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Spatial inequality and policy pathways for an equitable blue economy in the Nusa Penida marine protected area, Bali

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A B S T R A C T

This study aims to examine spatial disparities in tourism development within the marine conservation area of Nusa Penida, Bali. It further seeks to formulate an equitable blue economy policy pathway that integrates environmental conservation, spatial justice, and community participation through a stakeholder-driven framework. The research applies a spatial descriptive analysis to identify patterns of tourism infrastructure, service distribution, and accessibility across Nusa Penida's western, central, and eastern regions. In addition, a policy evaluation using the MULTIPOL (Multi-Policy) method was conducted, involving expert-based Focus Group Discussions (FGDs). The MULTIPOL framework evaluated three policy scenarios using five criteria: ecological sustainability, social inclusion, spatial equity, economic feasibility, and institutional support. Findings reveal a strong spatial imbalance, with development and tourism investment highly concentrated in the western part of the island. This has led to environmental stress in overdeveloped areas and exclusion in underdeveloped regions. The preferred scenario, Equitable Blue Economy, highlights institutional strengthening, adaptive spatial zoning, and empowerment of local communities. This model aligns with local Balinese values such as Tri Hita Karana, reinforcing policy legitimacy and sustainability. Comparative insights from similar island contexts globally support the relevance of participatory and spatially integrated planning. Tourism development in marine conservation areas like Nusa Penida must not only pursue economic growth and environmental preservation but also ensure social equity and spatial justice. The integration of community values and participatory governance is essential to achieve a resilient and just blue economy model.

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1. Introduction

Marine protected areas (MPAs) such as Nusa Penida encapsulate a critical paradox: tourism widely serves as a driver for local economic development, yet unchecked mass visitation may erode ecological integrity, entrench spatial inequalities, and compromise conservation goals. Across tropical island contexts, rising visitor numbers often amplify this tension, especially when governance mechanisms lag behind. The blue economy paradigm presents a conceptual bridge, advocating for marine-based economic growth that is ecologically respectful and socially equitable (Choudhary et al., 2021; Bennett et al., 2021). Although Indonesia formally endorses blue economy principles, implementation in many MPAs, including Nusa Penida, is constrained by fragmented policies, institutional inertia, and weak community participation, which undercut both conservation and developmental aspirations.

As a unique site within the Coral Triangle, Nusa Penida has gained global prominence for its scenic beaches such as Kelingking Beach, Crystal Bay, and Atuh Beach and its rich marine biodiversity featuring manta rays, mola mola, and coral reef ecosystems (Ruchimat et al., 2013). Tourist arrivals now exceed 200,000 per year, generating concentrated economic

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activity along the west coast, while eastern villages remain marginalized due to lower infrastructure development and access (CTC Report, 2023). This spatial concentration amplifies the dilemma for MPA management: supporting visitor services and livelihood diversification without compromising habitat health or community resilience.

Scholarship on other Indonesian MPAs illuminates this dynamic. Rosadi et al. (2022) show that MPAs yield equitable community benefits only when governance frameworks are inclusive and stakeholder perceptions align with policy designs. Kelly et al. (2022) critique Indonesia's marine governance as path-dependent, inhibiting adaptation of Marine Spatial Planning (MSP) and undermining decentralized participation. Rifai et al. (2023) underscore the link between seagrass awareness and community support for blue tourism in Karimunjawa, while Pranita et al. (2023) demonstrate how digital innovations like blockchain can increase transparency and trust in island-based blue economy systems. Yet integrative studies that combine spatial mapping, actual community practices in blue economy, and policy forecasting via scenario tools like MULTIPOL remain scarce.

Wishanesta et al. (2024) synthesizes global and regional evidence on sustainable tourism and sea-based value chains, highlighting potential mechanisms for economic diversification in MPAs, including community-based enterprises, seaweed aquaculture, and ecotourism partnerships. This literature foundation underscores the gap between potential and practice in settings like Nusa Penida, where cross-sector integration remains underdeveloped. Analysis from Wishanesta et al. (2024) also indicates that blue economy initiatives succeed when framed within holistic local strategies grounded in spatial, economic, and governance alignment.

Ecologically, Nusa Penida's reefs face mounting pressures from visitor overcrowding, diving and snorkeling tour saturation, and coastal development without integrated waste or visitor capacity planning. Although programs such as Green Fins offer standards training for diving operators, long-term ecological and community resilience remain uncertain (BNC/REEF World, 2023). Environmental monitoring continues to warn of bleaching events, coral cover degradation, and macroalgae overgrowth, signs of mounting ecosystem stress (Susiloningtyas & Pratiwi, 2018).

Spatially, research by Fithor et al. (2024) reveals a rapid land use shift on nearby Nusa Lembongan: former seaweed farming villages have transitioned to tourism infrastructure, reflecting broader regional pressures to commodify coastal land. Similar dynamics in Nusa Penida point to risk of lock in effects, infrastructure investments favoring tourism zones may solidify spatial inequalities and ecological fragility further.

Infrastructure-wise, studies by Budiartha & Adnyana (2018) identify key bottlenecks: limited harbor facilities, underdeveloped docking infrastructure, and fragmented blockchain of governance between district and provincial authorities obstruct integrated spatial development and economic access. Visitor access, especially to eastern Nusa Penida, lags behind western areas, magnifying disparities in income, skilled labor inclusion, and institutional support.

Thus, the central research problem emerges: despite its acclaim as a global marine tourism icon, Nusa Penida exhibits stark spatial inequality in tourism-derived benefits, pressurized ecological conditions, and lagging integration of blue economy models in local economic structures. The literature gap lies in the absence of an integrated study that maps tourism activity spatially, evaluates ongoing blue economy practices in situ, and formulates strategic, scenario-based policy interventions via MULTIPOL methodology targeting Nusa Penida's dual mandate as conservation sanctuary and tourism destination.

Accordingly, this study aims to analyze the spatial dynamics of tourism development and community welfare in Nusa Penida MPA, assess the implementation and impact of blue economy initiatives on the ground, and derive policy alternatives using MULTIPOL scenario analysis to reduce spatial disparities while aligning development with conservation objectives. Research questions are as follows: (1) What are the spatial patterns of tourist activity and socio-economic welfare across the island's zones? (2) Which blue economy practices, such as community-based tourism, seaweed valorization, coral restoration, are active, and how effectively do they contribute to sustainability? (3) What policy scenarios can be formulated using MULTIPOL to achieve inclusive growth, ecological resilience, and equitable resource distribution in Nusa Penida?

This research contributes a novel, integrated framework for MPAs navigating conservation–tourism trade offs. By mapping spatial disparities, appraising community-led blue economy innovations, and modeling policy futures, the study delivers actionable insights for Nusa Penida and analogous small islands aiming to harmonize ecological protection with equitable tourism-led development.

2. Material and method

2.1 The Concept of Blue Economy in Coastal and Small Island Areas

The blue economy concept has emerged in response to global needs to balance the exploitation of marine resources with environmental protection and social equity. It refers to a sustainable ocean-based development model emphasizing three main

pillars: economic efficiency, environmental sustainability, and social inclusion (Bennett et al., 2021; Choudhary et al., 2021; Hampton & Jeyacheya, 2020). In the context of coastal and small island areas, this concept encompasses activities such as sustainable fisheries, marine ecotourism, and ecosystem conservation as integral components of the local economic system (Kelly et al., 2022).

In Indonesia, the mainstreaming of the blue economy is reflected in national development policies, including the RPJMN and the maritime axis vision. However, several studies reveal that its implementation is still dominated by sectoral and bureaucratic approaches and lacks integration with spatial and socio-ecological dimensions of local communities (Nasution, 2022; Kelly et al., 2022; Choudhary et al., 2021). This presents a significant challenge in areas like Nusa Penida, where economic activities, tourism, and marine conservation overlap within narrow geographical spaces.

A successful blue economy in small islands requires an adaptive model sensitive to local dynamics, including livelihoods, marine biophysical conditions, and institutional capacity (Hampton & Jeyacheya, 2020; Bennett et al., 2021; Fithor et al., 2024). Diversification of marine-based economies supported by technology, cross-sector collaboration, and appropriate spatial mapping are key elements in forming a resilient and equitable blue economy at the local level.

Nonetheless, literature shows that the integration of spatial approaches, community participation, and cross-sectoral governance in blue economy practices is still rarely studied systematically in Indonesia, particularly in marine conservation areas such as Nusa Penida (Rosadi et al., 2022; Rifai et al., 2023). This study seeks to fill that gap by building a comprehensive understanding of how the blue economy can be operationalized contextually in small islands.

2.2 Conservation Tourism and Conflicts in Protected Areas

Conservation tourism is a strategy that combines tourism activities with environmental protection goals and the empowerment of local communities. Marine protected areas (MPAs) are the primary sites for implementing this concept, where activities such as diving and snorkeling are managed to avoid damaging protected ecosystems (Susiloningtyas & Pratiwi, 2018; Rosadi et al., 2022; Rifai et al., 2023). However, in practice, tourism growth often increases environmental pressure without adequate governance.

Tourist pressure on conservation zones without carrying capacity control and zoning compliance can lead to coral reef damage, pollution, and spatial use conflicts (Kelly et al., 2022; Rosadi et al., 2022). Conversely, when managed collaboratively with local communities, conservation tourism can enhance ecological awareness and economic well-being of coastal residents (Rifai et al., 2023; Bennett et al., 2021).

Case studies in Gili Matra show that community involvement in conservation zoning can enhance prosperity and sustainability, provided that perceptions of equitable benefit distribution are maintained (Rosadi et al., 2022; Choudhary et al., 2021). In Karimunjawa, community participation in protecting seagrass is crucial for the success of conservation-based blue tourism (Rifai et al., 2023; Hampton & Jeyacheya, 2020). These studies underscore the importance of participatory approaches in conservation-oriented tourism.

Nusa Penida reflects similar challenges, where destinations like Kelingking and Crystal Bay have experienced a surge in visitors but lack adequate spatial policies and environmental impact management. This imbalance may undermine the ecological function of conservation areas and exacerbate spatial use conflicts among tourism actors, local communities, and regulators.

2.3 Spatial Inequality in Coastal Tourism

Spatial inequality in the tourism sector refers to the phenomenon where infrastructure development and tourism activities are concentrated in specific hotspots, while other areas are marginalized from investment flows and benefit distribution. In many coastal regions, this results in uneven economic growth and disparities in local quality of life (Fithor et al., 2024; Bennett et al., 2021; Hampton & Jeyacheya, 2020).

Research in Nusa Penida shows that western regions such as Bunga Mekar and Sakti villages enjoy increasing tourist visits and improved facilities, while eastern regions lack basic infrastructure, limited road access, and lower tourist arrivals (Fithor et al., 2024; Rosadi et al., 2022). This inequality fuels social tension as only part of the community benefits economically from tourism.

Spatial mapping based on geographic data can reveal these inequality patterns and serve as a crucial tool for crafting more equitable policies. Approaches such as interregional disparity analysis and spatial modeling using GIS are highly relevant for designing interventions that balance tourism and infrastructure distribution (Kelly et al., 2022; Choudhary et al., 2021).

The literature further highlights that if spatial inequality is ignored, the effectiveness of conservation and blue economy programs will decline, as marginalized communities tend not to support environmental policies that offer them no direct benefits (Rifai et al., 2023; Bennett et al., 2021). Thus, spatial justice must be a foundational principle in developing tourism in coastal and small island areas.

2.4 Community Participation and MPA Governance in Indonesia

Inclusive and participatory governance is a critical prerequisite for successful marine conservation area management. In many cases, MPAs fail because decisions are made top-down without involving local communities who live around the area (Kelly et al., 2022; Rosadi et al., 2022; Erwiantono et al., 2013).

In Indonesia, colonial legacies in institutional structures have resulted in a rigid and centralized marine resource management system that often overlooks local contexts (Kelly et al., 2022; Nasution, 2022). Jurisdictional fragmentation between the Ministry of Marine Affairs and Fisheries, provincial and district governments, and tourism actors causes policy overlap and weak coordination.

Studies suggest that community-based marine protected areas (CB-MPAs) can improve conservation effectiveness and zoning compliance if supported by community organization empowerment, environmental education, and strengthened local institutional capacity (Erwiantono et al., 2013; Rifai et al., 2023). However, this model has yet to be fully adopted in Nusa Penida.

Some local initiatives, such as conservation-certified dive guide training or Green Fins certification, show potential for cross-actor collaboration. Still, these initiatives remain partial and have not yet been integrated into a formal governance framework involving all stakeholders systematically.

2.5 Research Gap and Contribution

This literature review indicates that while numerous studies have addressed the blue economy, conservation tourism, and community participation, they often focus on isolated aspects. Research that integrates spatial approaches, economic justice, and participatory governance in the context of marine conservation areas remains limited, particularly in small islands experiencing intense tourism pressures such as Nusa Penida (Fithor et al., 2024; Kelly et al., 2022; Rifai et al., 2023).

Most existing studies have not explicitly employed spatial approaches to identify disparities in tourism benefit distribution or proposed policy scenarios that account for multiple stakeholders and environmental carrying capacity. In this regard, the present study contributes to the development of an interdisciplinary approach that can inform evidence-based planning and decision-making.

By constructing a conceptual and analytical framework that integrates spatial, social, and institutional dimensions, this study aims to offer a roadmap for developing a blue economy that is equitable, sustainable, and grounded in local realities in Indonesia's coastal conservation areas. The research is expected to provide not only theoretical contributions but also concrete policy implications to strengthen tourism and conservation governance in vulnerable yet strategic tropical coastal regions.

2.6 Method

This study adopts a mixed-methods approach, focusing primarily on the integration of descriptive spatial analysis and the MULTIPOL method to formulate blue economy development policies in the marine conservation area of Nusa Penida. This approach was chosen due to the multidimensional nature of the research problem, which includes spatial development inequalities, environmental sustainability, and socio-institutional dynamics in conservation-based tourism governance.

Broadly, this study aims to: (1) map spatial inequality in the development of tourism and infrastructure; (2) identify stakeholder perceptions and preferences regarding alternative blue economy development paths; and (3) formulate policy scenarios using the MULTIPOL method that are responsive to local contexts and oriented toward sustainability.

The initial stage of the study employed descriptive spatial analysis to portray the actual distribution of tourism infrastructure, marine conservation zones, and residential areas. Data sources included village administrative maps, high-resolution satellite imagery, zoning maps of the Nusa Penida Regional Marine Conservation Area (KKPD), and socioeconomic data from the Central Statistics Agency (BPS) and the Tourism Office.

eals the extent of development disparities between western and eastern Nusa Penida. This mapping serves as the basis for identifying development priority zones, access gaps, and conservation pressures. Additionally, this spatial foundation supports

cross-sectoral dialogue during the policy formulation stage by presenting evidence in a visual format that is accessible to both policymakers and communities.

As a key component of the MULTIPOL method, this study employed Focus Group Discussions (FGDs) to explore stakeholder perceptions and preferences regarding sustainable blue economy policy scenarios in Nusa Penida. FGD is a qualitative data collection method involving guided group discussions designed to gain in-depth insights into participant values, perceptions, and evaluations of specific issues (Krueger & Casey, 2015). In this context, FGDs were used to evaluate various policy alternatives through deliberative and reflective exchanges among actors directly engaged in tourism and conservation governance. The FGDs were conducted in two rounds. The first round aimed to map preliminary perceptions of the current state, opportunities, and governance challenges. The second round focused on evaluating policy scenarios using the MULTIPOL approach, where participants were asked to assign weights to assessment criteria and collectively evaluate each policy option. Discussions were participatory and facilitated through decision matrix sheets (Suasih et al., 2025). To ensure a diverse and representative set of views, FGD participants were purposely selected based on their direct relevance to the research topic. A total of 12 expert participants were categorized as Table 1.

Table 1
Expert as Members of FGD

No.	Institution / Profession	Number	Role & Relevance
1	Klungkung Regency Tourism Office	2	Decision-makers in zoning and marine conservation area (KKPD) management
2	Klungkung Regency Licensing Services Office	2	Planners and regulators of tourism sector development
3	Conservation NGOs (e.g., Coral Triangle Center)	2	Implementers of marine education and conservation outreach in Nusa Penida
4	Community leaders / customary authorities	2	Directly affected by tourism and conservation policies
5	Tourism business actors (diving & snorkeling)	2	Private stakeholders reliant on marine ecosystem health and zoning policies
6	Local academics / spatial planning experts	2	Independent evaluators knowledgeable in sustainability and spatial policy design

This composition was designed to capture diverse interests and roles in the governance system, bringing together technocratic, customary, environmental, and economic perspectives into one deliberative space. Thus, FGD outcomes not only reflect individual opinions but also serve as negotiated visions to guide policy direction. The use of FGD within the MULTIPOL framework enables transparent and consensus-based weighting of evaluation criteria, which is critical to enhancing the legitimacy of policy recommendations (Candel & Biesbroek, 2016). This participatory approach is expected to yield both academically robust and practically implementable outcomes grounded in local realities. The main components of MULTIPOL consist of scenarios, policies, and actions, all of which are directed toward achieving specific objectives. The stages of the MULTIPOL analytical framework are presented in Fig. 1.

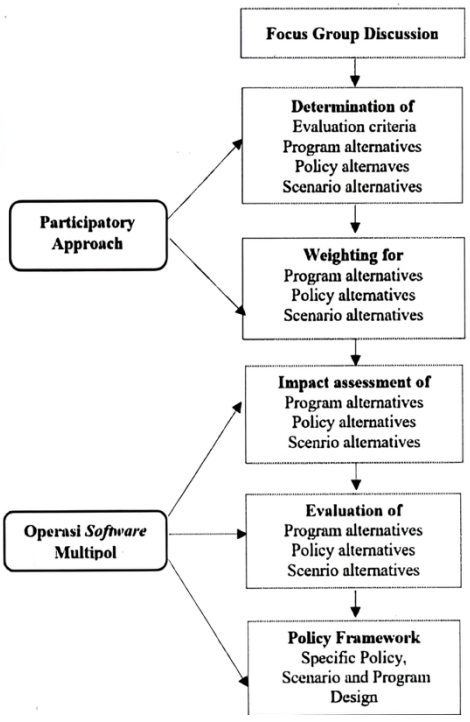

Fig. 1. Stages in Determining the MULTIPOL Framework

Overall, the methodology employed in this study is adaptive and contextual, aligning with the socio-ecological complexity of small island marine conservation areas like Nusa Penida. The integration of spatial and participatory approaches provides a foundation for formulating blue economy policies that are technically sound, socially equitable, and environmentally sustainable.

3. Results And Discussion

3.1 Spatial descriptive analysis

The spatial analysis in this study aims to identify disparities in the distribution of tourism infrastructure and activities in Nusa Penida, as well as their correlation with environmental sustainability and the local economy. Based on spatial data utilized in this dissertation, it was found that the concentration of tourism development is significantly located in the western part of the island. Areas such as Desa Sakti, Bunga Mekar, and Ped demonstrate dominance in tourism activities such as diving and snorkeling, which have rapidly grown due to high exposure on social media and easy accessibility from the main port. Fig. 2. presents the spatial distribution of tourism destinations across the Nusa Penida region.

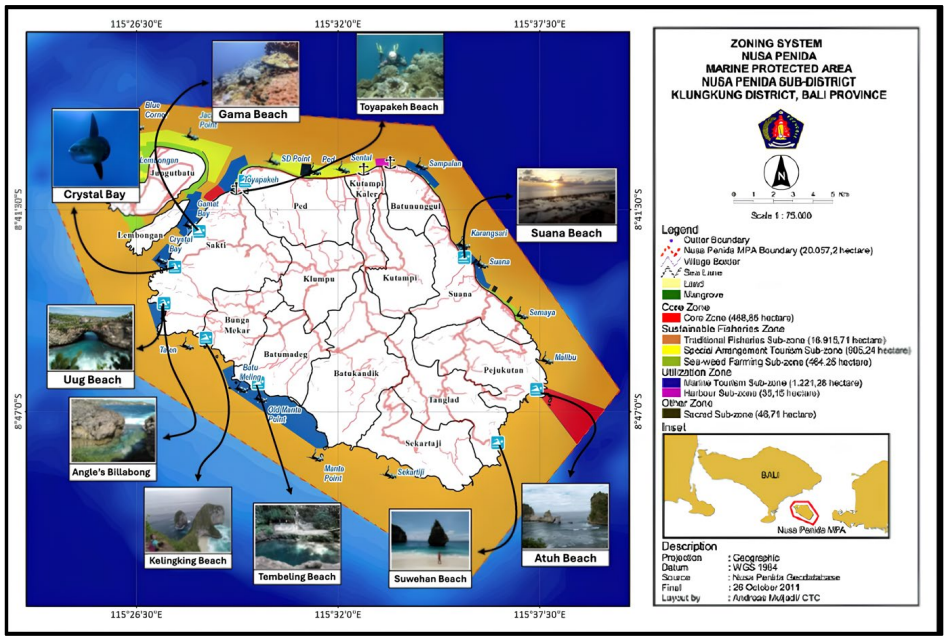

Fig. 2. Spatial distribution of tourism destinations across the Nusa Penida MPA
Source: Marine and Fishing Office of Bali Province (2017)

When compared with environmental conservation, Fig. 3 presents the map of the Nusa Penida Marine Protected Area (MPA).

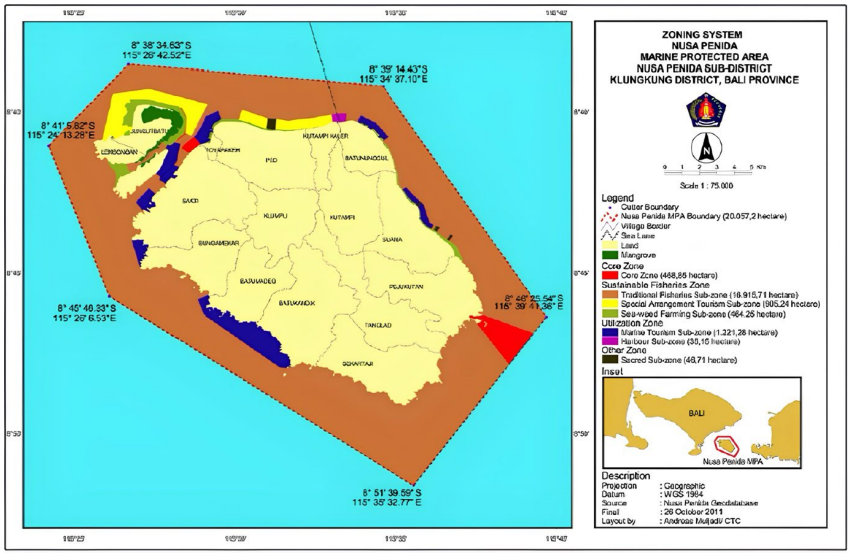

Fig. 3. Zoning Map of the Nusa Penida Marine Protected Area (MPA)
Source: https://www-coraltrianglecenter-org.translate.goog/nusa-penida-mpa/?_x_tr_sl=en&_x_tr_tl=id&_x_tr_hl=id&_x_tr_pto=imgs

By examining the distribution of tourism destinations (Figure 2) and the conservation zone map (Figure 3), it is evident that the majority of tourism destinations are located within the marine protected area. This aligns with the fact that tourism in Nusa Penida is largely dominated by coastal and marine tourism. Consequently, a dilemma arises in regional development between expanding tourism destinations and conserving the environment.

Conservation is the key to sustainable tourism development. According to the results of the EVIKA (Evaluation of Effectiveness of Conservation Area Management) report, the EVIKA score for the Nusa Penida MPA is 85.61. The EVIKA score comprises four components: input, process, output, and outcome.

The input component includes the following indicators: (1) area status; (2) zoning plan; (3) management plan; (4) human resources; (5) budget; and (6) infrastructure and facilities. The process component includes: (1) management SOPs; (2) outreach; (3) partnerships; (4) monitoring and resources; (5) facility management; (6) permitting; (7) community empowerment; and (8) surveillance. The output component is measured through: (1) controlled utilization; (2) threats; (3) compliance level; (4) community knowledge; (5) community empowerment; and (6) data and information. The outcome component includes: (1) condition of conservation targets; (2) condition of the core zone; (3) condition of beneficiary communities; and (4) community participation.

The EVIKA scores for the Nusa Penida MPA in 2023 and 2024 are presented in Fig. 4.

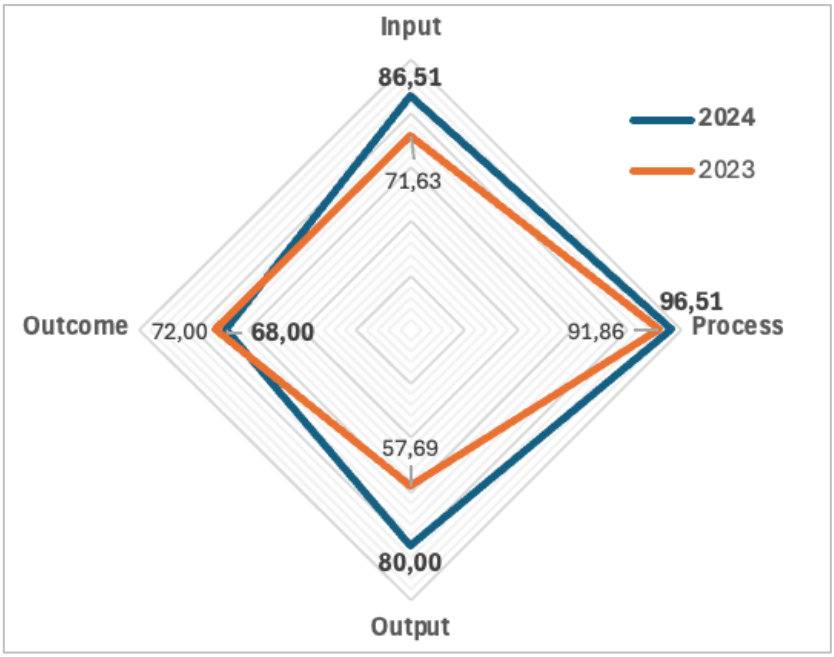

Fig. 4. Effectiveness Score of Nusa Penida Marine Protected Area Management in 2023–2024

The lowest EVIKA criterion score for the Nusa Penida MPA is found in the outcome component, particularly in the indicator of the condition of beneficiary communities. This indicator is the only one that showed a decline in score from 2023 to 2024. This raises an important question: Has the designation of the marine protected area not yet had an optimal impact on the condition of the local communities? The findings from this spatial condition analysis serve as the basis for policy review, which is further elaborated through the MULTIPOL analysis.

3.2 Potential Policy Path Through MULTIPOL Analysis

The policy analysis in this study employs the MULTIPOL (Multi-Policy) method to evaluate three alternative policy scenarios that can be implemented for the development of an equitable blue economy-based tourism in the coastal region of Nusa Penida. MULTIPOL is a participatory evaluation approach, in which each policy scenario is assessed based on a set of criteria relevant to the local context and aligned with sustainable development goals. As the initial stage of the MULTIPOL analysis, a set of development criteria was identified to serve as the objectives for sustainable tourism in Nusa Penida. In addition, relevant policies and actions were also identified, which together form the foundation for constructing the potential policy paths within the three defined scenarios. The identification process was conducted through literature review and confirmed via focus group discussions (FGDs) with domain experts. All identification results are presented in Table 2.

Table 2
Identification of Scenarios, Criteria, Policies, and Actions for Sustainable Tourism Development in Nusa Penida

Category	Element	Definition	Reference
Scenario	Status Quo	Maintaining current development trends without significant changes.	Cisneros-Montemayor et al. (2021)
	Progressive	Accelerating inclusive and sustainable growth through policy reform.	Cisneros-Montemayor et al. (2021)
	Transitional	Gradual shift towards balanced development across regions and sectors.	Cisneros-Montemayor et al. (2021)
Criteria	Increase in income	Improving local household and regional income through tourism and fisheries.	Ruckelshaus et al. (2020)
	Environmental quality	Maintaining ecosystem health and minimizing environmental degradation.	Bennett et al. (2020)
	Job creation	Expanding employment opportunities through tourism-based industries.	Cohen et al. (2022)
	Business productivity	Enhancing efficiency and scale of tourism-related businesses.	Ruckelshaus et al. (2020)
	Strengthening infrastructure	Upgrading public utilities, transport, and digital infrastructure.	Cohen et al. (2022)
	Reduction of social conflict	Reducing tensions and inequalities among regions or social groups.	Jentoft & Chuenpagdee (2009)
	Growth of new economic sectors	Fostering innovation and emerging sectors like creative industries and blue economy.	Cisneros-Montemayor et al. (2021)
	Human resource competency	Improving skills and competencies of the local workforce.	Salem (2014)
Policy	Local economic development	Strengthening the community-based and MSME economy.	Cohen et al. (2022)
	Economic connectivity	Connecting tourism and other economic sectors across regions.	Ruckelshaus et al. (2020)
	Conservation policy	Enforcing protection and sustainable use of marine and coastal ecosystems.	Bennett et al. (2020)
	Sectoral integration	Aligning policies across tourism, environment, and fisheries sectors.	Jentoft & Chuenpagdee (2009)
	Institutional capacity building	Enhancing governance and regulatory capacity at the local level.	Salem (2014)
	Integrated development programs	Designing synergistic programs involving multiple sectors and actors.	Cisneros-Montemayor et al. (2021)
Action	Conservation	Protecting biodiversity, habitats, and marine ecosystems.	Bennett et al. (2020)
	Infrastructure development	Developing roads, ports, utilities to support economic activities.	Ruckelshaus et al. (2020)
	Service quality improvement	Enhancing tourist and public services (cleanliness, safety, health).	Cohen et al. (2022)
	Information technology	Improving access to digital infrastructure and tourism promotion.	Ruckelshaus et al. (2020)
	Cultural preservation and promotion	Preserving cultural identity and traditions in tourism.	Cohen et al. (2022)
	Local HR training	Training and certifying local human capital.	Salem (2014)
	Foreign labor monitoring	Monitoring and regulating the use of foreign labor in local sectors.	Salem (2014)

Each criterion was assigned a weight based on the results of deliberation during the FGD (Focus Group Discussion). The criteria of ecological sustainability and social inclusion received the highest weights, as they were considered most relevant to the ecological vulnerability and social disparity observed in Nusa Penida. Table 3 presents the evaluation results based on actions and policies, while Table 4 shows the evaluation results based on policies and scenarios in the development of sustainable tourism within the Nusa Penida marine protected area.

Table 3
Scores of Actions Against Policies for Sustainable Tourism Development in the Nusa Penida Marine Protected Area

Action	Policy						Mean	St. Dev.	Rank
	Local economic development	Economic connectivity	Conservation policy	Sectoral integration	Institutional capacity building	Integrated development programs			
Conservation	7.8	7.8	10	12.8	12.2	8.8	10	2	6
Infrastructure development	15.1	14.8	15.3	12.4	10.4	14.6	13.7	1.8	3
Service quality improvement	11.5	12.5	10.9	12.4	14.2	11.2	12.1	1.1	4
Information technology	13.8	14.1	11.4	16.9	15.4	14.7	14.4	1.7	2
Cultural preservation and promotion	10.9	8.5	10.5	11.6	14.3	10.4	11.1	1.7	5
Local HR training	14.8	12.7	16.7	14.6	17.1	14.1	15.1	1.5	1
Foreign labor monitoring	9.3	9.8	7.8	10.6	12.1	10.1	9.9	1.3	7

Table 4
Policy Scores Against Scenarios for Sustainable Tourism Development in the Nusa Penida Marine Protected Area

Policy	Scenario			Mean	Std. Dev.	Rank
	Status Quo	Progressive	Transitional			
Local economic development	12.2	9.5	9.8	10.4	1.2	5
Economic connectivity	8.9	11.4	6.5	9.1	2	6
Conservation policy	16.1	12.2	16.3	14.7	1.9	2
Sectoral integration	11	15.5	14.8	13.9	2	3
Institutional capacity building	12.3	15.3	16.5	14.8	1.7	1
Integrated development programs	12.2	10.8	9.7	10.9	1	4

The results of the MULTIPOL analysis indicate that the third scenario, namely the Equitable Blue Economy Model, achieved the highest cumulative score. The key advantage of this scenario lies in its flexibility to accommodate both ecological priorities

and the aspirations of local communities, who have often been underrepresented in decision-making processes. Key strengths of this scenario include village-based development initiatives, incentives for local business actors, and an adaptive zoning approach. The results of the MULTIPOL analysis can be formulated into a potential policy path, as illustrated in Fig. 5.

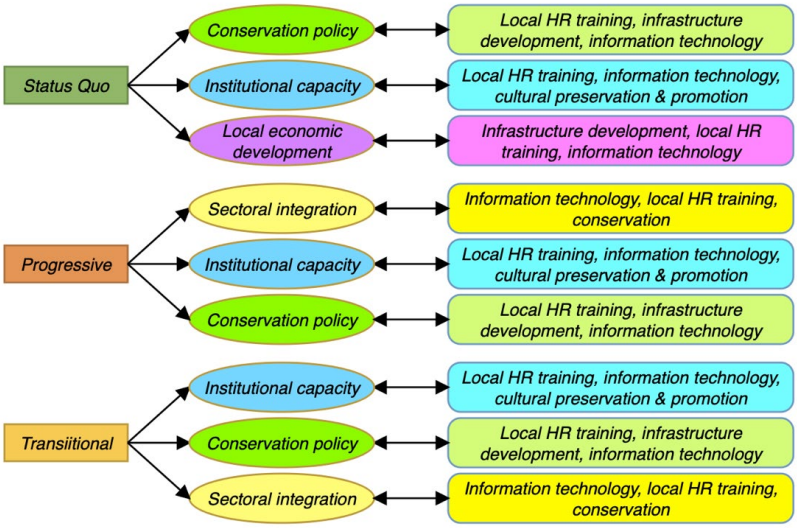

Fig. 5. Potential Policy Path for Sustainable Tourism Development in the Nusa Penida Marine Protected Area

In terms of stakeholder support, the evaluation results implicitly show that all stakeholder groups gave high scores to aspects of social inclusion and spatial equity in the blue economy scenario. Although there were concerns among tourism entrepreneurs regarding the high initial investment costs, this challenge can be addressed through public-private partnerships and the strengthening of fiscal incentive regulations. Implicitly, this approach also integrates local values such as Tri Hita Karana, the Balinese philosophy of balance between humans, nature, and spirituality, which serves as the social foundation of Balinese society. This provides the social legitimacy advantage for the blue justice scenario and enhances the adaptive capacity of policies at the customary village (desa adat) level. These findings reinforce the literature emphasizing the need to integrate participatory and spatial approaches in marine conservation area governance (Lester et al., 2018; Ison, 2024). Similar studies in Fiji (Cohen et al., 2022), Maldives (Lukambagire et al., 2024), and the Philippines (Marriott et al., 2021) also demonstrate that involving local communities in policy evaluation results in policies that are more equitable and sustainable.

3.3 Discussion

The findings of this study affirm that tourism development in Nusa Penida demonstrates significant spatial inequality, particularly in the distribution of infrastructure, economic activity, and access to development benefits. The concentration of tourism in the western part of the island results in high environmental pressure and risks of ecosystem degradation, while the central and eastern areas lag behind in terms of facilities, accessibility, and community involvement in tourism activities. These findings reflect patterns consistent with spatial inequality theory and development exclusion in small island contexts (Lopez & Gonzalez, 2018; Scheyvens & Russell, 2012; Weaver et al., 2022). Spatial analysis in this study reveals a direct relationship between physical accessibility and the intensity of tourism development. Areas with access to ports, road networks, and easily reachable natural attractions experience greater investment accumulation. In contrast, areas with geographical access barriers receive inadequate attention. This imbalance has led to the emergence of a dual economy between "core" and "peripheral" regions within a relatively small island, a phenomenon also reported in other island areas such as Gili Matra (Firdaus et al., 2020) and San Andrés (Putri & Salim, 2020). This situation is further exacerbated by land-use conflicts and pressure on conservation zones. Nusa Penida is part of a Regional Marine Protected Area (KKPD) designated to safeguard marine biodiversity. However, it also serves as a main marine tourism destination, including for snorkeling and diving. The absence of clear spatial regulations leads to conflict between conservation efforts and the commercialization of ecotourism. Similar conflicts have been reported in Raja Ampat and Palau, where tourism management lacked a spatial plan based on carrying capacity and local participation (Bennett et al., 2021; Sarker & Mahmudul Islam, 2021). The MULTIPOL method used in this study provides a deeper understanding of stakeholder preferences across alternative policy options. The preference for the progressive "Equitable Blue Economy" scenario, which emphasizes institutional strengthening, reflects an awareness of the importance of social inclusion, spatial equity, and environmental sustainability. This aligns with findings from Fiji (Cohen et al., 2022), where participatory approaches and fair spatial distribution were key to the success of a sustainable blue economy. Moreover, active community participation in policy formulation is crucial to ensure social legitimacy and long-term sustainability. This study supports the findings of Salem (2014) and Bennett et al. (2020), which show that policies that exclude local voices are prone to implementation resistance, particularly in coastal and island regions with strong communal systems.

The concept of “blue justice” provides a highly relevant theoretical framework within the discourse of coastal and island development. In the context of Nusa Penida, blue justice means not only protecting marine resources but also ensuring equitable distribution of access, benefits, and local participation in decision-making. Recent literature highlights the urgency of preventing “ocean grabbing”, where external actors take control of local resources without community consent (Barbesgaard, 2018; Silver et al., 2015).

This discussion also reflects the importance of integrating local values such as Tri Hita Karana in designing sustainable development strategies. This concept not only carries spiritual meaning but also guides harmony between humans, the environment, and social values. This approach has proven relevant in the Balinese context and is recommended for adoption in culturally grounded blue economy models (Prasetyo, 2019; Suarta & Budiarta, 2019).

Thus, this study not only provides empirical insight into the current state of tourism development in Nusa Penida but also contributes to the advancement of theory and practice in building a more just and sustainable blue economy. The integration of spatial analysis, participatory evaluation, and culturally contextualized approaches forms the foundation for shaping resilient futures in coastal and island regions.

4. Conclusion

This study aims to evaluate spatial inequality in tourism development within the Nusa Penida marine conservation area and to formulate equitable blue economy policy scenarios through a participatory approach. Based on the results of the spatial descriptive analysis, it is clearly evident that tourism development in Nusa Penida is highly concentrated in the western region, particularly in villages with direct access to ports and major tourist attractions. This region enjoys a high concentration of infrastructure, tourism facilities, and visitor numbers, while the central and eastern areas remain underdeveloped in terms of accessibility, basic services, and involvement in the tourism economy.

This spatial imbalance affects the unequal distribution of economic benefits and generates high ecological pressure in conservation zones densely populated with tourism activities. The analysis shows that excessive tourism activity, without strict zoning regulation, leads to degradation of marine ecosystems, such as coral reef damage and disruption of marine habitats. On the other hand, areas untouched by development suffer from exclusion from economic benefits and are increasingly left behind socially and infrastructurally.

The MULTIPOL method used to assess tourism policy scenarios revealed that in the “Equitable Blue Economy Model”, institutional strengthening emerged as the top policy priority, alongside conservation and sectoral integration. This potential policy path balances the need for marine ecosystem conservation, the enhancement of local community participation, and spatial equity in the distribution of investment and infrastructure. These findings highlight the importance of inclusive, participatory, and spatially-informed policy approaches to prevent regional polarization and to promote just development.

The implications of these findings are highly significant for coastal and small island development policies in Indonesia. First, there is a need for ecosystem-based spatial planning to harmoniously integrated conservation and tourism. Second, local community involvement must be strengthened through economic empowerment, capacity building, and inclusion in the tourism value chain, so that they do not remain mere spectators in the ongoing economic transformation. Third, local governments must design incentive policies to encourage investment dispersion to underdeveloped areas in order to balance development pressure.

Furthermore, the application of the blue economy approach in conservation areas must be guided by principles of social justice and long-term sustainability. In the Balinese cultural context, Tri Hita Karana values can serve as a normative foundation that connects harmony between people, the environment, and spirituality in the planning and implementation of policies.

This study also makes a conceptual contribution to the discourse on “blue justice”, which emphasizes fairness in ocean-based economic development, by underlining the importance of spatial and social inclusion as part of sustainable development strategies. Therefore, tourism development in conservation areas like Nusa Penida should not be directed solely at maximizing economic profits or environmental preservation but should also aim to foster equitable, balanced, and context-sensitive social transformation.

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