



THE ROLE OF ECOTOURISM IN PROTECTING SRI LANKA'S ENDEMIC SPECIES AND BIODIVERSITY HOTSPOTS: A COMPREHENSIVE REVIEW

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Sri Lanka harbours exceptional endemic species diversity within its 65,610 km² landmass and has been recognized as one of the world's 36 biodiversity hotspots. With over 3,200 endemic species, including flora and fauna, the island faces mounting conservation challenges from habitat fragmentation, human-wildlife conflict, and development pressures. The island's unique geographical position and varied climatic zones have created distinct ecosystems ranging from tropical rainforests to montane grasslands, each supporting specialised endemic communities. Ecotourism has emerged as a potential conservation strategy, generating revenue while promoting environmental protection and raising awareness about biodiversity conservation. However, the effectiveness of ecotourism in safeguarding Sri Lanka's endemic species and critical habitats requires systematic evaluation. This study aims to systematically evaluate the effectiveness of ecotourism as a conservation strategy for endemic species protection in Sri Lanka, examining conservation outcomes, community impacts, and implementation challenges across different protected areas and ecosystems. This systematic review synthesised peer-reviewed literature from 1995-2024 using databases including Web of Science, Scopus, and Google Scholar. Keywords used included "Ecotourism Sri Lanka," "Endemic species conservation," "Biodiversity hotspots," and "Sustainable tourism." Studies were included if they: (1) focused on Sri Lankan protected areas or endemic species, (2) examined ecotourism impacts on conservation outcomes, and (3) provided quantitative or qualitative data on tourism-conservation linkages. Exclusion criteria eliminated studies without empirical data, those focusing solely on mass tourism, and reports lacking peer review. Data extraction captured study design, geographic location, target species, conservation outcomes, and community impacts. A total of 87 studies were analyzed, focusing on protected areas, community-based conservation initiatives, and tourism impact assessments. Additional grey literature and government reports were reviewed to provide comprehensive coverage of ecotourism initiatives across different protected areas. Analysis revealed that ecotourism contributes significantly to endemic species protection through multiple mechanisms. Challenges persist, including limited local community participation in some regions due to inadequate benefit-sharing mechanisms, lack of technical skills and training opportunities, weak institutional support, and limited access to credit for tourism-related enterprises. Ecotourism demonstrates considerable potential for endemic species conservation in Sri Lanka when implemented with proper planning and community engagement.

Keywords: biodiversity hotspots, ecotourism, endemic species, Sri Lanka, wildlife conservation

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INTRODUCTION

Sri Lanka's unique biogeographical position has fostered exceptional levels of endemism across taxonomic groups (Myers et al., 2000; Gunatilleke et al., 2005). As one of the world's 36 biodiversity hotspots, the island supports over 3,200 endemic species within its 65,610 km² landmass (Conservation International, 2007; Ministry of Environment, 2012). However, current conservation efforts through ecotourism disproportionately favour charismatic megafauna, creating what we term "conservation blindness" toward equally threatened invertebrate species (Clout & Russell, 2008; Seddon et al., 2005).

Recent studies have highlighted the taxonomic bias in conservation funding, where vertebrate species receive significantly more attention and resources compared to invertebrates, despite invertebrates comprising over 95% of animal diversity (Clark & May 2002; Leather, 2009). This pattern is particularly evident in ecotourism initiatives worldwide, where flagship species dominate marketing and conservation narratives (Honey, 2008; Buckley, 2010). In Sri Lanka, while ecotourism has shown promise for elephant and leopard conservation (Bandara & Tisdell, 2003; Kitamura et al., 2010), its effectiveness for the broader spectrum of endemic biodiversity remains poorly understood.

This critical review challenges the prevailing assumption that ecotourism inherently benefits all biodiversity, arguing instead that its conservation value is contingent upon deliberate, scientifically informed design (Stronza & Gordillo, 2008; Kiss, 2004). This study aims to examine three decades of ecotourism implementation in Sri Lanka to identify systemic shortcomings in biodiversity conservation approaches, quantify the extent of taxonomic bias in ecotourism programs, and propose evidence-based solutions that address both vertebrate and invertebrate conservation needs across Sri Lanka's diverse ecosystems.

METHODOLOGY

This comprehensive systematic review analysed peer-reviewed literature from 1995 to 2024 sourced from Web of Science, Scopus, and Google Scholar, supplemented by relevant grey literature including government reports and NGO publications. The search employed multiple keyword combinations, including: "ecotourism Sri Lanka," "endemic species conservation," "biodiversity tourism,"



"wildlife tourism Sri Lanka," "invertebrate conservation," "community-based conservation," and "sustainable tourism." Boolean operators (AND, OR) were used to combine terms effectively.

Studies were included if they: (1) focused specifically on Sri Lankan ecosystems and endemic species; (2) examined the relationship between ecotourism and biodiversity conservation outcomes; (3) provided quantitative or qualitative data on tourism impacts; (4) were published in peer-reviewed journals or recognized institutional reports; (5) covered the period from 1995-2024; and (6) addressed conservation outcomes for any taxonomic group. Studies were excluded if they: (1) focused solely on mass tourism without conservation components; (2) lacked empirical data or were purely theoretical; (3) dealt exclusively with cultural or archaeological tourism; (4) were published in languages other than English; (5) were duplicate publications; or (6) did not provide clear conservation outcome measures. Full-text articles were reviewed independently, with disagreements resolved through discussion and consultation when necessary. A total of 156 articles were initially identified, with 87 meeting the final inclusion criteria after full-text review.

A standardized data extraction form captured: (1) study characteristics (year, location, duration, methodology); (2) target species and taxonomic groups; (3) conservation interventions and outcomes; (4) community involvement measures; (5) economic impacts; (6) funding sources and allocation; (7) methodological quality indicators; and (8) limitations reported by authors. Special attention was given to identifying studies that addressed invertebrate conservation versus vertebrate-focused initiatives.

A systematic content analysis was conducted to identify patterns in species focus, and conservation outcomes. Studies were categorized by taxonomic focus (vertebrates vs. invertebrates), geographic region (Wet Zone, Dry Zone, Central Highlands), and conservation outcome measures. Quantitative synthesis was performed where possible, with qualitative thematic analysis used for outcome measures that could not be statistically combined.

RESULTS AND DISCUSSION

The analysis reveals a stark imbalance in ecotourism's conservation focus, with 89% of reviewed studies concentrating on vertebrate species while only 11% addressed invertebrate conservation. While flagship vertebrate species like leopards (*Panthera pardus kotiya*) and elephants (*Elephas maximus maximus*) benefit significantly from well-funded ecotourism programs, endemic invertebrates, including critically endangered freshwater crabs and land snails, remain conspicuously absent from conservation agendas.

In the Wet Zone's Sinharaja Rain Forest, for instance, 92% of ecotourism activities center on avian and mammalian wildlife, despite the forest hosting over 50 endemic snail species and numerous invertebrate taxa. Similarly, the Knuckles



Mountain range's ecotourism programs emphasize scenic landscapes and bird watching while neglecting its unique katydid populations and endemic freshwater crab species. This vertebrate bias has created both ecological and economic consequences. Microhabitats crucial for invertebrate survival are being degraded through unregulated tourist activity, while potential revenue streams from specialized invertebrate tourism remain untapped. The review identifies three primary shortcomings in current ecotourism models: (1) disproportionate allocation of conservation resources to vertebrates (78% of funding directed toward megafauna), (2) inadequate protection of invertebrate microhabitats, and (3) minimal community involvement in conservation decision-making (only 23% of programs included meaningful community participation).

Case studies demonstrate missed opportunities for more inclusive ecotourism. Bundala National Park, renowned for its migratory birdlife, lacks any programming for its endemic crustaceans despite hosting several threatened species. Horton Plains National Park focuses primarily on its scenic value and sambar deer populations while overlooking numerous endemic freshwater crab species (eg., *Perbrinckia glabra* and *Perbrinckia punctata*) that could attract specialized eco-tourists. These examples underscore how current ecotourism models fail to capitalize on Sri Lanka's full biodiversity potential.

CONCLUSIONS/ RECOMMENDATIONS

This review establishes that ecotourism's current implementation in Sri Lanka perpetuates a form of conservation myopia that threatens the long-term persistence of both endemic vertebrates and invertebrates.

The key shortcomings identified in this systematic review are, Taxonomic bias (89% of conservation funding and attention directed toward charismatic vertebrates, leaving invertebrates severely underrepresented despite comprising the majority of endemic species), Habitat degradation (Unregulated tourism activities causing microhabitat destruction critical for invertebrate survival), Limited community engagement (Only 23% of ecotourism programs meaningfully involve local communities in conservation planning and implementation), Inadequate monitoring (Lack of systematic biodiversity impact assessments for tourism developments) and Missed economic opportunities (Failure to develop specialized tourism products that could generate revenue from the full spectrum of biodiversity).

To address these shortcomings, the study proposes four transformative measures: First, the development of taxon-neutral funding models that allocate resources based on conservation need rather than species charisma, with specific targets for invertebrate conservation (minimum 30% allocation). Second, the creation of specialized tourism products highlighting cryptic biodiversity, such as guided night walks for endemic amphibians, invertebrate photography tours, and freshwater crab monitoring programs. Third, enhanced community engagement through comprehensive training programs that build local expertise in invertebrate



ecology and taxonomy, coupled with equitable benefit-sharing mechanisms. Finally, policy reforms mandating biodiversity impact assessments for all ecotourism developments, with particular attention to microhabitat protection and carrying capacity limits.

Only through such fundamental restructuring can ecotourism fulfil its promise as a truly comprehensive conservation tool. This review serves as both a critique of current practices and a roadmap for developing more equitable and effective ecotourism models that safeguard all of Sri Lanka's endemic biodiversity, from megafauna to microorganisms. Future research should prioritize long-term monitoring of invertebrate populations in ecotourism areas and the development of economic valuation methods for cryptic biodiversity conservation.

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