Tropentag, September 10-12, 2025, hybrid conference

"Reconcile land system changes
with planetary health"

Sustainability challenges and opportunities in the batur unesco global geopark: integrating socio-economic activities and environmental conservation

Husnul Khotimah[1], Raden Deden Djaenudin[2], Nur Arifatul Ulya[3]

[1]*National Research and Innovation Agency of Indonesia (BRIN), Research Center for Behavioural and Circular Economics, Indonesia*
[2]*National Research and Innovation Agency of Indonesia (BRIN), Research Center for Behavioural and Circular Economics,*
[3]*National Research and Innovation Agency of Indonesia (BRIN), Research Center for Behavioural and Circular Economics,*

Abstract

The Batur UNESCO Global Geopark (BUGG), located in Kintamani District, Bali, Indonesia, represents a complex socio-ecological system where natural capital, cultural heritage, and local livelihoods intersect. The region supports diverse economic activities, including horticulture, aquaculture, and tourism, which are vital to community welfare but also pose significant environmental challenges. This study investigates the sustainability dynamics in BUGG, focusing on how socio-economic activities impact environmental quality, particularly in and around Lake Batur—a critical freshwater resource in Bali.

Using a mixed-method approach combining stakeholder analysis and the Eco-Canvas Business Model, the research identifies major environmental issues such as nutrient pollution, sedimentation, and ecosystem degradation driven by intensive agriculture, aquaculture, and unregulated tourism. Field observations and interviews with farmers, fishers, and tourism operators reveal high dependency on chemical inputs and inadequate waste management practices. Meanwhile, institutional fragmentation and overlapping authority hinder effective governance and integrated landscape management.

Despite these challenges, BUGG holds significant potential for sustainable development through innovation and collaboration. Opportunities include the promotion of eco-agrotourism that integrates organic farming and cultural heritage, smart agriculture to reduce input dependency, and circular economy initiatives that transform agricultural and aquaculture waste into productive resources. The study also highlights the role of stakeholder co-creation and participatory governance in ensuring equitable benefit distribution and enhancing community resilience.

The application of the Eco-Canvas Business Model illustrates how sustainability principles—such as resource optimisation, stakeholder engagement, and triple bottom line values—can guide the transformation of local livelihoods. The study recommends five strategic pathways: strengthening cross-sectoral coordination, implementing smart and eco-friendly farming, enhancing capacity-building initiatives, developing sustainable infrastructure, and

Contact Address: Husnul Khotimah, National Research and Innovation Agency of Indonesia (BRIN), Research Center for Behavioural and Circular Economics, Gatot subroto street no.10 south jakarta, 12710 Jakarta, Indonesia, e-mail: husn006@brin.go.id

enforcing land-use regulations. These integrated strategies are essential to balance conservation goals with economic development and position BUGG as a model of sustainable geopark management.

In conclusion, achieving sustainability in BUGG requires harmonising development and environmental protection through adaptive, inclusive, and science-based approaches. The findings contribute to broader discussions on managing geoparks as socio-ecological systems and offer practical insights for policymakers, community leaders, and development practitioners engaged in landscape-scale sustainability initiatives.

Keywords: Eco-agrotourism, environmental conservation, geopark, socio-ecological systems, sustainability