmetic height variable had been corrected towards the observed Lorey's height, why does the RMSE of the 4b remain high?
R: Thank you very much for your question. The accuracy of DSM based on GCPs is 0.17 m. However, this represent the ground surface, not the mangrove surface. The higher error for Lorey's height comes from the mismatch positions between the estimated Lorey's height and observed Lorey's height. However, since the maximum of Lorey's height in the present study is ~15 m, the RMSE of 1.28 m is still acceptable. (L270-280)

L356 : The authors' have the unpublished dataset of Suwa, et., al., with the detail of the dominant mangrove species. Given the corrected CHM and regression, it will be interesting, not only to compare the Suwa and Sanger and Snedaker, but also to compare the species-specific AGB on the selected plots.
R: The specific objective of this study is to extract canopy height and then AGB from the UAV, which can be categorized as a remote sensing study. The intended application of the proposed method is therefore for wide-scale mapping purpose beyond a plot scale. In remote sensing terminology, it is to obtain 'a synoptic view' of a parameter of interest, which is canopy height and AGB in this case. Data from a plot scale is mainly treated as a ground truth for the mapping purpose, either for building a model or a validation purpose but not treated or analyzed as a specific objective as in biology / ecology studies.

L444 : Instead of ending the conclusions with this statement, I prefer the statement the authors have built in discussion L411-422. I suggest elaborating this to the conclusion.
R: Thank you very much for your suggestion. We changed the conclusions following your suggestion. (L448-452)

Authors interchangeably use DGPS and GNSS, and please refer to one.
R: Thank you very much. We use GNSS.

In the introduction, the authors pledge to provide a high-res AGB map. However, the map is not provided in the supplement. I suggest providing the map in TIFF format, hosting it in a digital repository, and obtaining the DOI, for instance, in Zenodo.
R: Thank you very much for your suggestion. We have provided the high resolution of AGB map in the supplementary file.

Reference
Casella, E., Drechsel, J., Winter, C., Benninghoff, M., & Rovere, A. (2020). Accuracy of sand beach topography surveying by drones and photogrammetry. *Geo-Marine Letters, 40*(2), 255–268. https://doi.org/10.1007/s00367-020-00638-8
Mazzoleni, M., Paron, P., Reali, A., Juizo, D., Manane, J., & Brandimarte, L. (2020). Testing UAV-derived topography for hydraulic modelling in a tropical environment. *Natural Hazards, 103*(1), 139–163. https://doi.org/10.1007/s11069-020-03963-4

Moloney, J. G., Hilton, M. J., Sirguey, P., & Simons-Smith, T. (2018). Coastal Dune Surveying Using a Low-Cost Remotely Piloted Aerial System (RPAS). *Journal of Coastal Research*, *345*, 1244–1255. https://doi.org/10.2112/JCOASTRES-D-17-00076.1

Otero, V., Van De Kerchove, R., Satyanarayana, B., Martínez-Espinosa, C., Fisol, M. A. B., Ibrahim, M. R. B., Sulong, I., Mohd-Lokman, H., Lucas, R., & Dahdouh-Guebas, F. (2018). Managing mangrove forests from the sky: Forest inventory using field data and Unmanned Aerial Vehicle (UAV) imagery in the Matang Mangrove Forest Reserve, peninsular Malaysia. *Forest Ecology and Management*, *411*, 35–45. https://doi.org/10.1016/j.foreco.2017.12.049

Reviewer 2

In the revised version of the manuscript "Mangrove above-ground biomass and carbon stock in Karimunjawa-Kemujan Islands estimated from Unmanned Aerial Vehicle-imagery" the authors reasonably addressed my suggestions made in the first round of the review process. However, I still found some typos with regard to plant species names (e.g. Lumnitsera in L 147, and several Rhizopora in L 376 - 383; there might be more!) so I ask the authors once more to carefully check the species names. If this is done from my point of view the submission can be accepted for publication.

R: Thank you very much for your notice. We have corrected the species names.

Lampiran 6

[Sustainability] Manuscript ID: sustainability-1495057 - Accepted for Publication

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Date: Wednesday, January 5, 2022, 05:03 PM GMT+7

Dear Dr. Wirasatriya,

Congratulations on the acceptance of your manuscript, and thank you for your interest in submitting your work to Sustainability:

Manuscript ID: sustainability-1495057
Type of manuscript: Article
Title: Mangrove' above ground biomass and carbon stock in Karimunjawa-Kemujan Islands estimated from Unmanned Aerial Vehicle-imagery
Authors: Anindya Wirasatriya *, Rudhi Pribadi, Sigit Bayhu Iryanthony, Lilik Maslukah, Denny Nugroho Sugianto, Muhammad Helmi, Raditya Rizki Ananta, Novi Susetyo Adi, Terry Louise Kepel, Restu N. A. Ati, Mariska A. Kusumaningtyas, Rempei Suwa, Raghab Ray, Takashi Nakamura, Kazuo Nadaoka
Received: 19 November 2021
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Lampiran 7

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Date: Sunday, January 9, 2022, 05:30 PM GMT+7

Dear Authors,

We are pleased to inform you that your article "Mangrove Above-Ground Biomass and Carbon Stock in the Karimunjawa-Kemujan Islands Estimated from Unmanned Aerial Vehicle-Imagery" has been published in Sustainability as part of the Special Issue Mangrove Ecosystem Ecology, Conservation and Sustainability and is available online:

Abstract: https://www.mdpi.com/2071-1050/14/2/706
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Kind regards,

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