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# *Bambusa bambos* in Sri Lanka: a native species at the interface of climate resilience and ecological disruption

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*Bambusa bambos*, community perception, feedback effects, native invaders, Sri Lanka

## Introduction

### Native *versus* non-native invaders: an oversight in conservation biology

For decades, the biological invasions have been described by a definition: a threat that comes from exotics/alien/non-native species. These exotic, alien, and non-native species have generated many literature, legislation, and management strategies aimed at restricting their spread and mitigating their impacts. However, this single-perspective approach creates a blind spot in conservation biology, allowing more disruptive species to expand simply because they are labelled “native” (Prematilleke et al., 2015; Madawala and Wijewickrama, 2021). Lately, ‘native invaders’ have also been emerged challenging this long-standing understanding of invasive species. However, despite the growing scientific awareness of ‘native invaders’, the institutional and policy responses continue to lag behind.

The concept of native invasion, termed over-dominance by some scientists, is not merely of taxonomic interest. When a species native to a particular home range begins to expand its population in ways that suppress its cohabiting biodiversity, altering ecosystem functions, and restructuring faunal communities, the term ‘native’ becomes almost irrelevant from an ecological standpoint. They also incur almost similar impacts to that of exotic invaders, often measurable, and in many cases, accelerating.

This oversight is further compounded by the commercial and cultural values associated with many native invaders. Bamboo, for instance, have long been recognized as a multipurpose woody plant of known ecological and economic value. Beyond carbon sequestration and soil conservation, bamboos support rural livelihoods and are widely used in cultural practices across Asia. Therefore, suggesting that a bamboo species may have ecological impacts could challenge its widely held positive perception. The growing accumulation of scientific evidence demands a thorough examination of this issue, with the readiness to reconcile potentially conflicting perspectives. This paper presents a multidisciplinary case study of *Bambusa bambos* (L.) Voss, a native invader expanding across dry and intermediate forests in Sri Lanka, to examine its ecological and socio-economic impacts. It also challenges conventional understanding of invasive species and

their long-term role in forest ecosystems. It further considers how management strategies for such native invaders can be implemented while balancing ecological integrity and climate resilience.

## ***Bambusa bambos* in Sri Lanka: a case study in an ecological paradox**

Sri Lanka's forest distribution reflects climate and topography, with rainforests in the wet southwest, monsoon forests in the dry north and east, and transitional forests in the intermediate zone. Bamboo is an important yet understudied component of these forests. Species such as *B. bambos* play a significant role in the dry and intermediate zones, whereas reed bamboos like *Ochlandra stridula* tend to dominate wetter habitats (Prematilleke et al., 2015). *Bambusa bambos* is a large, thorny, clump-forming bamboo native to South and Southeast Asia, characterized by monocarpic gregarious flowering at long intervals, ranging from about 30–50 years (Figure 1). It expands through rhizomatous clonal growth, forming compact but gradually enlarging clumps (Wijewickrama, 2020).

Although national estimates are limited, available sources suggest that Sri Lanka contains about 5,000 ha of natural bamboo-rich forests, while the dry and intermediate zones are largely dominated by *B. bambos* (Vipushnan, 2021). A case study carried out by Wijewickrama and co-workers, perhaps the most comprehensive multi-dimensional investigation of a single native bamboo invader in the Asian tropics, explored ecological and social impacts *B. bambos*, including effects on forest structure and composition, regeneration potential, edaphic characteristics, and community perceptions (Mafaziya et al., 2019; Wijewickrama et al., 2020a, 2020b, 2022a, 2022b). The findings reveal a complex and, at times, conflicting picture of a species undergoing ecological change, occasionally challenging established ecological and social

paradigms, possibly in response to anthropogenic disturbance and/or climate change. At the ecosystem level, the rapid expansion of *B. bambos* in Sri Lanka's dry and intermediate zone forests has altered canopy structure, enhancing light penetration and promoting light-demanding, disturbance-adapted species at the expense of shade-tolerant, late-successional taxa.

A broader regional context highlights similar patterns. In the Western Ghats of India, multi-temporal satellite analysis (1973–2012) showed that approximately 21% of evergreen forests were threatened by invasion of *Ochlandra travancorica*, a native reed bamboo species (Dutta and Reddy, 2016). Similarly, another native bamboo species *Yushania maling* in the Darjeeling Himalayas has exhibited high invasion potential, raising concern among regional policymakers (Srivastava et al., 2018).

Together, these findings highlight a key ecological paradox: a species that functions simultaneously as an ecological and socio-economic resource, while also acting as an agent of ecosystem transformation and disturbance. Understanding this dual role and developing evidence-based solutions grounded in both scientific data and community perspectives is the central challenge addressed in this paper. Although based on Sri Lanka, these insights are broadly applicable to similar tropical forest systems elsewhere.

## **Bamboo and climate resilience: ecosystem functions and trade-offs**

Global studies identify bamboo as one of the most productive plant groups, capable of sequestering carbon at rates comparable to many broadleaved forest species (Song et al., 2011; Chen et al., 2023; Tripathi et al., 2024). In China, bamboo forest carbon density ranges from 168.7 to 259.1 t C/ha, exceeding many forest types as well as the global average of 86 t C/ha (Zhang et al., 2023). Although these estimates are largely derived from managed plantations, they

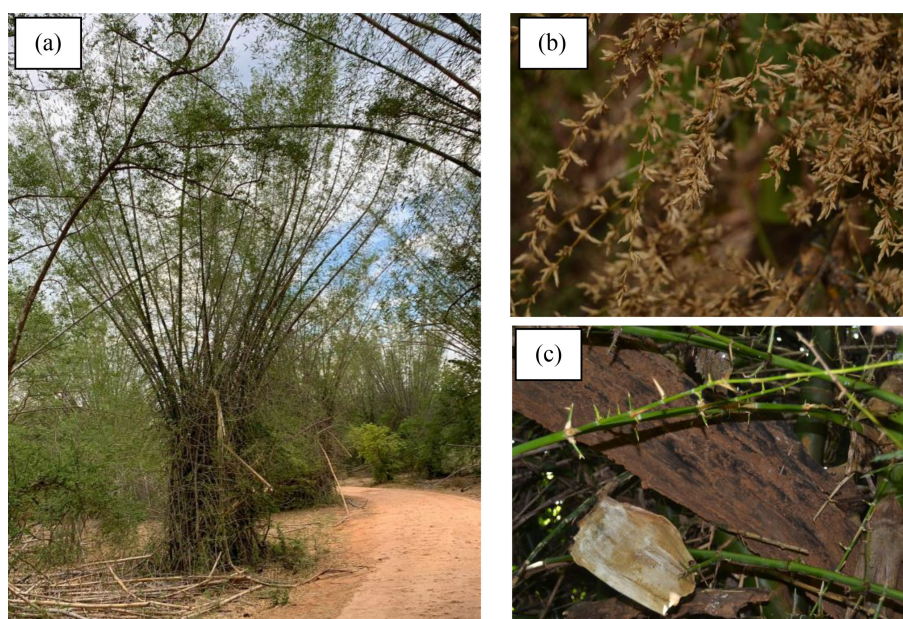


FIGURE 1

(a) Clump of *Bambusa bambos* growing in Minneriya-Giritale National Park, Sri Lanka; (b) close-up of *B. bambos* inflorescences; (c) thorny nature of emerging bamboo shoots. Photo Credits: Imesh Weerasinghe and Tharanga Wijewickrama.

demonstrate that bamboo-dominated systems are far from carbon deficient.

Bamboo also plays a significant role in soil and water conservation. Its extensive root and rhizome systems stabilize soil, reduce erosion—particularly on slopes and in riparian zones—and help regulate water distribution (Acharya, 2018; Shen et al., 2025). In Sri Lanka, where intermediate zone forests are critical to hydrological processes, the watershed protection functions of bamboo-rich vegetation warrant careful consideration. In this context, *B. bambos*, well adapted to prolonged dry periods in Sri Lanka's dry and intermediate zones, demonstrates rapid vegetative regeneration and ecological persistence, reinforcing its long-term presence in these ecosystems.

In contrast, the literature also highlights potential ecological drawbacks of bamboo expansion, particularly its competitive advantage over broadleaved trees due to differences in growth timing and resource acquisition (Yang et al., 2017; Xu et al., 2020). This has raised concerns about reduced biodiversity. In contrast, Gong et al. (2023) found that bamboo expansion can enhance the radial growth of broadleaf trees: shade-intolerant species extend their growth periods, while shade-tolerant species adjust growth cycles to reduce competition. These adaptive responses suggest that coexistence is possible. Most reports of such invasive behavior in bamboos are confined to monopodial species such as *Phyllostachys edulis*; thus, the recognition of a sympodial species like *B. bambos* as invasive is relatively uncommon.

Therefore, bamboo expansion should be interpreted in a balanced way, as focusing solely on its negative impacts overlooks its crucial ecological functions. This highlights the need for context-specific assessment and management.

## Does climate-driven disturbance facilitate opportunistic bamboo expansion?

A key question in forest ecology is how climate change is reshaping disturbance regimes and, in turn, influencing forest dynamics (Prävalie, 2018; Seidl and Turner, 2022). However, global understanding of forest disturbances remains limited by patchy data and inconsistent methodologies, making it difficult to attribute them solely to climate change. Identifying the drivers of these disturbance patterns therefore remains critical for effective adaptation and mitigation strategies (Anderegg et al., 2020).

Climate change is also expected to drive shifts in species distributions, although the role of specific plant traits in determining these responses remains complex and context-dependent (Hampe, 2011). In addition, anthropogenic disturbances further influence species expansions such as bamboo, complicating narratives of climate resilience (Tamang et al., 2025). Traits such as rapid growth, disturbance tolerance, and competitive dominance allow bamboos to both respond to and capitalize on changing conditions.

Disturbances such as fire, land-use change, and climate-induced stressors increase canopy openness, soil disturbance, and resource availability, and are likely to facilitate the spread of clonal bamboo species such as *Guadua* spp. and *B. bambos* (da Silva et al., 2021; Yang et al., 2015). In Sri Lanka, for example, disturbances associated

with the Moragahakanda mega hydropower project have fragmented forests and altered hydrological regimes, likely promoting the sudden expansion of *B. bambos* (Wijewickrama, 2020). As disturbance-sensitive species decline, disturbance-tolerant species like *B. bambos* may occupy the available ecological space, leading to structural simplification of forest ecosystems. This raises an important question: whether such expansion should be interpreted as a sign of climate resilience or as an indicator of ecosystem degradation. While bamboo may appear to benefit from climate change, its dominance can simultaneously displace native species, diminish diversity and potentially reduce long-term ecosystem stability.

## Why *B. bambos* thrives where others fail?

*Bambusa bambos* thrives in disturbed forest environments primarily due to its high phenotypic plasticity and its ability to modify local ecosystem conditions in ways that reinforce its persistence. Phenotypic plasticity, plants' capacity to adjust morphology and physiology in response to environmental variation, is a defining trait of ecologically successful species such as bamboos (Zheng et al., 2024; Weijie, 2025). In disturbance-prone ecosystems, this trait becomes particularly advantageous for potential invaders, regardless of their ecological status (Piyasinghe et al., 2014). In Sri Lanka's intermediate zone forests, canopy openings resulting from anthropogenic and other disturbances create fluctuations in light, temperature, and moisture. Under these variable conditions, bamboos exhibit greater morphological and physiological flexibility than many late-successional species, allowing them to establish, grow rapidly, and outcompete species adapted to stable, undisturbed environments (Zuo et al., 2023).

Moreover, *B. bambos* also alters ecosystem processes in ways that promote its dominance. Compared to many broadleaved species, bamboo litter tends to decompose at slower rates, largely determined by its litter quality and interactions with soil biota (Lubina et al., 2022; Jagadish et al., 2015). Thus, bamboo litter can alter soil properties and generate positive feedback mechanisms that favor bamboo regeneration, whereby changes in soil nutrient dynamics, moisture retention, and microbial activity further enhance conditions that further facilitate bamboo establishment and expansion. These changes extend to belowground interactions: increased abundance of arbuscular mycorrhizal fungi (AMF) in bamboo-dominated patches suggests enhanced symbiotic pathways for nutrient acquisition (Mafaziya et al., 2019). Similar mutualistic strategies have been observed in invasive species such as *Austroeuatorium inulifolium*, which gain competitive advantages through beneficial microbial associations (Karunaratne and Madawala, 2016; Madawala, 2014). In addition, modified belowground biotic assemblages may influence nutrient cycling, thereby further reinforcing bamboo persistence (Wijewickrama et al., 2022a; Long et al., 2025). Therefore, species such as *B. bambos* succeed over other forest species not only by tolerating environmental variability but also by actively restructuring their habitat, creating self-reinforcing ecological conditions that limit the establishment and performance of other species.

## Evidence from a Sri Lankan case study

### How does *B. bambos* influence structural and compositional changes in tropical moist evergreen forests?

Bamboo dominance in the Moragahakanda area (Galboda, Moragolla, and Maragomuwa) appears to fundamentally alter both the structure and composition of forest stands (Wijewickrama et al., 2020a). Compared to non-bamboo forests, bamboo-rich areas show clear signs of structural simplification, with reduced canopy height, fewer tall trees, and a pronounced concentration of vegetation in the lower strata. This pattern likely reflects the competitive suppression of canopy-forming species and a disruption of normal vertical stratification. More importantly, these structural differences seem to coincide with pronounced shifts in species composition and regeneration dynamics. Bamboo-rich patches are not merely variants of the same forest type but appear to represent ecologically divergent systems, with lower similarity to non-bamboo forests and a higher proportion of site-restricted species. The increasing dominance of light-demanding and disturbance-adapted taxa such as *Pterospermum suberifolium* and *Macaranga peltata*, alongside the decline or absence of characteristic moist evergreen forest species including *Nothopegia beddomei* and *Dimocarpus longan*, suggests a transition away from late-successional forest conditions. In this context, bamboo presence can be interpreted not just as a structural modifier, but as a driver of compositional change.

From a conservation perspective, this shift is concerning. The reduced presence of endemic species in bamboo-rich patches implies a decline in conservation value, raising questions about the long-term ecological integrity of these forest ecosystems. Rather than functioning as resilient forest stands, bamboo-rich areas seem to behave more like arrested or degraded stands, where recovery toward mature forest conditions is limited. This interpretation is further supported by the apparent increase in tree mortality and gap formation in bamboo-rich areas. Such conditions likely enhance light availability and create feedbacks that favor continued bamboo persistence, potentially reinforcing its dominance. In this sense, bamboo expansion may not be a transient phase but part of a self-perpetuating cycle that inhibits the re-establishment of shade-tolerant, late-successional species.

Taken together, these observations suggest that bamboo expansion could be driving a long-term transformation of these forests toward simpler, more homogeneous systems. If this trajectory continues, it may result in a gradual erosion of biodiversity, particularly among endemic and moisture-dependent taxa, and a decline in the overall resilience of tropical moist evergreen forests. Such structural and compositional simplification is also likely to reduce the potential of these ecosystems to withstand and recover from climate-related disturbances, as low species and functional diversity can constraint adaptive responses to shifts in climatic regimes.

### Is regeneration in jeopardy? Seedling recruitment, mortality, and the fate of late-successional species

The regeneration dynamics observed in forests affected by *B. bambos* expansion reveal a significant shift in their successional trajectory (Wijewickrama et al., 2022b). Although bamboo-rich areas exhibit higher overall seedling abundance and diversity, this pattern appears misleading, as it is largely driven by herbs and lianas rather than tree and shrub species that determine long-term forest structure. In contrast, non-bamboo forests consistently show stronger recruitment and survival of tree seedlings, suggesting more stable and functionally meaningful regeneration trajectory.

Species-level patterns reinforce this shift. Shade-tolerant taxa such as *Dimocarpus longan* perform better in non-bamboo forests, whereas disturbance adapted species like *Pterospermum suberifolium* are more successful in bamboo-rich forest patches. This divergence indicates a transition away from late-successional assemblages toward communities adapted to higher light and disturbance conditions.

Taken together, these patterns suggest that bamboo expansion is actively redirecting regeneration pathways rather than simply modifying them. Increased canopy openness, altered microclimatic conditions, and the accumulation of recalcitrant litter likely create environments that favor pioneer species while inhibiting tree establishment. As a result, bamboo-rich forests appear to support a narrower range of functional groups. If sustained, these altered dynamics may lead to arrested succession, where mature forest structure fails to recover over time and late-successional species persist only as aging individuals. Such trajectories could reduce structural complexity and adaptive capacity, potentially limiting the resilience of these forests to ongoing environmental change, including climate variations.

### What lies beneath bamboo expansion?

The impacts of *B. bambos* expansion extend well beyond above-ground vegetation, influencing below-ground communities and processes in ways that may further reinforce ecosystem change and complexity. While bamboo-rich forests show higher abundance and richness of arbuscular mycorrhizal fungi (AMF), this increase is largely characterized by the dominance of disturbance-tolerant taxa such as *Glomus* (Mafaziya et al., 2019). Similarly, litter-dwelling arthropod communities are more abundant and compositionally distinct under bamboo dominance, suggesting that these systems are not necessarily more functionally diverse, but rather reorganized.

These patterns likely reflect strong environmental filtering driven by bamboo-driven changes in litter dynamics and forest floor conditions. The accumulation of lignin-rich, slowly decomposing bamboo litter appears to create a modified microhabitat while altering soil temperature and moisture regimes. Such conditions are likely to favor opportunistic and generalist taxa, rather

than specialized or functionally diverse communities. In this context, the observed increase in below-ground diversity may not indicate improved ecosystem functioning, but rather a shift toward disturbance-tolerant assemblages.

This reorganization has crucial implications for ecosystem processes. Changes in microbial and faunal composition are likely to influence decomposition pathways and nutrient cycling, although the direction of these effects remains uncertain and context-dependent. Nevertheless, it is reasonable to argue that bamboo dominance may promote feedback mechanisms that stabilize its persistence, particularly through altered plant-soil interactions and litter dynamics (Li-Hua et al., 2014; Song et al., 2016; Wu et al., 2024; Rong et al., 2025; Meng et al., 2025). Taken together, these below-ground responses suggest that bamboo expansion is reshaping not only vegetation structure but also basic ecosystem processes, potentially reinforcing a trajectory toward simplified and less resilient forest systems. Is Bamboo a Boon or Bane? Community Perceptions of *B. bambos* Expansion.

Community perceptions provide an important socio-ecological perspective on the expansion of *B. bambos*. Evidence from the case study indicates a high level of awareness, with most respondents recognizing its spread and largely attributing it to natural causes (Wijewickrama et al., 2020b). Local ecological knowledge is also evident, with approximately 70% of respondents identifying rocky slopes as preferred habitats. At the same time, bamboo expansion is associated with multiple perceived impacts: a large majority (92%) link it to increased forest fire frequency during dry periods, while 59–60% report a greater presence of wild elephants in bamboo-dominated areas, often attributed to attraction to young shoots. Despite these concerns, bamboo remains widely used for agriculture, household needs, and cultural practices, and is not perceived as significantly affecting other non-timber forest products such as honey and medicinal plants (61–87% of respondents).

These patterns reveal a complex and context-dependent perception of bamboo expansion. While communities clearly recognize ecological changes, particularly increased fire risk and altered wildlife interactions, these concerns are moderated by the continued utility of bamboo as a subsistence resource. The reported increase in elephant presence contrasts with studies suggesting that thorny bamboo species may act as deterrents (Kumar et al., 2022), highlighting the importance of locally grounded observations. Variation in perception with proximity, where communities closer to bamboo-rich forests express more negative or neutral views, further indicates that direct exposure to ecological impacts shapes attitudes. Together, these findings suggest that bamboo is perceived neither purely as a benefit nor as a threat, but as a species with both ecological consequences and livelihood value.

These insights imply that management of *B. bambos* must move beyond purely ecological assessments to incorporate community perspectives and dependencies. The coexistence of benefits and risks highlights the need for participatory, context-specific strategies that reconcile conservation goals with local livelihoods. Integrating scientific evidence with local knowledge will therefore be essential for designing interventions that are both ecologically effective and socially acceptable, particularly in systems where native species simultaneously function as resources and drivers of ecological change.

## Unravelling the paradox

### When native status becomes a shield: why *B. bambos* escapes attention?

Findings from the case study by Wijewickrama et al. indicate that the expansion of *B. bambos* has resulted in significant ecological and social impacts. These impacts warrant urgent management comparable to that for exotic invasive species, yet such measures remain absent due to the conceptual protection afforded by its native status.

In Sri Lanka and across much of the region, invasive species policies are explicitly limited to alien taxa and do not account for native species that display invasive behavior. As a result, any species classified as native regardless of its ecological and/or social impacts falls outside formal management frameworks. This reflects a deeper assumption that native species are inherently in equilibrium within their ecosystems, and therefore incapable of causing any significant ecological and/or social harm. Consequently, native invaders such as *B. bambos* escape regulation and continue to expand unchecked, producing long-term consequences comparable to those of recognized exotic invasive species.

This regulatory gap is further complicated by the cultural and economic value of bamboo in rural Asian communities. Although *B. bambos* has low commercial value in Sri Lanka than other bamboo species, largely due to its thorny nature, it still holds local significance. Its relatively limited economic utility, however, strengthens the case for management interventions aimed at preventing further biodiversity loss. The reversibility of bamboo impacts depends on factors such as duration of dominance, soil changes, and seed bank persistence, with intact systems potentially recovering naturally, while heavily disturbed areas may require active restoration.

### Feedback loops: how bamboo maintains its own dominance

In the Sri Lankan context, the most concerning aspect of *B. bambos* expansion in intermediate and dry zone forests is not the initial establishment, but the self-reinforcing feedback mechanisms that sustain and extend its dominance. These feedbacks could amplify initial disturbances and make ecosystem recovery increasingly difficult.

*Bambusa bambos* generates substantial quantities of lightweight leaf litter that accumulates on the forest floor and becomes highly flammable during extended dry seasons. These fire events may lead to mature tree mortality, reduced seedling establishment, and canopy opening, while simultaneously facilitating further bamboo expansion. In addition, the dense litter layer acts as a physical barrier to germination and may alter soil moisture and temperature in ways that disadvantage native tree species, particularly late-successional, shade-tolerant taxa critical for long-term forest structure.

Shifts in biotic communities may further reinforce bamboo dominance. Changes in AMF communities from specialist, tree-associated taxa to more generalist, disturbance-adapted forms are

likely to disrupt symbiotic relationships necessary for native tree establishment. Similarly, altered litter dwelling arthropod assemblages may accelerate decomposition and nutrient cycling, potentially modifying forest floor conditions in ways that favor bamboo. There is also potential for allelopathic effects through litter and root exudates, which may inhibit native plant regeneration, although empirical evidence remains limited. Together, these interacting feedbacks may create conditions that promote *B. bambos* persistence and spread, while simultaneously constraining the regeneration of native forest species.

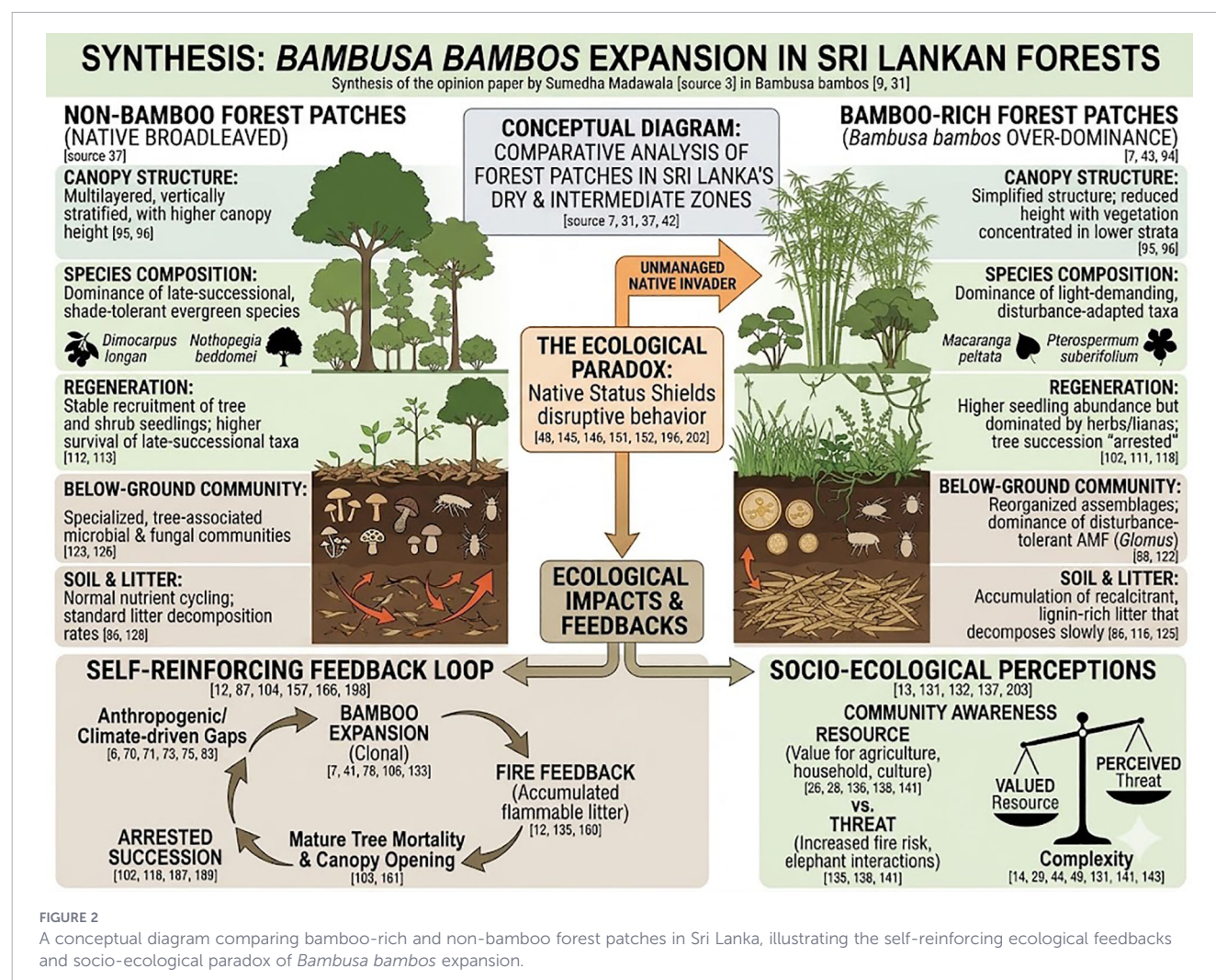
## The way forward: moving beyond the native/exotic dichotomy

This multidisciplinary case study from Sri Lanka highlights a broader issue in invasion biology: the native–exotic dichotomy is insufficient for guiding ecological management. While the native–exotic distinction reflects biogeographic history, it offers limited insight into current ecological impacts, which are better understood through species' population dynamics, interactions, and effects on ecosystem integrity.

As climate change and other anthropogenic disturbances reshape environmental conditions, native species are increasingly likely to exhibit behaviors that diverge from their historical roles. This emphasizes the need for a conceptual framework that evaluates species based on ecological impact rather than origin, while still recognizing the relevance of the native–exotic distinction in evolutionary and management contexts. Although debate continues over the terminology, both exotic and native invaders can produce comparable ecological effects and, in many cases, warrant similar management responses. The following conceptual diagram synthesizes the multi-dimensional findings of this study, illustrating the noted ecological and structural contrasts between native non-bamboo forests and patches rich in *B. bambos* expansion in Sri Lanka (Figure 2).

## What drives native species spread? Climate change, disturbance, or both?

In the context of accelerating climate change, the rapid expansion of native species such as *B. bambos* raises important and unresolved questions: is this driven by climate change, long-



term anthropogenic disturbance, or an interaction of both? Disentangling these drivers is challenging, as anthropogenic factors often interact with changes in temperature and rainfall patterns. These overlapping influences make it difficult to explain such expansions using a single cause and suggest they should not be interpreted only as signs of climate resilience. Thus, native species expansion is better understood as the outcome of multiple interacting drivers. Recognizing this complexity, greater attention should be given to how such expansions alter ecosystem structure and function, and long-term resilience under combined climatic and anthropogenic pressures.

## Knowledge gaps and risks of delayed action

Due to the limited availability of case studies on native invaders and their ecological and socio-economic consequences—such as the work by Wijewickrama and colleagues—a significant knowledge gap persists. This limits our understanding of the rapid expansion of native invaders like *B. bambos* and constrains the development of effective management strategies. Even in Sri Lanka, this study could not ascertain the primary causal driver of *B. bambos* expansion, whether it is historical human disturbance, climate-driven change, legacy effects of past flowering events, or an interaction of these factors. As a result, predictions of future expansion and assessments of management feasibility remain largely speculative.

The long-term dynamics of bamboo-dominated forests are still poorly understood. Most existing studies including the case study by Wijewickrama et al. provide only short-term snapshots rather than capturing directional or temporal change. This makes it difficult to determine whether observed bamboo dominance represents a stable alternative state or a transitional phase in forest succession. If bamboo dominance is self-limiting, it would eventually facilitate forest recovery; if it is self-reinforcing, natural recovery may be unlikely and require more intensive management interventions.

The consequences of delayed action in the face of these knowledge gaps are also concerning. *Bambusa bambos* has already expanded into protected areas such as Ritigala and Minneriya–Giritale, as well as sanctuaries like Victoria–Randenigala–Rantambe, indicating the severity of its spread. The impacts of this expansion have made restoration increasingly difficult as bamboo becomes more established. Continued inaction is therefore likely to result in further loss of biodiversity, reduced regeneration potential, and declining ecosystem integrity, with management challenges becoming progressively more complex over time.

## Concluding remarks

### Holding the paradox: resilience without sacrificing integrity

The expansion of *B. bambos* in Sri Lanka illustrates a central ecological paradox: the same species that enhances short-term

climate resilience can simultaneously erode long-term ecological integrity. By stabilizing soils, sequestering carbon, and rapidly occupying disturbed habitats, bamboo contributes to immediate ecosystem functioning; yet through structural simplification, altered regeneration pathways, and self-reinforcing feedbacks, it can progressively reduce biodiversity and constrain forest recovery.

This paradox is fundamentally scale- and process-dependent. At local scales, bamboo-dominated systems may appear resilient and functionally efficient, particularly under increasing disturbance regimes. However, at broader spatial and temporal scales, these gains may come at the cost of reduced structural complexity, diminished species diversity, and altered ecosystem trajectories. The capacity of *B. bambos* to exploit disturbance, through rapid clonal growth, litter accumulation, and modification of below-ground processes, further reinforces its persistence and limits the likelihood of passive restoration once dominance is established.

This dual role challenges the conventional native–exotic dichotomy and underscores the need to evaluate species based on ecological impact rather than origin alone. Accordingly, effective management must integrate ecological evidence with socio-economic realities and local knowledge, moving toward adaptive, context-specific strategies. However, in Sri Lanka, and likely in other regional contexts, addressing such “native invaders” remains constrained by limited long-term datasets and policy frameworks primarily focused on exotic species. As a result, impact-driven expansions of native species often go unrecognized within formal management systems, increasing the risk of further simplification of structurally complex forest ecosystems. Proactive, adaptive management, supported by long-term monitoring and informed by both scientific and local knowledge, is therefore essential to maintaining ecological integrity while enhancing climate resilience.

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SM: Writing – original draft, Writing – review & editing.

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## Conflict of interest

The author(s) declared that this work was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

## Generative AI statement

The author(s) declared that generative AI was used in the creation of this manuscript. The author acknowledges the use of ChatGPT (OpenAI, GPT-5.3) for language editing, structural refinement, and clarity improvement, while retaining full responsibility for all scientific interpretations, analyses, and conclusions presented. Gemini AI used to prepare the Figure 2.

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