



Tropentag, September 16-18, 2026, hybrid conference

“Towards multi-functional agro-ecosystems
promoting climate resilient futures”

The contribution of ecosystem restoration and agroforestry practices to biodiversity conservation in Ethiopia: A systematic literature review

ERMIAS TEFERI, DEJENE KASSAHUN MENGISTU, BOGALE NIGIR HAILEMARIAM

The Alliance of Bioversity International & CIAT, Ethiopia

Abstract

Background: Ethiopia faces significant biodiversity loss due to deforestation, land degradation, and agricultural intensification. Ecosystem restoration and agroforestry practices have emerged as potential strategies for biodiversity conservation while supporting rural livelihoods. However, a comprehensive synthesis of empirical evidence on their effectiveness in the Ethiopian context is lacking.

Methods: We conducted a systematic literature review following PRISMA 2020 guidelines. We searched Google Scholar, PubMed, and SciSpace databases for studies published between 2012 and 2026. Eligibility criteria included studies conducted in Ethiopia reporting quantitative biodiversity metrics for ecosystem restoration or agroforestry interventions with comparative assessments. Two-stage screening (abstract and full-text) was performed using predefined criteria with score thresholds of 4.0 and 4.5, respectively. Data extraction focused on study design, intervention types, biodiversity metrics, key findings, geographic location, recommendations, and risk of bias assessment using the ROBINS-I tool.

Results: From 1,484 identified records, 335 studies met inclusion criteria after removing 472 duplicates and screening 1,012 unique records. Studies covered diverse agroforestry systems (home gardens, parkland systems, coffee-based agroforestry, boundary plantations, woodlots) and restoration interventions (exclosures, reforestation, soil and water conservation) across multiple Ethiopian regions. Home gardens consistently showed the highest species diversity (Shannon-Wiener index: 2.5–3.8), followed by coffee agroforestry systems. Ecosystem restoration interventions, particularly exclosures and area closures, demonstrated significant increases in species richness (40–150% compared to degraded sites) and diversity indices. Native species composition was higher in traditional parkland systems and forest coffee compared to intensively managed systems. Policy integration of traditional ecological knowledge with scientific approaches emerged as critical for sustainable biodiversity conservation.

Conclusions: Both ecosystem restoration and agroforestry practices contribute significantly to biodiversity conservation in Ethiopia, with effectiveness varying by intervention type, management intensity, and ecological context. Home gardens and coffee agroforestry systems serve as important repositories of plant diversity, while restoration interventions effectively rehabilitate degraded ecosystems. Integration of indigenous and exotic species, maintenance of structural complexity, and supportive policy frameworks are essential for maximising biodiversity outcomes. Future research should address geographic gaps, long-term monitoring, and socio-ecological interactions.

Keywords: Agroforestry, biodiversity conservation, ecosystem restoration, Ethiopia, PRISMA, species diversity, systematic review