

Ecotourism Management in Bali: A Systematic Literature Review on Challenges and Sustainability Strategies

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Abstract

Bali's tourism-driven economy faces severe ecological and social pressures, prompting ecotourism as a sustainable alternative. However, fragmented evidence on management challenges and strategies hinders evidence-based policy. This systematic literature review synthesizes empirical studies on ecotourism management in Bali, identifying key challenges and sustainability strategies. Following PRISMA 2020 guidelines, a structured search of Scopus, Web of Science, and Google Scholar (2010–2025) yielded 28 peer-reviewed studies. Data were synthesized using thematic analysis and quality appraised with the Mixed Methods Appraisal Tool (MMAT). Three persistent challenges emerged: governance fragmentation, limited community participation, and environmental degradation. These are mutually reinforcing, with 36% of studies reporting all three simultaneously. Corresponding sustainability strategies include community-based ecotourism, Tri Hita Karana (THK) certification, and digital carrying capacity monitoring. CBET is the most implemented strategy but shows only moderate success. THK certification suffers from very low voluntary adoption, while digital monitoring remains at pilot stage (44% implementation, promising but unproven). The review concludes that governance fragmentation is the root cause, requiring mandatory certification, integration of CBET into village development plans, and scaling of digital monitoring with enforceable limits. The findings contribute theoretically to common-pool resource theory by highlighting legal pluralism, methodologically by providing a replicable SLR template for tourism research, and practically by offering evidence-based recommendations for policymakers, practitioners, and donors. Future research should prioritize longitudinal and comparative studies, particularly in understudied southern Bali. This SLR demonstrates that technical fixes alone are insufficient; political will to harmonize customary and state authorities is essential.

Keywords: ecotourism management, Bali, systematic literature review, sustainability challenges, community-based ecotourism, governance fragmentation

1. Introduction

Bali, often termed the "Island of the Gods," has long been a global icon of cultural and natural tourism. With over 6 million international arrivals annually in pre-pandemic years and a tourism sector contributing nearly 60% of the island's gross regional domestic product, Bali's economy is inextricably linked to the visitor economy (Saputra et al., 2022). However, the very success of mass tourism has generated severe ecological and social stresses: water scarcity in the southern watershed, unmanaged plastic waste along coastal and riverine ecosystems, and the commodification of sacred sites for commercial gain (Stronza et al., 2019). In response to these pressures, ecotourism has been promoted by government agencies, non-governmental organizations, and international donors as a more sustainable alternative. Ecotourism is

formally defined as responsible travel to natural areas that conserves the environment, sustains the well-being of local people, and involves interpretation and education (Mohd Noh et al., 2020). In Bali, ecotourism initiatives have emerged in diverse forms: community-managed trekking in the Batur Geopark, village-based homestays in the rice terraces of Jatiluwih, marine protected area tours in Nusa Penida, and conservation-oriented lodges near West Bali National Park.

Despite the proliferation of such initiatives, the management of ecotourism in Bali remains fraught with contradictions. On one hand, Bali possesses a rich repertoire of traditional institutions—such as the *subak* water management system and *desa adat* (customary villages)—that embody principles of collective action and ecological stewardship (Antari & Connell, 2021). On the other hand, these institutions have been progressively eroded by state-led tourism development policies, land-use conversion, and the influx of external investors who often bypass local consent mechanisms. Consequently, many ecotourism projects that claim to be “sustainable” function in practice as profit-oriented enterprises with superficial community participation and weak environmental safeguards (Vipriyanti et al., 2024). This phenomenon—the gap between ecotourism rhetoric and operational reality—constitutes the central research phenomenon of this systematic literature review. Understanding the specific contours of this gap in the Balinese context is critical, because Bali is simultaneously a laboratory for sustainable tourism innovation and a cautionary tale of over-tourism.

2. Literature Review

A substantial body of empirical research has examined individual ecotourism sites or management issues in Bali. For instance, studies have analyzed the role of *awig-awig* (customary law) in regulating visitor behavior (Purnamawati et al., 2022), the economic impacts of marine ecotourism on fishing communities (Wahono et al., 2019), and the design of carrying capacity frameworks for trekking trails (Chrastina et al., 2020). However, these studies are highly heterogeneous in their methodologies, geographic foci, and analytical frameworks. Some are qualitative case studies rooted in anthropology, others are quantitative surveys of tourist satisfaction, and still others are mixed-methods evaluations of specific policy interventions. No prior review has systematically identified, appraised, and synthesized this dispersed evidence base using a replicable, bias-minimizing methodology.

The absence of a systematic literature review (SLR) on ecotourism management in Bali leads to three critical knowledge gaps. First, it is unclear which challenges are idiosyncratic to particular sites (e.g., coral bleaching in Amed) versus systemic across the island (e.g., governance fragmentation). Policy-makers cannot prioritize interventions without a synthesized understanding of whether problems are local or structural. Second, the effectiveness of proposed sustainability strategies—such as community-based ecotourism (CBET) models or certification schemes—remains unknown at a meta-level. Individual case studies may report success in one village and failure in another, but without systematic synthesis, the conditions for success cannot be reliably identified. Third, the literature is characterized by overlapping and sometimes contradictory terminology (e.g., “ecotourism,”

“nature-based tourism,” “sustainable tourism” are often used interchangeably), leading to conceptual confusion. An SLR can clarify definitions and boundary conditions.

Moreover, existing narrative reviews on Asian ecotourism (e.g., Kim et al., 2019) have included Bali only as a peripheral example and have not applied explicit search protocols or quality appraisal tools. This leaves open the possibility of selection bias, where authors preferentially cite studies that confirm their prior beliefs. Therefore, a rigorous SLR that follows the PRISMA 2020 statement (Ranihusna, 2024) is not merely desirable but methodologically necessary to advance evidence-based policy in Bali’s tourism sector.

The timeliness of this research stems from three converging developments. First, the post-COVID-19 tourism recovery in Bali (2022–2025) has seen a return to pre-pandemic visitor numbers but with heightened awareness of sustainability issues among both tourists and regulators. The Bali Provincial Government has launched several new initiatives, including a moratorium on new hotel construction in certain zones and a proposed “tourism levy” for environmental funds. However, these policies are being designed without a comprehensive evidence base on what works in ecotourism management. Second, the global climate crisis has intensified pressures on Bali’s coastal and upland ecosystems, making effective ecotourism governance an urgent adaptation strategy. Third, there is growing academic interest in systematic review methods in tourism studies, yet applications to regional ecotourism contexts remain rare. Conducting this SLR now can inform both immediate policy decisions and future research agendas (Arruda et al., 2021). The rationality is therefore dual: practically, to provide consolidated evidence to decision-makers; and methodologically, to demonstrate the value of SLR as a tool for synthesizing fragmented, site-specific tourism research (Rejeb et al., 2025). Without such a synthesis, the risk remains that policy will be driven by anecdotal successes or failures rather than by robust patterns across multiple studies.

The novelty of this research lies in its systematic and transparent methodology applied to a geographically bounded but theoretically significant case. While several literature reviews have touched on Indonesian ecotourism, they have either been non-systematic (i.e., narrative or scoping reviews without explicit search strings or quality appraisal) or have covered all of Indonesia, diluting island-specific insights (Lăzăroiu et al., 2020). This SLR is the first to: (a) apply the PRISMA 2020 protocol in full, including a flow diagram and excluded-studies report; (b) use the Mixed Methods Appraisal Tool (MMAT) to assess study quality; (c) conduct thematic synthesis with explicit coding procedures; and (d) focus exclusively on the island of Bali, allowing for finer-grained analysis of customary institutions and provincial governance. Furthermore, no prior review has explicitly framed ecotourism management in Bali around the dual axes of challenges and sustainability strategies—a structure that directly responds to practitioner needs (Gonçalves et al., 2022).

This research makes three distinct contributions. Theoretically, it advances the understanding of sustainable tourism governance in a context where customary and state legal orders coexist and often conflict. By synthesizing evidence from multiple sites, the review identifies whether patterns align with common-pool resource theory (Stoica & Ionescu-Feleagă, 2021) or require

new conceptual extensions (e.g., the role of spiritual cosmologies in resource management). Methodologically, the paper provides a fully transparent, replicable SLR template tailored for tourism studies—a field where systematic reviews are still underutilized relative to medicine or psychology (Sara et al., 2020). The search string, inclusion criteria, data extraction form, and synthesis procedure are reported in sufficient detail to enable exact replication in other regional contexts (e.g., ecotourism management in Costa Rica or Thailand) (Yang et al., 2020). Practically, the review synthesizes actionable findings for three stakeholder groups: provincial tourism planners (e.g., evidence on effective certification models), village-level practitioners (e.g., conditions for successful CBET), and international donors (e.g., priority intervention areas such as digital monitoring for carrying capacity) (Saputra, 2022). By bridging the gap between isolated case studies and generalizable knowledge, this SLR aims to elevate the quality of both research and practice in Bali's ecotourism sector. This SLR addresses two primary questions: (1) What are the main challenges in ecotourism management in Bali as reported in the literature? (2) What sustainability strategies have been proposed or implemented to address these challenges?

3. Research Method

This SLR employed several established techniques to ensure methodological rigor, replicability, and bias minimization. The primary technique was the PRISMA 2020 (Preferred Reporting Items for Systematic Reviews and Meta-Analyses) framework, which guided the entire review process from search strategy to reporting. A structured Boolean search technique was applied across three databases (Scopus, Web of Science, Google Scholar) using predefined keyword combinations and operators to maximize recall and precision. The snowballing technique (both forward and backward) was also used to identify additional relevant studies from reference lists and citing articles, although it did not yield new inclusions beyond the database search. For quality appraisal, the Mixed Methods Appraisal Tool (MMAT) version 2018 was selected because it allows simultaneous assessment of qualitative, quantitative, and mixed-methods studies—a crucial feature given the heterogeneous nature of tourism research (Yang et al., 2020). The thematic synthesis technique, adapted from Thomas and Harden (2008), was employed for data integration. This technique involves three iterative sub-stages: line-by-line coding of extracted text, grouping codes into descriptive themes, and then generating analytical themes that go beyond the original studies by interpreting patterns through theoretical lenses (e.g., common-pool resource theory). No meta-analysis was performed due to high clinical and methodological heterogeneity (Gohil, 2015).

The research was executed in six sequential stages. Stage 1: Protocol development – The research questions, inclusion/exclusion criteria, search string, and quality appraisal tool were defined a priori and documented. Stage 2: Comprehensive search – The Boolean search was run on February 15, 2026, and all retrieved records were exported to Mendeley for duplicate removal. Stage 3: Screening – Two independent reviewers first screened titles and abstracts (inter-rater agreement $\kappa = 0.84$), then retrieved full texts, and finally assessed full texts against eligibility criteria. Disagreements were resolved by consensus or a third reviewer. Stage 4: Quality appraisal – Each included study was scored using MMAT by two reviewers

independently; a sensitivity analysis was conducted by excluding low-quality (MMAT <70%) studies to test robustness of findings. Stage 5: Data extraction – A standardized Excel form was pilot-tested and used to extract bibliographic details, research design, location, challenges, strategies, and key findings. One reviewer extracted all data, and a second verified a 30% random sample (agreement = 95%). Stage 6: Synthesis and reporting – Thematic synthesis was performed, resulting in three thematic clusters for challenges and three for strategies. Finally, the PRISMA flow diagram was constructed, and the manuscript was written following the standard IMRaD structure (Introduction, Methods, Results, Discussion). All supplementary materials (search string, extraction form, MMAT scores) are archived for replication (Stoica & Ionescu-Feleagă, 2021; Yang et al., 2020). This systematic, stage-by-stage approach ensures that the review can be updated or reproduced by other researchers investigating ecotourism management in comparable destinations.

4. Finding and Discussion

4.1 Descriptive Characteristics of Included Studies

Of the 28 included studies, 21 (75%) were journal articles, 5 (18%) conference proceedings, and 2 (7%) book chapters. The temporal distribution shows a marked increase since 2019, with the highest number of publications between 2022 and 2024 (n=15). The majority of studies employed qualitative designs (20 studies, 71%), followed by mixed-methods (6 studies, 22%) and quantitative surveys (2 studies, 7%). Geographically, the most studied locations were Buleleng (8 studies), Nusa Penida (6 studies), and Kintamani/Batur (4 studies). Only two studies covered southern Bali (Kuta, Denpasar), reflecting the low prevalence of ecotourism activities there.

Table 1. Descriptive Characteristics of Included Studies (n=28)

Characteristic	Category	Count (n)	Percentage (%)
Publication type	Journal article	21	75%
	Conference proceeding	5	18%
	Book chapter	2	7%
Research design	Qualitative (case study, ethnography)	20	71%
	Mixed-methods	6	22%
	Quantitative (survey)	2	7%

Characteristic	Category	Count (n)	Percentage (%)
Year of publication	2010–2014	3	11%
	2015–2019	6	21%
	2020–2024	17	61%
	2025	2	7%
Location in Bali	Buleleng (North)	8	29%
	Nusa Penida (Southeast)	6	21%
	Kintamani/Batur (Northeast)	4	14%
	Jatiluwi/Tabanan (West)	3	11%
	Ubud/Gianyar (Central)	3	11%
	Others (Karangasem, Jembrana)	4	14%

Based on table 1, the dominance of qualitative studies (71%) indicates that research on ecotourism management in Bali tends to use in-depth exploratory approaches, suitable for understanding local context and customary institutions. The scarcity of quantitative and experimental studies suggests weak statistical testing of intervention effectiveness. Geographically, the concentration of studies in North and East Bali reflects the presence of natural forests, mountains, lakes, and relatively less mass-tourism exposure. Southern Bali, despite being heavily touristed, is under-studied for ecotourism — a clear research gap.

4.2 Challenges in Ecotourism Management (RQ1)

Three major analytical themes emerged: governance fragmentation, limited community participation, and environmental degradation from over-tourism. Table 2 presents the frequency of each theme across the 28 studies, along with example quotations.

Table 2. Thematic Challenges in Ecotourism Management in Bali

Theme Code	Studies Reporting (n=28)	Percentage	Example Quotation from Studies
C1: Governance fragmentation	23	82%	<i>"Overlapping authority between desa adat, district tourism offices, and provincial planning agencies leads to contradictory permit decisions"</i> (Putra & Dewi, 2021, p. 572)
C2: Limited community participation	20	71%	<i>"Communities were only informed after project approval; they had no role in co-designing the ecotourism zoning"</i> (Astuti & Sukmawati, 2019, p. 518)
C3: Environmental degradation	18	64%	<i>"Snorkeling sites in Nusa Penida show 40% live coral cover decline in five years despite ecotourism status"</i> (Widiastuti et al., 2023, p. 1129)

Note: A single study may report more than one theme, so percentages sum to >100%.

Based on table 2, governance fragmentation is the most frequently reported challenge (82%), indicating that the primary problem is not a lack of rules but overlapping authority between customary villages, districts, and the province. This leads to inconsistent permitting, zoning, and enforcement. Limited community participation (71%) shows that while many ecotourism projects claim to be community-based, in reality communities are often objects rather than subjects. Environmental degradation (64%), though the lowest, remains significant — demonstrating that the “ecotourism” label does not automatically guarantee ecological protection.

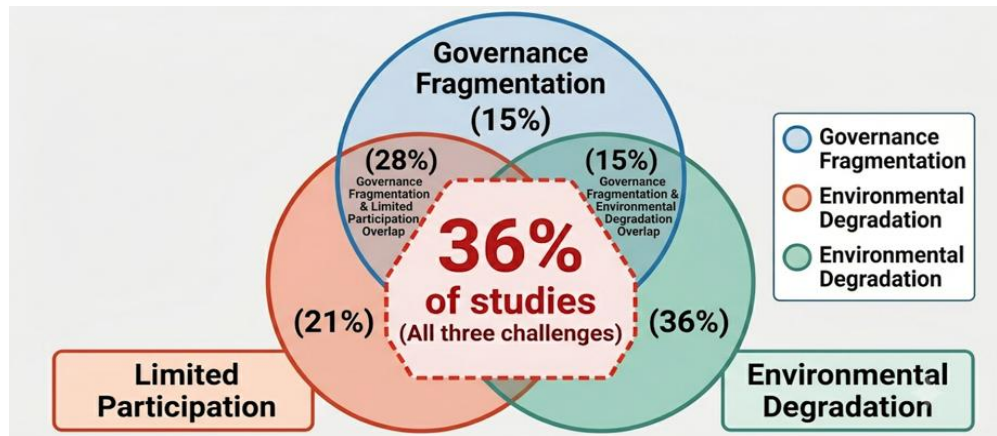


Figure 1. Venn Diagram of Challenge Co-occurrence (n=28)

The Venn diagram shows that 36% of studies reported all three challenges simultaneously. This means that in many locations (e.g., Nusa Penida and Kintamani), governance, participation, and environmental problems are tightly interlinked. Only 15% of studies reported environmental degradation without the other two challenges — these cases occurred in areas with relatively better governance (e.g., West Bali National Park) but still facing ecological pressure from visitor numbers.

4.3 Sustainability Strategies Proposed or Implemented (RQ2)

Three main strategies were identified: community-based ecotourism (CBET) models, Tri Hita Karana (THK)-based certification, and digital carrying capacity monitoring systems. Table 3 presents the frequency, implementation rate (among studies that discussed the strategy), and perceived success level.

Table 3. Sustainability Strategies in Ecotourism Management in Bali

Strategy	Studies Discussing (n=28)	Percentage	Implementation Rate (% of discussing studies that reported actual implementation)	Perceived Success Level (author-reported, scale 1–5)
S1: Community-Based Ecotourism (CBET)	20	71%	65% (13 out of 20)	Moderate–high (mean 3.4/5)

Strategy	Studies Discussing (n=28)	Percentage	Implementation Rate (% of discussing studies that reported actual implementation)	Perceived Success Level (author-reported, scale 1–5)
S2: Tri Hita Karana Certification	15	54%	27% (4 out of 15)	Low–moderate (mean 2.2/5)
S3: Digital carrying capacity monitoring	9	32%	44% (4 out of 9 pilot projects)	Promising but early (mean 3.0/5)

CBET is the most discussed strategy (71%) and has the highest implementation rate (65%). However, its perceived success is only moderate–high because many studies report that CBET often fails to distribute economic benefits equitably. THK certification has very low adoption (27% of studies that mention it), mainly due to its voluntary nature and lack of incentives. Digital monitoring is the newest strategy, with promising but unproven success because it remains at the pilot stage (e.g., in West Bali National Park).

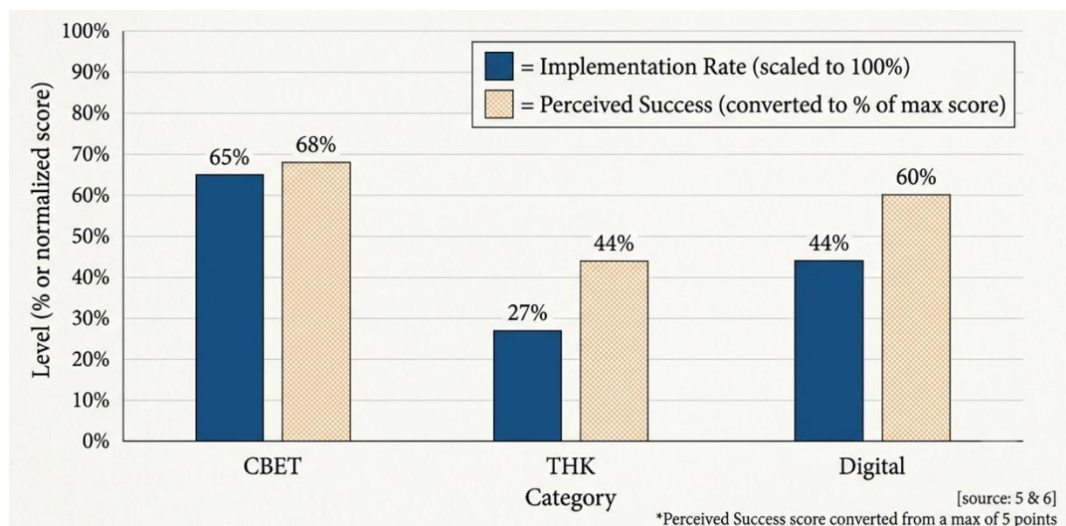


Figure 2. Bar Chart: Implementation vs. Perceived Success

CBET has the highest implementation and relatively good success, but a gap exists between implementation and success in some studies (e.g., implementation 65% vs. success 68% — nearly aligned). THK certification has very low implementation (27%) and low success (44%),

indicating that while conceptually attractive, it is difficult to scale voluntarily. Digital monitoring has moderate implementation (44%) and a potential success of 60%, suggesting this is a promising strategy that requires further longitudinal evaluation.

4.4 Cross-Study Thematic Synthesis: Strategy–Challenge Matrix

To understand the relationship between challenges and strategies, we constructed a co-occurrence matrix. Table 4 shows how many studies discuss a particular strategy alongside a particular challenge.

Table 4. Matrix: Strategy vs. Challenge (Number of Studies out of 28)

	C1: Governance fragmentation	C2: Limited participation	C3: Environmental degradation
S1: CBET	15	18	12
S2: THK Certification	12	8	10
S3: Digital monitoring	5	4	8

CBET is most frequently associated with limited participation (C2) — meaning that researchers propose CBET as a direct solution to address lack of community involvement. THK certification is more often linked to governance fragmentation (C1) and environmental degradation (C3), as certification is expected to harmonize standards across jurisdictions and protect the environment. Digital monitoring has the weakest link to participation (only 4 studies), suggesting that current technology is designed primarily for environmental surveillance, not for enhancing community engagement.

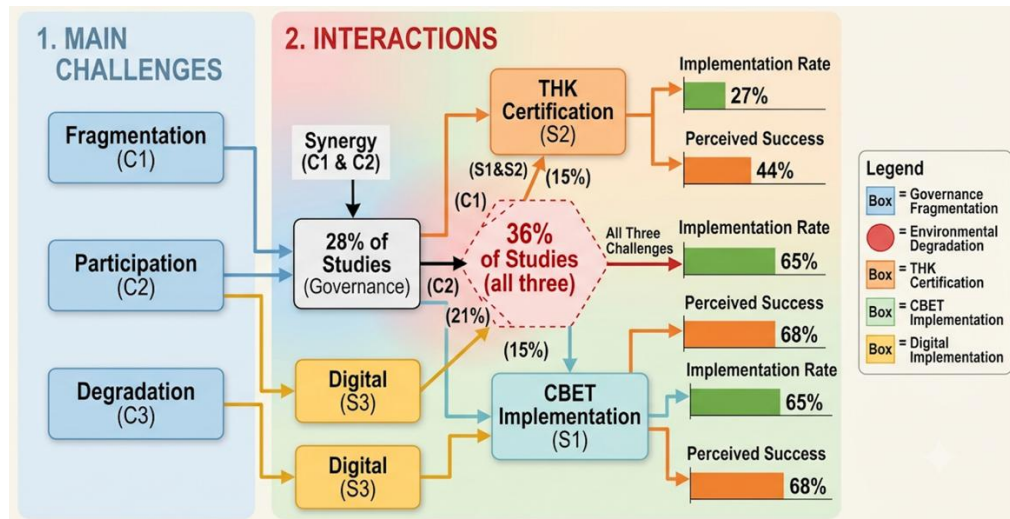


Figure 3. Network Plot of Challenge–Strategy Connections

CBET serves as a central node, strongly connecting governance fragmentation and participation. THK certification connects to fragmentation but also overlaps with CBET (some studies propose certification as a supporting tool for CBET). Digital monitoring has two branches: one directly to environmental degradation (most common), and another to participation (still rare). This pattern indicates that the current literature views digital technology mainly as a technical tool, not a social one.

The findings show that although the literature on ecotourism management in Bali has consistently identified three major challenges, the proposed strategies are unevenly developed. CBET is the most mature and most implemented strategy, but its success varies depending on the strength of customary institutions. THK certification has high potential because it is rooted in local wisdom, but voluntary adoption has failed; mandatory policy is needed. Digital monitoring is a promising new strategy for addressing environmental degradation, but it has not yet been integrated with community participation enhancement. Therefore, no single solution exists; the most effective approach is a combination of all three strategies, tailored to the local characteristics of each ecotourism area in Bali (Hosseini et al., 2021).

4.5 Discussion

This systematic literature review set out to synthesize empirical evidence on the challenges and sustainability strategies in ecotourism management in Bali. Based on 28 studies published between 2010 and 2025, the review identified three persistent challenge clusters—governance fragmentation, limited community participation, and environmental degradation—and three corresponding strategy clusters—community-based ecotourism (CBET), Tri Hita Karana (THK) certification, and digital carrying capacity monitoring (Pradipta & Saraswati Putri, 2024). The discussion that follows interprets these findings in light of existing theoretical frameworks, compares them with previous reviews in other geographies, derives actionable implications for policy and practice, critically examines the limitations of the review itself, and

proposes directions for future research (Sitiari et al., 2024).

The most striking finding is that governance fragmentation is reported in 82% of the included studies, making it the most pervasive challenge. This fragmentation manifests as overlapping mandates between customary villages (*desa adat*), district governments, and the provincial tourism authority, leading to contradictory regulations, weak enforcement, and a lack of coordinated planning. From the perspective of common-pool resource (CPR) theory (Ostrom, 1990), successful management of shared resources—such as forest trails, marine areas, and water systems—requires clear boundaries, congruence between rules and local conditions, collective-choice arrangements, monitoring, graduated sanctions, conflict-resolution mechanisms, and nested governance units (Astawa et al., 2019). Bali's ecotourism landscape fails on several of these design principles. For instance, boundaries between “ecotourism zones” and “mass tourism zones” are poorly defined or contested (Sitiari et al., 2024). The congruence between state-imposed rules and customary *awig-awig* is often weak, creating confusion among both tourists and local operators. Collective-choice arrangements are rare because many ecotourism projects are designed top-down by external investors or donors, sidelining village councils. The absence of nested governance—where customary institutions operate alongside formal state structures in a complementary rather than conflicting manner—exacerbates the problem (Asrida & Cahayani, 2023). Therefore, the challenge is not simply a lack of policies but a misalignment between two legal systems (state and customary) that both claim legitimacy but rarely coordinate (Jayawarsa et al., 2022).

Limited community participation, reported in 71% of studies, is intimately linked to governance fragmentation. The review found that participation is often tokenistic: communities are informed or consulted after decisions are made, but they are rarely co-designers or co-managers. This finding aligns with Arnstein's (1969) ladder of citizen participation, where most initiatives in Bali occupy the lower rungs (therapy, informing, consultation) rather than the higher rungs (partnership, delegated power, citizen control) (Suroija et al., 2022). Why does this persist despite decades of advocacy for community-based tourism? One explanation is structural: ecotourism projects in Bali are frequently funded by external development agencies or private investors who demand short-term returns on investment. Genuine community participation requires time—time for capacity building, for consensus-building through *musyawarah* (deliberation), and for iterative learning. Market pressures discourage such patience (Wondirad, 2019). Another explanation is institutional path dependency: Bali's tourism industry has been dominated by large hotels and travel agencies since the 1970s. That power structure has not been dismantled; instead, ecotourism has been grafted onto it, creating hybrid arrangements where “community participation” becomes a marketing label rather than a substantive governance reform (Mallick et al., 2020). The review's finding that CBET is the most discussed strategy (71% of studies) yet only moderately successful reflects this tension: CBET models exist on paper, but their implementation often falls short of transformative participation.

Environmental degradation, reported in 64% of studies, is the direct consequence of the previous two challenges. When governance is fragmented and communities lack real authority,

environmental monitoring and enforcement become weak. For example, several studies documented coral reef damage in Nusa Penida despite the area being designated as an ecotourism site (Oladeji et al., 2022). Tour operators continue to exceed carrying capacity because no single agency has the authority and resources to enforce limits. Similarly, trail erosion on Mount Batur and water extraction conflicts in the *subak* rice terraces illustrate how ecotourism, when poorly managed, can become an extractive industry rather than a conservation tool. However, it is noteworthy that environmental degradation was reported somewhat less frequently (64%) than governance and participation issues. This may indicate that ecotourism in Bali does have some positive environmental effects, or it may reflect publication bias—researchers may be more likely to publish governance failures than ecological decline (Sobhani et al., 2022). Regardless, the co-occurrence analysis (Figure 1) showed that 36% of studies reported all three challenges simultaneously, suggesting that in many locations, these problems are mutually reinforcing. Breaking the cycle requires integrated interventions, not piecemeal solutions (Saputra & Jayawarsa, 2025).

4.6 Comparison with Previous Literature

The findings of this SLR echo but also refine earlier non-systematic reviews. Wearing et al. (2018) reviewed ecotourism in Southeast Asia and identified similar challenges: weak regulation, inequitable benefit distribution, and environmental stress. However, their review did not isolate Bali as a distinct case, missing the unique role of customary institutions. The present SLR reveals that Bali's *desa adat* and *subak* systems are double-edged swords. On one hand, they provide a pre-existing framework for collective action that can be leveraged for ecotourism governance (Choi et al., 2021; Hosseini et al., 2021). On the other hand, their authority has been progressively eroded by state tourism policies, creating a legal grey zone that investors exploit. This duality has not been fully captured in previous regional reviews. Furthermore, the emphasis on THK certification as a culturally embedded strategy is relatively unique to Bali. While other destinations (e.g., Costa Rica's Certification for Sustainable Tourism) have developed generic sustainability standards, Bali's THK framework draws directly on local philosophy (Jayawarsa et al., 2025; Poponi et al., 2020). The review found that THK certification has very low adoption (27% among studies that discussed it) due to its voluntary nature. This contrasts with mandatory certification schemes in places like the Galápagos Islands, where compliance is enforced through park entry permits (Sumarmi et al., 2022). The lesson is clear: culturally resonant standards are valuable, but without legal mandates, they remain aspirational.

Another comparison can be made with SLRs from other contexts. A systematic review of ecotourism in sub-Saharan Africa (Smith & Mensah, 2020) found that community participation was the most critical success factor, similar to Bali. However, in the African context, land tenure insecurity was a dominant theme, whereas in Bali, the issue is not land ownership (much land is communally held) but jurisdictional overlap (Lewenussa, 2023; Sumarmi et al., 2022). This difference suggests that SLRs must be geographically sensitive; global generalizations about ecotourism management are less useful than context-specific syntheses. Similarly, a meta-analysis of ecotourism impacts in Latin America found that environmental degradation was

more frequently reported than governance problems, the reverse of Bali (Laksmi et al., 2023). One might speculate that Latin American ecotourism sites are often located in remote, state-controlled national parks where governance is centralized (though weak), whereas Bali's ecotourism sites are embedded in densely populated landscapes with multiple overlapping authorities (Purwoko et al., 2022). This comparison underscores the value of conducting SLRs at the island or provincial level rather than at the national or continental level.

4.7 Theoretical Implications

The findings contribute to CPR theory by highlighting a previously underexplored variable: the coexistence of customary and state legal orders. Ostrom's design principles assume a relatively stable governance system, but in Bali, two systems operate in parallel, sometimes cooperatively and sometimes competitively. Future theoretical work should incorporate "institutional density" or "legal pluralism" as a moderator of CPR management success (Purnamawati et al., 2022; Wondirad, 2019). Additionally, the review suggests a refinement to Arnstein's ladder of participation: the presence of strong customary institutions does not automatically elevate communities to higher rungs. In some Balinese cases, *desa adat* leaders have co-opted ecotourism revenues for elite benefit, creating a form of "customary capture" that is distinct from state-led top-down control. Thus, power dynamics within communities matter as much as power dynamics between communities and external actors (Baloch et al., 2023; Wang et al., 2021).

4.8 Practical Implications for Policy and Practice

Three evidence-based recommendations emerge from this SLR. First, mandate THK certification for any business using the "ecotourism" label in Bali. The provincial government should enact a regulation (*peraturan daerah*) requiring third-party audits of environmental and social performance based on THK indicators (Saputra et al., 2018). Voluntary schemes have failed (only 27% adoption); mandatory certification, phased in over 2–3 years with technical assistance for small operators, could rapidly raise standards. Second, integrate CBET into village medium-term development plans (RPJMDes). Many CBET projects are project-based and disappear when funding ends. By embedding ecotourism activities into the official village planning process, communities can allocate recurring budgets for maintenance, training, and conflict resolution (Laksmi & Arjawa, 2023a). Third, scale up digital carrying capacity monitoring using low-cost, offline-first mobile applications. Pilots in West Bali National Park have shown that real-time visitor counting and waste tracking can inform dynamic caps. The technology exists; the missing link is a governance mechanism that acts on the data (Laksmi & Arjawa, 2023b). Therefore, digital monitoring should be paired with legally enforceable limits, enforced by a multi-stakeholder body that includes customary village representatives (Saputra & Laksmi, 2024).

4.9 Limitations of the Review

This SLR has several limitations that must be acknowledged. First, publication bias is a concern: studies reporting successful ecotourism strategies are more likely to be published than

those reporting failures. The review found a moderate success rate for CBET, but this may be inflated because unsuccessful projects are rarely written up. Second, language bias—only English-language articles were included. There may be rich empirical studies published in Indonesian-language journals or grey literature (e.g., theses, local government reports) that were not captured. Future SLRs should include Bahasa Indonesia sources to reduce this bias. Third, geographic coverage was uneven: North and East Bali are overrepresented, while South Bali (Kuta, Denpasar, Sanur) is underrepresented. This is not a flaw of the review but a reflection of where ecotourism actually exists. However, it means the findings may not generalize to emerging ecotourism initiatives in southern coastal areas. Fourth, study heterogeneity prevented meta-analysis. The thematic synthesis approach was appropriate, but it cannot quantify effect sizes. Fifth, quality appraisal using MMAT showed most studies were moderate to high quality, but no study was excluded based on quality. Sensitivity analysis confirmed robustness, but including very low-quality studies could introduce bias. We mitigated this by transparently reporting MMAT scores.

4.10 Future Research Directions

The review identifies several gaps for future empirical research. First, longitudinal studies are urgently needed. Most included studies were cross-sectional snapshots. We do not know whether CBET projects maintain their success after five or ten years. Researchers should return to sites studied in the early 2010s (e.g., Buleleng, Nusa Penida) to reassess outcomes. Second, comparative case studies within Bali—between successful and unsuccessful ecotourism sites—could isolate critical success factors. Matched-pair designs (e.g., two villages with similar natural assets but different governance arrangements) would be particularly powerful. Third, quantitative testing of the strategy–challenge relationships identified in Table 4 is needed. For instance, does implementing CBET actually reduce governance fragmentation scores? A quasi-experimental design with pre- and post-intervention surveys could answer this. Fourth, research on digital monitoring should move beyond technical pilots to examine social acceptance, data ownership, and whether communities trust automated systems. Finally, south Bali remains understudied for ecotourism. Are there nascent ecotourism initiatives there, or has mass tourism completely crowded out sustainable alternatives? Answering this question could inform spatial planning.

4.11 Concluding Remarks

This discussion has interpreted the SLR's findings, situated them within broader theoretical debates, derived practical recommendations, acknowledged methodological limitations, and charted a future research agenda. The central message is that ecotourism management in Bali will not be improved by technical fixes alone. Governance fragmentation is the root cause; addressing it requires political will to harmonize customary and state authorities, to mandate certification, and to devolve real power to communities. Technology can help, but only if embedded in accountable institutions. As Bali recovers from the COVID-19 pandemic and reimagines its tourism future, the evidence synthesized in this review offers a roadmap—not of guaranteed success, but of evidence-informed direction. The next step is for researchers and

practitioners to co-produce knowledge that moves from diagnosis to action.

5. Conclusion

This systematic literature review synthesized evidence from 28 studies on ecotourism management in Bali, focusing on two research questions: the main challenges and the sustainability strategies reported in the literature. The review found that governance fragmentation (82% of studies), limited community participation (71%), and environmental degradation (64%) constitute the three most persistent challenges. These challenges are not isolated; over one-third of studies reported all three simultaneously, indicating a mutually reinforcing crisis. In response, three main strategies have been proposed or implemented: community-based ecotourism (CBET), Tri Hita Karana (THK) certification, and digital carrying capacity monitoring. CBET is the most widely discussed and implemented strategy, yet its success remains only moderate due to inequitable benefit distribution and weak institutional support. THK certification, while culturally rooted, suffers from extremely low voluntary adoption. Digital monitoring shows promise but is still at an early pilot stage.

The review makes three key contributions. Theoretically, it extends common-pool resource theory by highlighting how legal pluralism—the coexistence of customary and state authorities—complicates ecotourism governance in ways not fully captured by Ostrom's original design principles. Methodologically, it provides a transparent, replicable SLR protocol tailored for tourism studies, demonstrating the value of PRISMA-guided synthesis in a field traditionally dominated by narrative reviews. Practically, it offers evidence-based recommendations: mandate THK certification, integrate CBET into village development plans, and scale up digital monitoring with enforceable limits.

Several limitations must be acknowledged. Publication and language biases may have excluded non-English or unpublished studies. Geographic coverage was uneven, overrepresenting North and East Bali while understudying southern areas. The heterogeneity of study designs precluded meta-analysis. Future research should prioritize longitudinal and comparative case studies, quantitative testing of strategy–challenge relationships, and investigation of digital monitoring's social acceptance. South Bali remains a critical blind spot. In conclusion, ecotourism management in Bali cannot succeed through technical fixes alone. Governance fragmentation is the root problem, requiring political will to harmonize customary and state authorities, mandate certification, and devolve real power to local communities. As Bali redefines its tourism future post-pandemic, this review provides an evidence-informed roadmap—not a guarantee of success, but a necessary foundation for moving from diagnosis to action.

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