

Sustainability challenges and opportunities in the Batur Unesco Global Geopark

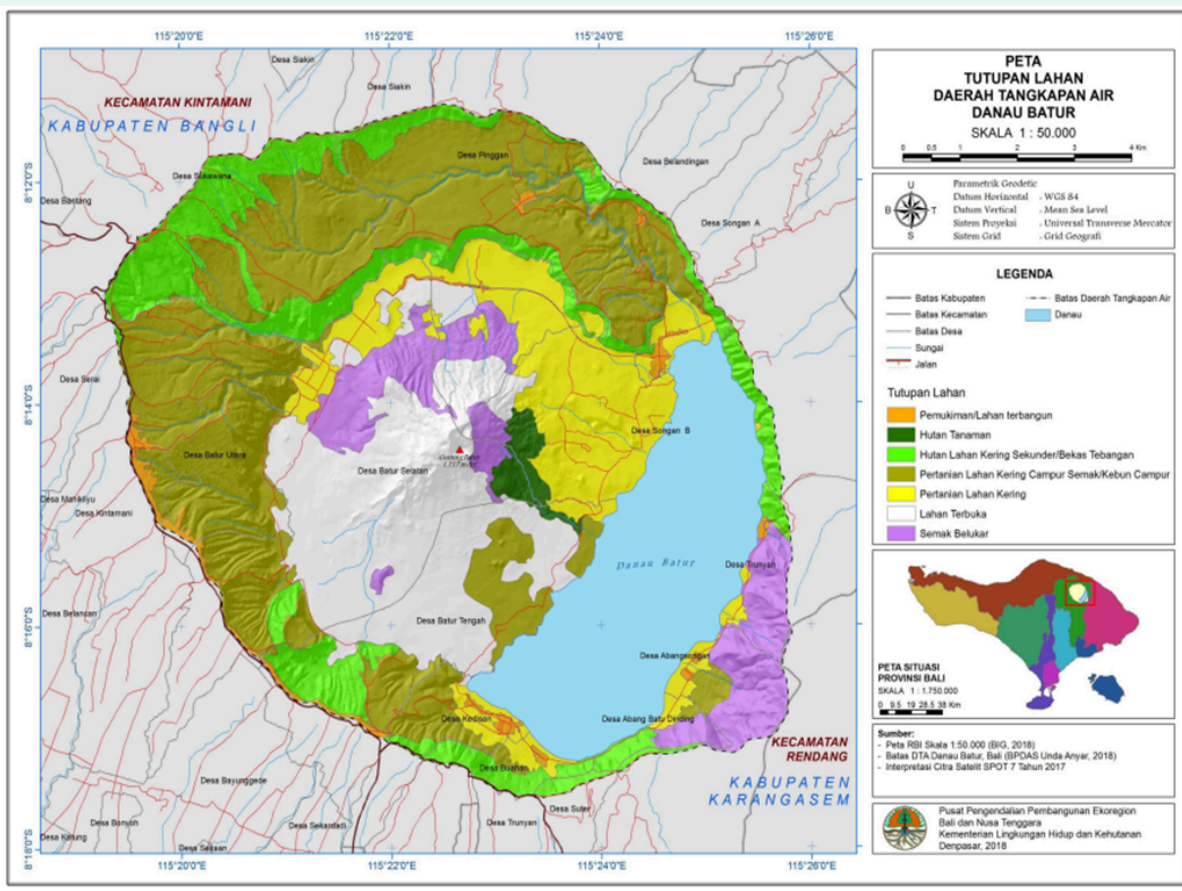
integrating socio-economic activities and environmental conservation



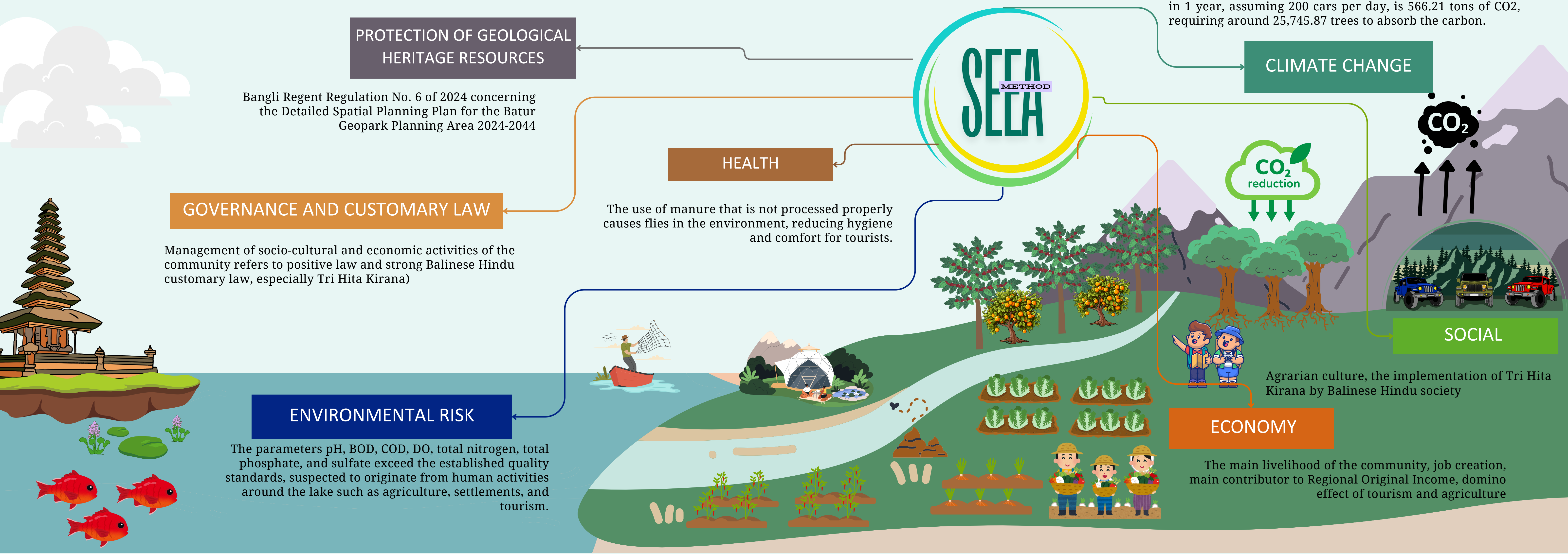
Husnul Khotimah, Raden Deden Djaenudin, Nur Arifatul Ulya, I Wayan Budiasa, Ida Ayu Astarini, Budi Leksono, Abdul Muis Hasibuan, Apri Laila Sayekti, Dhany Yuniati, Muhamad Rifqi Tirta Mudhofir, Fahmi Said

OVERVIEW

- 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 explores the sustainability dynamics of BUGG, with particular attention to the impacts of socio-economic activities on environmental quality in and around Lake Batur, a vital freshwater resource for Bali.
- Data were collected from both primary and secondary sources through field observations, in-depth interviews, and Focus Group Discussions. Employing a mixed-methods design, the research integrates qualitative and quantitative approaches within a socio-ecological system and stakeholder analysis framework, complemented by the Eco-Canvas Business Model to identify pathways toward sustainable livelihood strategies



HOW SOCIO-ECONOMIC ACTIVITIES IMPACT ENVIRONMENTAL QUALITY



A PROPOSED ECO-CANVAS BUSINESS MODEL

<p>Foresight & Impact (environmental)</p> <p>(5) what are they and how will the most important environmental aspects affect your business in the coming years? Think of global warming, scarcity resources, contamination</p> <p>Key Environmental Aspects:</p> <ul style="list-style-type: none">Climate change impacts, including erratic rainfall and temperature variability.Resource scarcity, with declining lake water quality and soil fertility.Pollution risks from agricultural runoff and untreated waste.	<p>Circular Value Chains</p> <p>(4) who are the main stakeholders that are going to affect the project or can be affected by it?</p> <p>Key stakeholders influencing and affected by the project:</p> <ul style="list-style-type: none">Local farmers and fishers transitioning to sustainable practices.Tourism operators incorporating eco-friendly services.Traditional villages (Banjar) preserving cultural heritage.Government agencies overseeing spatial planning and conservation policies.Conservation organizations supporting capacity building and technical expertise.Private sector entities promoting organic products and sustainable tourism.	<p>Need/Problem/Challenge</p> <p>(1) what is the problem/need that you have identified and intend to solve?</p> <p>The primary challenge in the Batur UNESCO Global Geopark (BUGG) is balancing socio-economic development with environmental conservation. Issues include:</p> <ul style="list-style-type: none">Environmental degradation caused by agricultural runoff, excessive pesticide use, and nutrient pollution in Lake Batur.Unsustainable tourism practices leading to habitat destruction, pollution, and loss of biodiversity.Vulnerability of traditional livelihoods, such as agriculture and fishing, to climate change and market fluctuations.Limited access to education and technical expertise, hindering community adaptation to changing socio-economic dynamics.	<p>Unique circular value proposition</p> <p>(10) what is your unique value proposition for each customer segment? What is the unique value (that cannot be copied) that you generate. Describe the value proposal, your products & services.</p> <p>BUGG offers:</p> <ul style="list-style-type: none">Eco-Agrotourism Experiences: Hands-on activities such as organic farming, cultural immersion, and agroforestry tours.Sustainable Products: High-quality organic coffee, citrus, and vegetables targeting niche markets.Circular Innovations: Waste-to-resource systems, including composting and biogas production, that reduce pollution and generate additional value.	<p>Stakeholder relationships</p> <p>(8) How is your relationship with customers & stakeholders?</p> <p>Relationships with stakeholders emphasize collaboration, trust, and shared accountability:</p> <ul style="list-style-type: none">Transparent communication through participatory decision-making forums.Long-term partnerships with conservation organizations, government agencies, and private investors.Engaging local communities as active participants in eco-tourism and conservation efforts.	<p>Customer segments</p> <p>(2) who is affected by the problem or has the need? who are your main customer segments? Be as specific as possible.</p> <p>The customer segments most affected by these challenges include:</p> <ul style="list-style-type: none">Primary Segments:<ul style="list-style-type: none">Eco-conscious tourists seeking sustainable travel experiences.Health-conscious consumers and niche markets for organic agricultural products.Secondary Segments:<ul style="list-style-type: none">Local communities reliant on agriculture, fisheries, and tourism for livelihoods.Conservation organizations and policymakers aiming to promote sustainable development.	<p>Foresight & Impact (Social)</p> <p>(6) what are they and how will the most important social aspect affect your business in the coming years? Think about technology, culture, social networks.</p> <p>Social impacts</p> <p>Here below indicate what are the social impacts that you will generate: positive and negative</p> <ul style="list-style-type: none">Increasing demand for eco-friendly products and sustainable tourism experiences.The role of cultural heritage in strengthening social cohesion.The importance of community participation in decision-making.Positive: Diversified income streams; empowerment through education and capacity building; preservation of cultural heritage.Negative: Potential resistance to change; socio-economic disparities if benefits are not equitably distributed.
<p>Environmental impacts</p> <p>Here below indicate what are the environmental impacts that you will generate: positive and negative</p> <ul style="list-style-type: none">Positive: Reduced pollution through SMART agriculture and waste management systems; enhanced biodiversity via agroforestry.Negative: Initial resource use for infrastructure development, mitigated by long-term sustainability benefits.	<p>(3) what resources (physical, human, financial, ...) does your company need to operate? what is your relationship with natural capital?</p> <ul style="list-style-type: none">Natural Capital: Fertile volcanic soils, Lake Batur's water resources, and the unique biodiversity of BUGG.Human Resources: Skilled local farmers, eco-tourism operators, and community artisans.Physical Resources: Agricultural infrastructure, eco-tourism facilities, and cultural heritage sites.Financial Resources: Funding from government grants, private investments, and partnerships with non-profits.	<p>Keyresources</p>	<p>(9) How will you attract customers and engage stakeholders? How is the service provided? How and where is it sold?</p> <ul style="list-style-type: none">Attracting Customers: Marketing through social media campaigns, eco-certifications, and partnerships with sustainable tourism operators.Engaging Stakeholders: Regular stakeholder meetings, educational workshops, and joint initiatives.Service Delivery: Tourism services and organic products provided directly at BUGG facilities and through online platforms.	<p>Communications & Sales</p>	<p>Revenue streams</p> <p>(11) What are the different income streams for the value you create and deliver to the market?</p> <ul style="list-style-type: none">Ticket sales for eco-tourism activities, such as farm tours, glamping, and guided nature walks.Sales of organic agricultural products to local and international markets.Grants and sponsorships from conservation projects and sustainable development programs.	<p>Structured costs</p> <p>(7) what are the costs that your business will incur by implementing the activities and using necessary resources? Think carefully about all sources of expenditure</p> <ul style="list-style-type: none">Fixed Costs:<ul style="list-style-type: none">Development of eco-tourism infrastructure and SMART agriculture systems.Training and education programs for local communities.Variable Costs:<ul style="list-style-type: none">Inputs for organic farming and renewable energy systems.Marketing and operational expenses for tourism enterprises.
<p>Sustainable Business Model and Innovation</p> <p>(12) What are the key features of your circular business model? Apply the strategies and describe the results here</p> <p>The Eco-Canvas model incorporates:</p> <ul style="list-style-type: none">Cross-Sectoral Coordination: Establishing a management forum for integrated governance and policy alignment (Mikhailenko et al., 2022).Circular Economy Principles: Recycling agricultural and aquaculture waste into valuable resources, reducing environmental impact (Pérez-Calderón et al., 2022).Community Empowerment: Training programs and pilot projects to build local capacity for sustainable resource management (Ólafsdóttir & Dowling, 2014).Infrastructure Development: Investments in eco-friendly facilities to support sustainable livelihoods and mitigate pollution (Jolánka et al., 2019).Regulation and Compliance: Enforcing spatial planning and conservation regulations to ensure long-term ecological and cultural preservation (Aziz et al., 2011; Costa et al., 2024)						

CONCLUSION

- The application of the Eco-Canvas Business Model illustrates how sustainability principles—such as resource optimisation, stakeholder engagement, and Tri Hita Kirana 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 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.

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RESEARCH COLLABORATION

