Submission to the Roadmap for Halting and Reversing Deforestation and Forest Degradation by 2030

Leveraging *Ficus* Species as High-Impact Nature-Based Solutions

Summary

Restoring forests requires restoring ecological processes — not just planting trees. To accelerate progress toward halting and reversing deforestation by 2030, Parties should prioritize the strategic use of *Ficus* species (fig trees) in forest conservation, restoration, agroforestry and community-based management.

With more than 800 species across the tropics and subtropics, *Ficus* are keystone resources that sustain exceptionally high numbers of seed-dispersing birds and mammals, enhance natural regeneration and strengthen resilience under climate stress. Integrating *Ficus* into restoration strategies offers a cost-effective, biodiversity-positive and socially grounded approach aligned with paragraphs 33 and 34 of the outcome of the first Global Stocktake under the Paris Agreement.

1. Key barriers

Ecological simplification in restoration: Many reforestation efforts rely on monocultures or low-diversity plantations, prioritizing short-term carbon gains over ecosystem function. This limits biodiversity recovery, weakens resilience and slows natural regeneration.

Breakdown of seed dispersal networks: Defaunation, habitat fragmentation and increasing heat stress reduce seed dispersal by birds and mammals, slowing forest recovery and increasing restoration costs.

Limited use of Indigenous and local knowledge: Restoration programs often underuse culturally important and ecologically strategic native species known to local communities.

Carbon-centric finance metrics: Climate finance mechanisms frequently overlook biodiversity and ecosystem function, disincentivizing the use of keystone species.

2. Leveraging *Ficus* species as solutions

Keystone species–led restoration: *Ficus* species are among the most important food resources for wildlife, supporting over 1,300 species of birds and mammals.[1] Their asynchronously fruiting — often during periods of general fruit scarcity — sustains fruit-eating birds and mammals year-round, maintaining the seed dispersal systems critical to forest regeneration.[2,3]

Cost-effective regeneration: Figs attract birds, bats and primates in high densities, acting as ecological "magnets" in degraded landscapes. Studies across Africa, Asia and Latin America show increased seed rain and faster secondary forest recovery around fruiting fig trees.[4,5,6,7,8] This makes them well suited to assisted natural regeneration approaches that reduce planting costs.

Climate resilience and landscape connectivity: Many *Ficus* species are drought-tolerant, fast-growing, and capable of establishing in degraded soils. Their root systems stabilize slopes and riverbanks, while their canopies moderate microclimates and support landscape connectivity.[9]

Multi-purpose species for sustainable land-use: Many *Ficus* species provide food, fodder and traditional medicines. They integrate well into agroforestry or silvopastoral systems, supporting livelihoods while enhancing biodiversity and reducing pressure on natural forests.[10,11,12]

Alignment with Indigenous Peoples and local communities: Across Asia, Africa, Oceania and parts of Latin America, fig trees hold deep spiritual and cultural significance.[13] Their protection as sacred or culturally important trees has conserved biodiversity within human-dominated landscapes.[14] Building on these traditions can strengthen locally led restoration and conservation.[15]

Existing capacity and momentum: A global research community and a growing number of practical initiatives — across Asia, Africa and Latin America —are already demonstrating the value of *Ficus* in restoration.[16,17] These approaches are low-cost, rely on locally available species and are readily replicable across tropica and sub-tropical regions.

3. Policy levers

- Include keystone species criteria in restoration standards and NDC implementation.
- Require biodiversity and ecosystem function indicators (e.g., frugivore return, natural regeneration rates) alongside carbon metrics.
- Prioritize assisted natural regeneration strategies centred on remnant or planted fig trees.
- Support community nurseries producing native *Ficus* seedlings for enrichment planting.
- Support research aimed at
- Integrate *Ficus* into climate adaptation strategies and watershed restoration programs.
- Use fig trees as biodiversity nodes in fragmented agricultural mosaics and agroforestry systems.
- Embed fig-based restoration within community forestry and tenure-secure systems.
- Recognize culturally protected fig trees within area-based conservation frameworks.
- Fund participatory mapping of culturally significant keystone trees.
- Invest in research and knowledge exchange on *Ficus* ecology, propagation, and restoration applications, including long-term monitoring of biodiversity and regeneration outcomes and the integration of Indigenous and local knowledge systems.

4. Replicability and diverse contexts

The genus *Ficus* spans ecosystems including tropical rainforests, dry forests, montane systems, and semi-arid savannas. This ecological breadth allows tailored application across a wide range of settings:

- **In deforested areas:** catalyse natural regeneration in degraded landscapes.
- **In high forest-cover areas:** strengthen resilience and wildlife corridors.
- **In agricultural frontiers:** integrate into agroforestry systems.
- **IPLC territories:** build on existing cultural values and stewardship systems.

These approaches are adaptable, low-cost and compatible with different development pathways and governance contexts.

5. Conclusion

Strategic use of *Ficus* species provides a practical, science-based, culturally grounded and cost-effective pathway to accelerate forest regeneration, biodiversity recovery and climate resilience. By embedding keystone species–led restoration into policy frameworks, finance mechanisms, research agendas and community-based management, Parties can move beyond tree-planting toward restoring functioning forest ecosystems. The Roadmap for Halting and Reversing Deforestation and Forest Degradation should explicitly recognize keystone species-based restoration, particularly the use of Ficus species, as a scalable, effective and locally adaptable approach to achieving the 2030 goals.

References

[1] Shanahan, M et al. (2001). Fig-eating by vertebrate frugivores: a global review. Biological Reviews 76, 529–572.

[2] Terborgh, J (1986). Keystone plant resources in the tropical forest, in ME Soule (ed.) Conservation Biology, the Science of Scarcity and Diversity. Sinauer, 330–344.

[3] Lambert, FR & Marshall, AG (1991). Keystone characteristics of bird-dispersed Ficus in a Malaysian lowland rain forest. Journal of Ecology 79, 793–809.

[4] Goosem, SP & Tucker, NIJ (1995). Repairing the Rainforest: Theory and practice of rainforest re-establishment in North Queensland's wet tropics. Wet Tropics Management Authority, Cairns, Australia.

[5] Kuaraksa, C & Elliott, S (2012). The use of Asian *Ficus* species for restoring tropical forest ecosystems. Restoration Ecology 21, 86–95.

[6] Cottee-Jones, HEW et al. (2016). The importance of *Ficus* (Moraceae) trees for tropical forest restoration. Biotropica doi: 10.1111/ btp.12304.

[7] Guevara, S, Laborde, J & Sanchez-Rio, G (2006). Rain forest regeneration beneath the canopy of fig trees isolated in pastures of Los Tuxtlas, Mexico. Biotropica 36, 99–108.

[8] Purwanto, S., M.Iqbal, M. & Sheil, D. (2026). Terrestrial establishment of strangler figs in burned tropical peat swamp forests, Sumatra, Indonesia. Ecology and Evolution 16: e73194. https://doi.org/10.1002/ece3.73194.

[9] Cottee-Jones, HEW (2014). Isolated Ficus trees and conservation in human-modified landscapes. DPhil. University of Oxford.

[10] Balehegn, M., Eik, L.O. & Tesfay, Y. (2014). Silvopastoral system based on *Ficus thonningii*: an adaptation to climate change in northern Ethiopia. African Journal of Range & Forage Science, 32:3, 183-191, DOI: 10.2989/10220119.2014.942368

[11] Balehegn, M. 2018. Drought tolerant *Ficus thonningii* silvopastures sustain livestock and crops in Northern Ethiopia, AFSA Case Study. ficus-thonningi-eng-online.pdf (afsafrica.org)

[12] Huang, J. et al. 2026. Optimizing shade and nitrogen for profitable *Ficus hirta* Vahl. in rubber-based agroforestry. Industrial Crops and Products, 240: 122725.

[13] Wilson, D & Wilson, A (2013). Figs as a global spiritual and material resource for humans. Human Ecology 41, 459–464.

[14] Shanahan, M. (2026). Figs, Forests and the Fight for People-Focused Conservation. Planet Ficus. 24 January 2026. https://planetficus.substack.com/p/figs-forests-and-the-fight-for-people

[15] Parikesit, D. W. W., Hardiyanti, Kurniawan,F.H, & Sheil, D. (2025). Strangler figs and their spirits: How Indigenous beliefs and practices influence an Iban Landscape, West Kalimantan, Indonesia. Biotropica 57: e70089. https://doi.org/10.1111/btp.70089

[16] Shanahan, M. (2018). Gods, Wasps and Stranglers: The Secret History and Redemptive Future of Fig Trees. Chelsea Green Publishing.

[17] Shanahan, M. (2024). How fig trees could revolutionise reforestation and tourism in Borneo. Dialogue Earth. 17 January 2024. https://dialogue.earth/en/nature/borneo-fig-trees-reforestation-wildlife-tourism-2/