

Diversity of vegetation, birds, dragonflies and butterflies at coal mining reclamation sites in South Kalimantan, Indonesia

SLAMET ISWORO[✉], POERNA SRI OETARI

Department of Environmental Health, Universitas Dian Nuswantoro, Jl. Imam Bonjol 207, Semarang 50131, Central Java, Indonesia.

Tel.: +62-24-3517261, Fax.: +62-24-3569684, ✉email: slamet.isworo@dsn.dinus.ac.id

Manuscript received: 26 May 2023. Revision accepted: 18 October 2023.

Abstract. Isworo S, Oetari PS. 2023. Diversity of vegetation, birds, dragonflies and butterflies at coal mining reclamation sites in South Kalimantan, Indonesia. *Biodiversitas* 24: 5376-5390. Coal mining can help the country's economy, but it can also be detrimental to the environment, especially due to the reduced biodiversity in mining areas. Recovery efforts are therefore needed to reclaim post-coal mining land. The aim of the research is to identify the biodiversity of plants, birds, dragonflies, and butterflies in the coal mining reclamation area in Banjar and Tapin regencies, South Kalimantan Province, Indonesia. A biodiversity survey was conducted on eight sites representing various reclamation conditions and histories. Based on vegetation studies in the reclamation area, 136 species belonging to 101 families were found. Zone TAJ1-4 had the highest diversity index (H') at the tree, stake and sapling strata with the index of 0.96, 1.06 and 1.71, respectively. The highest diversity index at the pole stratum was recorded in the TAJ1-3 zone with 0.6. Zone TAJ5-8 had the highest diversity index at the herbaceous vegetation, with 2.33. The Fabaceae family dominates all observation sites. The species with the highest importance index for the tree stratum was *Acacia mangium*, the pole stratum was *Albizia chinensis*, *Hevea brasiliensis* and *Vitex pinnata*, the stake stratum was *A. chinensis*, the sapling stratum was *A. mangium*, and the herbaceous stratum was *Ottochloa nodosa*. The Shannon-Simpson Index fell into the low category (10.00% to 57.78%), showing varying directions of vegetation succession. There were 21 birds, 10 dragonflies, and 15 butterflies recorded across the observation sites. According to the IUCN Red List of Threatened Species, no recorded species is listed as protected. The results of this study might be used for the management of post-mining reclamation areas, especially in South Kalimantan.

Keywords: Avifauna, biodiversity, coal mining reclamation, Lepidoptera, *Vitex pinnata*, vegetation

INTRODUCTION

The coal mining sector is one of the main energy sources for generating electricity power in many countries, including Indonesia (Clark et al. 2020). Coal mining activities can also benefit the economy by opening various business opportunities, developing infrastructure, and creating jobs (Monten et al. 2019). Nonetheless, they have detrimental environmental impacts, particularly for ecosystem and biodiversity. Mining activities, especially those conducted using open pit mining technique, usually involve land clearing, causing changes in the structure and composition of vegetation and disrupting the integrity and ability of the landscape as the habitat of flora and fauna (Feng et al. 2019).

Biodiversity refers to the variety of living creatures found in various habitats, including ecosystems in coal mining areas and the ecological complexes of which these organisms are a part. Thus, biodiversity is more than just the number of species of flora and fauna (Riefani et al. 2019). The impact of coal mining activities on biodiversity occurs not only at the species level but also at the ecosystem level, namely the diversity of habitats or locations where various types of living organisms dwell and interact with other abiotic and biotic elements. The increasing demand for coal used in energy production will pose a major danger to biodiversity conservation if not carefully planned and mitigated.

The government of Indonesia, through Law Number 3 of 2020 concerning Mineral and Coal Mining, stipulates that holders of Mining Business Permits (IUP) and Special Mining Business Permits (IUPK) carry out post-mining reclamation activities. This law is strengthened by the Minister of Energy and Mineral Resources Regulation No. 18 of 2008 regarding Reclamation and Mine Closure (Mahfud et al. 2022) and the Minister of Forestry Regulation No. 60 of 2009 concerning Guidelines for Evaluating the Success of Forest Reclamation. The pre-emptive measures of mining impacts are also regulated through the Minister of Environment and Forestry Regulation No. 4 of 2021 concerning Risk-Based Environmental Impact Analysis, Environmental Management and Monitoring and the Minister of Energy and Mineral Resources Regulation No. 5 of 2021 concerning Implementation of Business Permits Based Risks in the Mining Sector (Cahyaningtyas 2022). Such rules must be followed by all mining companies to promote a sustainable mining industry. Mining companies are obliged to carry out reclamation activities and provide reclamation guarantee deposits. The government, as the regulator, supervises the reclamation of ex-mined land. The violation of such laws is considered a crime, which also leads to the revocation of the mining permit (Faisal et al. 2022).

As stated by laws, post-coal mining lands should be reclaimed and revegetated so that they continue to provide various ecological functions once provided by forest