Unveiling Dynamic Shifts: A Sentinel-2 Data Analysis of Land Cover Change and Forest Fragmentation in Tondulu, Sabah, Malaysia (2019-2023)

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Abstract

In this study, Sentinel-2 satellite imagery was utilized to examine land cover changes in the Tondulu, Sabah, Malaysia, between 2019 and 2023. The primary objectives were to quantify land use changes during this period and evaluate the degree of forest fragmentation over time. Advanced remote sensing techniques were employed using cutting-edge geospatial tools, including ArcGIS and Google Earth Engine, in conjunction with FRAGSTATS, to analyze changes in forest cover, urbanization, and agriculture. Google Earth Engine facilitated the processing of large-scale satellite data, enabling a thorough analysis of temporal variations in land use and land cover. ArcGIS provided a robust platform for spatial analysis, integrating various datasets to produce precise land cover maps. FRAGSTATS, a landscape metrics tool, was used to analyze patch size, edge density, fragmentation, and connectivity indices, offering insights into forest fragmentation. The results indicated that primary forest areas decreased from 2923 ha to 2776 ha between 2019 and 2023, with accuracy exceeding 90% for each year. The landscape analysis revealed a significant increase in primary forest fragmentation, as evidenced by the rise in the number of patches from 167 to 277. This suggests that the primary forest is at risk of degradation due to increased accessibility from fragmented areas, potentially exacerbating anthropogenic pressures on the forest.

1. INTRODUCTION

The authors should include a statement of the work's objectives at the conclusion of the introduction section. The authors should include a brief literature survey or review before the objective, along with a sufficient background (no more than one paragraph) that outlines the existing solutions or methods, highlights the best past research, highlights the main limitations of past research, outlines the authors' goals for resolving the limitations, and highlights the paper's scientific merits or novelties.

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2. METHODS

Section Headings

The method explains the presentation in the form of paragraphs about the materals, research design, data source(s), data collection technique(s), types of research design data and data analysis technique(s) that are carried out by the researcher(s).

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3. RESULTS

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Tables are sequentially numbered with the table title and number above the table. Tables should be centered in the column OR on the page. Tables should be followed by a line space (12pt). Elements of a table should be single-spaced, however double spacing can be used to show groupings of data or to separate parts within the table. Table headings should be in 11pt bold. Tables are referred in the text by the table number without location (above, below, following, etc.), e.g.: Table 1. Do not show vertical line in the table. There is only horizontal line should be shown within the table.

Table 1. Table caption and description

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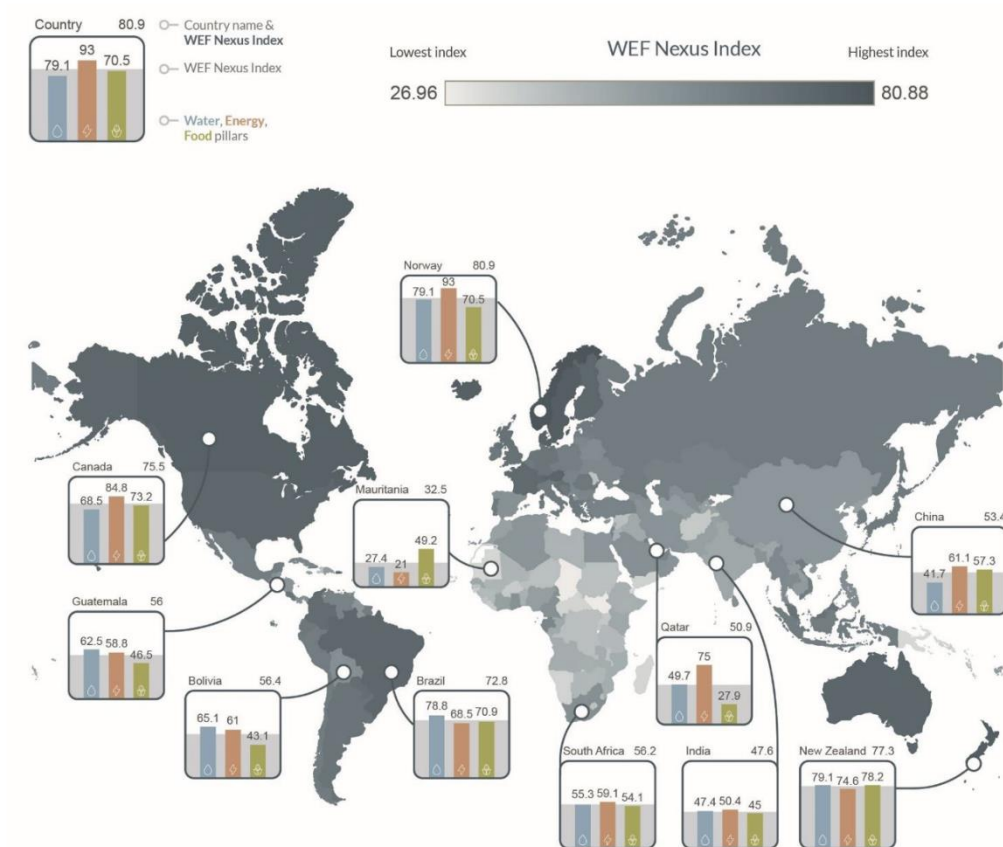

Figure 1. World map indicating the Water-Energy-Food Nexus Index per country (with selected countries featured in glyphs) - see https://www.wefnexusindex.org/

4. DISCUSSION

Section Headings

The discussion reviews the important findings according to the research objectives. Research results and data clarity are described with pictures that must be mentioned in the body of the article. The results of the analysis must be related to the research objectives, as well as the meaning of the results/findings carried out, compared to previous similar studies and existing theories

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5. CONCLUSION

comprises research findings presented in the form of paragraphs that either summarize the main conclusions of the discussion or serve as answers to research questions.

ACKNOWLEDGMENT

REFERENCES

Follow the styles shown in the examples below for books, specific chapters in books, and journal articles, respectively:

Madigan, M.T., Martinko, J.M., Stahl, D.A.,Clark, D.P. 2010. Brock Biology of Microorganisms, 13th ed. Benjamin Cummings. San Francisco. pp. 42-59.

O'Brien, P., Revaprasadu, N. 2013. Solid-State Materials, Including Ceramics and Minerals. In Reedijk, J., Poeppelmeier, K. (eds.), Comprehensive Inorganic Chemistry II, 2nd ed. Elsevier. United states. pp.xxii-xxiv.

Kwon, J. W and Kim, S.D. 2014. Characterization of an antibiotic produced by bacillus subtilis JW-1 that suppresses Ralstonia solanacearum. J. Microbiol. Biotechnol. 24(1): 13-18, http://dx.doi.org/10.4014/jmb.1308.08060.