



Analysis and Identification of Non-Avifauna Diversity in the Reclamation Area of Limestone Mining at PT Semen Indonesia

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ARTICLE INFO	ABSTRACT
Published Online: 01 September 2025	Biodiversity is a fundamental pillar in maintaining ecosystem balance, particularly in post-mining areas that are vulnerable to degradation. This study aims to analyze non-avifauna diversity in the reclamation area of limestone mining at PT Semen Indonesia, Tuban Plant. The research employed an exploratory survey method with purposive sampling, conducted from February to May 2021 in six mining sites: three limestone sites (Temandang, Pongpongan, Sumberarum) and three clay sites (Sugihan, Tobo, Mliwang). Data were analyzed using the Shannon-Wiener diversity index (H'), Simpson's dominance index (D), and evenness index (J). The results showed that the average H' value across all sites ranged between 2.47–3.04, which falls under the “GOOD” category, indicating medium diversity. The D values approached 0.00, suggesting the absence of dominance by any particular species, while J values ranged from 0.90–0.97, reflecting normal environmental conditions with relatively even population distribution. These findings indicate that the non-avifauna community in the reclamation areas is stable and has not been significantly disturbed by mining activities. This study highlights the importance of sustainable reclamation practices in supporting ecosystem recovery and conserving non-avifauna biodiversity in industrial mining landscapes.
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INTRODUCTION

Biodiversity is one of the key pillars in maintaining ecosystem balance. In Indonesia, a country rich in natural resources, mining activities—particularly limestone extraction—often exert negative impacts on the environment. Mining can lead to the loss of natural habitats, deterioration of soil quality, and decline in species diversity. Therefore, post-mining land reclamation is crucial for restoring affected ecosystems and ensuring environmental sustainability.

Post-mining reclamation is not only intended to restore ecological functions but also to create habitats that support various species. PT Semen Indonesia, as one of the leading companies in the cement industry, has implemented several reclamation techniques to mitigate the negative impacts of mining activities. However, the effectiveness of these techniques in supporting biodiversity, particularly non-avifauna, still requires further investigation.

Non-avifauna biodiversity includes a wide range of organisms such as mammals, reptiles, amphibians, insects, and flora. These organisms play essential roles in maintaining

ecosystem balance, functioning as decomposers, pollinators, and natural predators. Furthermore, non-avifauna diversity can serve as an environmental health indicator, reflecting the impacts of human activities on ecosystems. Therefore, this study aims to analyze and identify non-avifauna diversity in the reclamation area of PT Semen Indonesia's limestone mining sites.

This research also explores various factors influencing the presence of non-avifauna species in reclamation areas, including physical and chemical soil conditions, water availability, and vegetation types planted during reclamation. By understanding these factors, significant relationships may be revealed between the applied reclamation techniques and existing species diversity.

In addition, this study addresses challenges in reclamation efforts and biodiversity conservation, such as climate change, invasive species, and pressures from other human activities. Identifying these challenges is expected to provide more effective solutions for improving reclamation success and safeguarding biodiversity in the future.

Through this analysis, useful recommendations for future reclamation land management can be formulated. By understanding non-avifauna diversity, we can better appreciate the importance of maintaining healthy and sustainable ecosystems. This study is also expected to serve as a reference for further ecological and conservation research and to encourage improved and sustainable reclamation practices.

This research aims to reveal biodiversity in the reclamation area of PT Semen Indonesia Tuban Plant and emphasize the company's role in protecting and conserving the environment. Thus, the results are expected to raise awareness of the importance of biodiversity conservation amid growing industrial activities and provide guidance for more environmentally friendly reclamation policies and practices.

METHODS

This study was exploratory in nature and employed a survey method. Samples were collected using purposive sampling. Site mapping, sampling, and fauna observations were conducted between the fourth week of February 2021 and the third week of May 2021 at locations designated by PT Semen Indonesia (Persero) Tbk in Tuban, administratively located in Kerek and Merakurak Districts.

The index values ranged between 0.00–1.00, where:

- A value approaching 0.00 indicates the influence of environmental factors on organisms, resulting in uneven population distribution due to selectivity and leading to dominance by one or several species.
- A value approaching 1.00 indicates normal environmental conditions, characterized by relatively even population distribution and the absence of dominance.

RESULTS AND DISCUSSION

Non-Avifauna Community Conditions

The non-avifauna groups targeted in this study included terrestrial fauna such as mammals, herpetofauna (reptiles and amphibians), and arthropods including butterflies and dragonflies found in the limestone mining areas (TED, PON, SUM) and clay mining areas (SUG, TOB, MLI) within PT Semen Indonesia Tuban Plant.

The average Shannon-Wiener diversity index (H') across all study sites was above 2 ($1.00 < H' < 3.00$), thus categorized as “GOOD” with medium diversity (TED 2.94; PON 3.04; SUM 2.86; SUG 2.87; TOB 2.47; and MLI 2.61). This indicates that environmental factors affect non-avifauna life. This finding is supported by Simpson's dominance index (D) values approaching 0.00, suggesting no taxa were dominant and species diversity was high. Evenness index (J) values were TED 0.91; PON 0.97; SUM 0.97; SUG 0.94; TOB 0.91; and MLI 0.90.

A J value close to 0.00 indicates environmental factors influencing organisms, causing uneven population

distribution due to selectivity and dominance by one or several species. However, all study sites exhibited J values approaching 1.00, reflecting normal environmental conditions characterized by relatively even distribution and the absence of dominance among non-avifauna species.

Based on the Shannon-Wiener index (H'), it is indicated that there was no disturbance to the non-avifauna community in the limestone mining areas [Temandang (TED), Pongpungan (PON), Sumberarum (SUM)] and clay mining areas [Sugihan (SUG), Tobo (TOB), Mliwang (MLI)] despite land clearing and site preparation activities conducted by the company.

CONCLUSION

Based on data analysis and discussion, the following conclusions can be drawn: The average Shannon-Wiener diversity index (H') across all study sites was above 2 ($1.00 < H' < 3.00$), categorized as “GOOD” with medium diversity. All study areas had evenness index (J) values approaching 1.00, indicating normal environmental conditions characterized by relatively even population distribution and the absence of dominance among non-avifauna species. Based on the Shannon-Wiener index (H'), it can be concluded that the non-avifauna community in the limestone mining areas has not been disrupted

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