Review of: "Peatmass Change and Water Level Influencing Regenerated Melaleuca Forest After a Fire in U Minh Thuong National Park, Vietnam"

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Potential competing interests: No potential competing interests to declare.

Peatmass Change and Water Level Influencing Regenerated Melaleuca Forest After a Fire in U Minh Thuong National Park, Vietnam

ABSTRACT

Objective: The study was conducted in U Minh Thuong National Park to address forest regeneration.

Comments: If the statement "Objective: The study was conducted in U Minh Thuong National Park to address forest regeneration." does not accurately describe the actual objective of the study, it's important to revise it for clarity and precision.To replace it, you would need to identify what the study specifically aims to accomplish. Is it trying to assess biodiversity, measure the impact of human activity, or perhaps analyze soil quality?

Theoretical framework: What means by various measures? It is various technique?

Methods: Please rewrite the method

INTRODUCTION

Comment 1: General Introduction and Significance of U Minh Thuong National Park

The introduction effectively sets the context by describing the park's size, ecological value, and the variety of species it hosts. Citing sources adds credibility to the information.

Comment 2: Park's Recognition by UNESCO

Mentioning UNESCO recognition serves to underline the park's global significance and elevates the importance of conservation efforts.

Comment 3: Threats and Challenges

The text does well to outline various challenges including illegal logging, unsustainable fishing, and climate change. Each

threat could be expanded upon to understand their immediate and long-term impacts, especially in terms of policy or management changes.

Comment 4: Need for Multi-stakeholder Cooperation

The passage emphasizes that tackling these challenges will require concerted efforts from various stakeholders including the government, local communities, and scientists, which is crucial for effective conservation measures.

Comment 5: Importance of Education and Awareness

While the text does mention the need for awareness and education, this could be developed further. For instance, are there ongoing or planned educational campaigns? Are there partnerships with schools or local organizations?

Comment 6: Introduction of Peat as a Resource

The transition to discussing peat feels a bit abrupt. The relevance of peat to the park and its conservation challenges could be better highlighted to set the context for this topic.

Comment 7: Peat's Role in Fire Prevention

The passage successfully outlines why peat is an important resource for fire prevention, citing research that lends authority to the claims.

Comment 8: Study Findings and Implications

The findings about the relationship between peat volume and forest growth, and how forest fires impact them, are well-articulated. However, the text should explicitly state that these findings pertain to a specific study (presumably the study the passage is from) for clarity.

Comment 9: Importance of Research for Conservation

The conclusion effectively ties the research back to the broader goal of conservation and management, emphasizing the need for further study to inform these efforts.

MATERIALS AND METHODS

Comment 1: Sample Collection

The text here describes the methodology for collecting soil samples, including the number and arrangement of plots and how the samples were coded and transferred for analysis. It's detailed but could benefit from some clarification. For example, the sentence structure "a total of 15 plots set up the same plots survey growth forest on 03 the thickness levels of peat" might be confusing to readers.

Comment 2: Forest Growth Survey

This part discusses how forest growth was surveyed, mentioning the maps used and the categorization of peat levels. It's

essential that the methods should align with the objective of the study, which should be clearly stated.

Comment 3: Measuring Techniques

This section provides specific information about how different measurements were taken in the field. It's a crucial section for the reproducibility of the study, but it could be formatted for easier reading, perhaps using bullet points or subheadings.

Comment 4: Analytical Methods in the Laboratory

The passage briefly mentions that previous studies and maps were consulted, but it could be more specific about what kind of analyses were performed on the peat samples in the laboratory.

Comment 5: Calculations

This part outlines the mathematical formulas used in analyzing the data, from peat and carbon reserves to CO2 emissions. While highly technical, this section is essential for readers who may wish to scrutinize or replicate the study. However, the use of specific acronyms or symbols should be clearly defined.

Comment 6: Research Method for Peat Properties

This section seems to be a more specific breakdown of the types of analyses done, focusing on peat properties under specific conditions. Again, formatting could help make this more readable and digestible.

Comment 7: Chemical Analyses

The final part of this section indicates what kind of chemical analyses were performed and how. This is important for the integrity and replicability of the study but could be clearer.

Comment 8: Statistical Tests

The text states that t-tests and one-way ANOVA will be used to analyze the mean differences between various thickness levels of peat and forest growth. This is a typical approach for comparing means across different groups. However, the text should clarify the assumptions that need to be met for these statistical tests to be valid (e.g., normal distribution, homogeneity of variance).

Comment 9: Correlation Analysis

It specifies that Pearson's correlation coefficient will be used to assess the relationship between peat quality and the growth of Melaleuca trees. This is a common method for assessing linear relationships between two variables.

Comment 10: Significance Levels

The text defines a significant correlation as one with a P-value of less than 0.05 and an absolute correlation coefficient value greater than 0.5. These are commonly used thresholds, but it would be helpful to explain why these particular thresholds were chosen.

Comment 11: Statistical Software

The software used for these analyses are IBM SPSS 20.0 Windows and Statgraphics Centurion XVI. This is important for the sake of reproducibility.

Comment 12: Spearman’s Correlation Coefficient

The text mentions that Spearman's correlation will also be used, which is generally employed for ordinal data or when assumptions of normality are not met. It's a bit confusing why both Pearson and Spearman are being used, and the text could clarify this point.

Comment 13: Hypotheses

The section refers to a hypothesis Ho (which I assume is the null hypothesis) that will be rejected if a significant correlation is found. This is standard procedure but again could be more clearly articulated.

Comment 14: Data Processing Tools

It mentions that Microsoft Excel and other software will be used for statistical calculations, descriptive statistics, hypothesis testing, and graphing. While Excel is commonly used, it is generally less robust than specialized statistical software for some types of analyses.

General Comments:

The text is very dense and could benefit from clearer formatting and perhaps some subheadings for better readability.

There are a number of grammatical issues and unclear sentences that could confuse the reader or cast doubt on the study's credibility. It may need a thorough review for clarity, coherence, and grammatical correctness.

It's not entirely clear how all these methods relate back to the study's objectives, which should be explicitly stated and linked to these methodologies.

Consistency in terminology and units of measurement will help in making the text less confusing. Make sure abbreviations are defined the first time they are used.

The methodological rigor in the data analysis approach is evident, but some clarification could improve it. For example, under what conditions will Pearson vs. Spearman correlations be used?

Formatting could be improved for easier reading; for example, each type of analysis could be given its own subsection or bullet point.

Consistency is crucial; for example, the software is referred to as both "IBM SPSS Statistic version 20.0" and "IBM SPSS 20.0 Windows." Choose one term for clarity.

Terminology and abbreviations should be consistent. For instance, 'P' in P-value should be consistent in its representation (either always uppercase or always lowercase unless following a specific notation standard).

RESULTS AND DISCUSSION

Comment 1: Table 1 and Area Changes

The table seems to show that the area of thick peat at different depth levels has changed dramatically between 2002 and 2022, particularly after the 2003 forest fire. The data appears to be in hectares (ha), which gives a good sense of the scale of these changes.

Comment 2: Peat Types and Depth

The report states that the peat layer can be categorized into black and brown peat based on its physical characteristics. Black peat is tightly compressed and primarily left behind after a forest fire. In contrast, brown peat has a loose structure. It's an interesting note that the black peat is harder to burn and typically wetter due to better capillary water permeability.

Comment 3: Figures

The figures mentioned (Figures 2, 3, and 4) likely offer visual aids to understand the distribution of peat layers, their changes over time, and their current status. However, without the figures themselves, it's difficult to comment on their effectiveness.

Comment 4: Fire Effects on Peat

The forest fire seems to have a significant impact on the type and distribution of peat layers in the park. The text notes that black peat is mainly left behind after a forest fire and that it has a higher percentage of tight soil, which has implications for water retention and fire resistance.

Comment 5: Post-Fire Peat Area Distribution

The section opens by detailing how the remaining peat areas are distributed based on their depth. For example, the largest area (2,331 hectares) has a peat layer depth between 30 and 70 cm, while the smallest area (148 hectares) has a depth between 120 and 130 cm. This provides a snapshot of how the park's ecosystem might have been affected by the fire, and how it may function going forward.

Comment 6: Importance of Peat Depth

The text highlights the importance of the depth of the peat layer for the quality and productivity of the soil. This is critical for both the natural ecology of the area and any potential uses it might have for agriculture, forestry, or other industries.

Comment 7: Carbon Reserves

Table 2 provides a detailed breakdown of the carbon content in the remaining peat areas. Given the critical role that

peatlands play as carbon sinks, understanding how much carbon remains stored in these areas post-fire is crucial for climate change considerations.

Comment 8: Unit Consistency and Clarity

Table 2 mixes units (cm, m, m^2, m^3, Mg/m^2, ton, %C), which might make it difficult for the reader to quickly understand the data. It could be helpful to keep units consistent or at least clearly define conversions for easier interpretation.

Comment 9: Policy Implications

The data provided is critical for policy-making, particularly in the context of climate change and conservation. Knowing the depth of peat and the amount of carbon it contains will guide both restoration efforts and policies aimed at mitigating climate change.

Comment 10: Research Methodology

This section provides a comprehensive look at how the research was carried out, from selecting survey plots to the formula used for calculating peat volume. The use of a well-established formula adds scientific rigor to the findings.

Comment 11: Change Over Time

While the focus here is on 2022, it is titled to suggest changes in peat status between 2012 and 2022. However, the section doesn't present comparative data for 2012. Including such data would be critical for showing how the peatlands have evolved over that decade, particularly given climate change and other environmental pressures.

Comment 12: Carbon Content

Table 3 breaks down the peat and carbon volume, crucial for understanding both the ecology of the park and its role in carbon sequestration. The carbon percentage is consistently reported as 42.12%, aligning with earlier data, and shows the area's significance in terms of climate change mitigation.

Comment 13: Conservation Implications

The data in this section is particularly important for conservation efforts. Given that U Minh Thuong National Park is an important habitat for endangered species like the white-winged ducks, understanding the status and health of its peatlands is critical for broader ecological protection.

Comment 14: Unit Consistency

Like in previous tables, unit consistency is somewhat mixed, which might hinder quick understanding. It would be useful to keep the units consistent or provide clear conversions for easier interpretation.

Comment 15: Significance of Peat Thickness

The results show a statistically significant correlation between peat thickness and Melaleuca tree growth (both in diameter and height). Thicker peat layers correspond with more significant growth, with a p-value of less than 0.001, making these

findings highly statistically significant.

Comment 16: Methodology and Time Span

The study is comprehensive, covering a span from 2003 to 2021. While the methodology isn't explicitly detailed in the text, the long duration provides robust data.

Comment 17: Metrics and Units

The study uses multiple metrics (trunk diameter at 1.3 m, height growth, etc.) to provide a holistic understanding of tree growth. The units used are consistent, which aids in interpretation.

Comment 18: Control vs. Experimental Results

A control group (trees with no peat layer) is used for comparison, which strengthens the findings. When compared with various peat thicknesses, growth in both diameter and height was significantly higher in the latter, reinforcing the importance of peat thickness in Melaleuca forest growth.

Comment 19: Ecological Implications

The results have ecological implications, as Melaleuca forests play a significant role in local ecosystems. The growth data can inform forest management practices, particularly in peatland areas where Melaleuca trees are prevalent.

Comment 20: Statistical Validation

The use of p-values adds validity to the results. Given that the p-values for all measurements are less than 0.001, this suggests that the differences observed are extremely likely to be due to peat thickness, rather than random variability.

Comment 21: Height Growth Under Branches (Hb)

Peat thickness plays a significant role in the height growth of the Melaleuca trees under their branches. The difference is especially pronounced in areas with thicker peat layers (86-92 cm), where the growth height is up to five times higher compared to areas with no peat. This complements the findings on the height of the trees, showing a consistent effect across different growth measures.

Comment 22: Canopy Diameter Growth (Dc)

The findings suggest that while peat thickness significantly impacts canopy diameter at certain ranges (5-12 cm and 86-92 cm), it doesn't have a statistically significant impact in the 20-56 cm range. This may indicate that different growth metrics are affected differently by peat thickness, perhaps due to other soil nutrients or other ecological factors.

Comment 23: Number of Trees in Survey Plot (N/p)

The data reveals that the number of trees per 500 square meters is highest in the 86-92 cm peat thickness condition. This could imply that thicker peat layers not only influence individual tree growth but also potentially promote greater tree density.

Comment 24: Statistical Significance

Again, the use of p-values in all three aspects discussed makes the findings robust. Most of the changes in growth and

density are statistically significant, reinforcing the concept that peat thickness is a critical factor in Melaleuca forest development.

Comment 25:Correlation Equations
Hb and Ht Correlation: The strong positive correlation between the height of the tree (Ht) and the height under the branches (Hb) can be useful for quick and easy estimations of either parameter. Such equations can be highly practical for forest surveying, particularly when direct measurements are challenging.

Comment 26:Diameter and Height Correlation: Another equation connects the diameter at breast height (D1.3) and tree height (Ht). This equation would also serve well for estimation purposes, especially when measuring the height directly can be challenging.

Comment 27:Application: These equations can be particularly useful for surveys and investigations where quick estimations are needed and could be a boon for forest management.

Comment 28:Relationship between Peat Chemical and Growth
Acid Humic: Contrary to what one might expect, there is no significant correlation between acid humic levels and any of the growth indicators studied (D1.3, Ht, Hb, and Dc). This is quite illuminating because it suggests that while peat thickness significantly influences tree growth, the acid humic levels in the peat do not.

SO42-: Similar to acid humic, the sulfate ion (SO42-) also does not show a significant correlation with growth indicators, emphasizing that other factors are likely more critical in determining tree growth in these peatland forests.

Comment 29:Statistical Robustness: The use of p-values (α) and correlation coefficients (R) adds rigor to these findings. All values of α greater than 0.05 imply that the correlations are not statistically significant.

CONCLUSION

Comments:
Multifaceted Approach: The study acknowledges that forest growth and regeneration are influenced by a multitude of factors. This understanding supports the need for a multifaceted approach to forest management and conservation.

Seasonal Variability: The mention of seasonal changes in nutrient content and pH provides an avenue for future research and also for real-time monitoring to understand better how these fluctuations impact forest growth.

Practical Implications: The study not only sheds light on the academic aspects but also has clear practical implications. For instance, it provides insights that could guide forest management practices to mitigate the risks of forest fires while fostering growth.

Biodiversity Consideration: The inclusion of biodiversity as a factor in forest management decisions is commendable. It recognizes that any intervention in natural systems has a range of ecological impacts.

Strategic Development: The conclusion effectively underscores the need for a comprehensive and well-considered

strategy for forest restoration. Such a strategy would require inter-disciplinary expertise, involving ecologists, hydrologists, and forest management experts, among others.

Overall, the conclusion does a good job of encapsulating the study's key findings while also highlighting their broader implications. It calls attention to the complexity of forest ecosystems and the need for multi-dimensional strategies in forest management and conservation efforts.

GENERAL COMMENTS:

Clarity: The text could benefit from clearer presentation. For example, in Table 1, it's not clear what the numbers in the 2003 and 2022 columns represent. Is it the area that has been lost, gained, or simply the area as it exists in those years?

Comparative Analysis: It would be beneficial to include a comparison of the current status of peat layers with the status before the 2002 forest fire to better understand the fire's long-term impact.

Interpretation: Providing interpretations of these results in the context of the study's objectives could help the reader understand their significance better.

Terminology: Using standard scientific terms and providing definitions for terms like "tight soil," "capillary water permeability," etc., would make the report more accessible.

Overall, the research results seem to provide valuable insights into the properties and changes in peat layers in a specific national park, particularly in the context of forest fires. However, the text could benefit from some clarifications and a more structured presentation.

Interpretation: Similar to the previous sections, while this section is rich in data, it might benefit from interpretations or conclusions drawn from this data, relating it back to the study's objectives.

Global Significance: The role of peatlands in global carbon cycles is touched upon briefly but could be expanded upon to emphasize the study's broader relevance.

Methodological Link: The earlier part of your text mentioned various statistical analyses performed using software like SPSS. It would be beneficial to see how these analyses were applied to these results.

Referencing: Continuity in citations and referencing previous research or reports, like SubFIPI's 2005 report, enhances the credibility and context of the information presented.

Comparative Analysis: Including trends or comparative analysis could enhance the understanding of how peatland dynamics are changing over time, especially in relation to water levels, as the title suggests.

Implications: Discussing the implications of these findings on local and global scales, particularly in terms of climate change, could make the paper more impactful.

Limitations: Any research has limitations, and acknowledging them strengthens the validity of the study.

Citations: As with earlier sections, continuity in citations, like referencing Tran & Thai (2014) multiple times, enhances credibility.

Recommendations: The paper would benefit from including recommendations based on the findings for conservationists, policymakers, and future researchers.