

KERALA STATE BIODIVERSITY STRATEGY AND ACTION PLAN (K-SBSAP) 2025 – 2035



Cover page. K-SBSAP 2025 - 2035 Nested Governance Strategy for Biodiversity and the SDGs: This picture echoes the nested approach of the Kerala State Biodiversity Strategy and Action Plan (KSBSAP) 2025–2035, with the central eye envisions Kerala as the most biodiverse-friendly state in India by 2035. Encircling it the innermost conceptual wheel representing KSBSAP’s eight integrated target areas (four mainstream biodiversity domains and four cross-cutting socio-ecological production domains) serves as the operational core. These targets are directly mapped to the 23 action targets of the Kunming-Montreal Global Biodiversity Framework (K-MGBF), forming the central wheel of global biodiversity ambition. Radiating outward, the 17 Sustainable Development Goals (SDGs) form the outermost ring, underscoring how Kerala’s biodiversity stewardship is deeply interwoven with global development priorities.

KERALA STATE BIODIVERSITY STRATEGY AND ACTION PLAN (K-SBSAP) 2025 – 2035



KERALA STATE BIODIVERSITY BOARD

**Kerala State Biodiversity Strategy
and Action Plan (K-SBSAP)
2025 – 2035**

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02 September, 2025.

MESSAGE

Kerala is widely recognized for its progressive environmental policies, community-driven development, and exemplary decentralized governance. Kerala consistently ranks at the top of the country's SDG Performance Index. This Government has also set a goal to make Kerala a carbon-neutral state by 2050. Building on this stronger platform, the *Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025–2035* sets an ambitious vision: to make Kerala "India's Most Biodiverse-Friendly State." Aligned with both the *Biological Diversity (Amendment) Act, 2023* and the *Kunming-Montreal Global Biodiversity Framework*, this transformative plan outlines a comprehensive roadmap to integrate biodiversity conservation with sustainable development, social equity, and ecological resilience as a nature-based climate adaptation strategy.

Recognizing biodiversity as a cross-cutting priority, the K-SBSAP calls for its mainstreaming across all sectors—from agriculture, health, and education to infrastructure, livelihoods, and tourism. Success hinges on coordinated efforts that foster interdepartmental convergence, optimize financial and institutional resources, and mobilize strong public and political support. Kerala's global reputation as a green and socially progressive state positions K-SBSAP as a potential model for people-led biodiversity governance, both nationally and internationally. With sustained commitment, biodiversity conservation can evolve beyond a governance priority into a widespread people's movement, securing Kerala's ecological future while reinforcing its legacy of sustainable and equitable development.

My best wishes.

Pinarayi Vijayan



A. K. SASEENDRAN
MINISTER FOR FORESTS &
WILDLIFE PROTECTION
GOVERNMENT OF KERALA



Thiruvananthapuram

Date 08.09.2025

Message

Kerala, situated in the Western Ghats of India, harbors an exceptionally rich and diverse flora. Its forest ecosystems—ranging from tropical rainforests and montane sholas to sacred groves—are biodiversity treasure troves that provide critical habitats for numerous endemic and threatened species. Beyond their ecological role in maintaining environmental balance, these forests also sustain the livelihoods, cultural traditions, and overall well-being of tribal and forest-dependent communities.

The *Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025-2035* recognizes the central role of forest landscapes in the state's biodiversity framework and calls for their protection, restoration, and co-management. The Forest Department is pivotal in implementing these strategies, which include integrating biodiversity conservation into forest working plans, enhancing community participation in forest governance, and restoring degraded forest patches using native species.

The urgency of these measures is emphasized by Kerala's remarkable biodiversity. Located within the Western Ghats-Sri Lanka biodiversity hotspot, the state accounts for only 1.18% of India's land area yet supports an extraordinary variety of life—1,847 vertebrate species (including 905 fishes, 151 amphibians, 173 reptiles, 500 birds, and 118 mammals). Levels of endemism are particularly high, with amphibians showing a significant proportion of threatened species. Kerala's flora comprises nearly 5,000 species of flowering plants (~28% of India's total), including around 900 medicinal species, along with rich fungal diversity represented by more than 600 mushroom species recorded across the state. These figures underscore the centrality of conserving and restoring forest ecosystems to the K-SBSAP vision.

Aligned with this vision, the plan also stresses the importance of recognizing and supporting the rights and roles of tribal communities under the Forest Rights Act and other participatory forest management frameworks. It encourages the documentation and revitalization of forest-based traditional knowledge, particularly in the areas of non-timber forest products, medicinal plants and climate-adaptive forest practices. Effective coordination between the Forest Department, Biodiversity Management Committees (BMCs), and local self-governments will be essential to implementing these measures at the grassroots level.

Furthermore, the K-SBSAP emphasizes the need to align forest sector planning with climate change mitigation and adaptation goals, particularly through carbon sequestration, ecosystem-based adaptation, and the promotion of green livelihoods. This positions the State Forest Department at the core of Kerala's green development pathway, integrating biodiversity conservation with community resilience and sustainable economic growth. By assuming this proactive role, the Department can ensure that forests continue to serve as vital ecological, cultural, and economic assets in Kerala's future.

Best Wishes!


A.K.Saseendran.



P. PRASAD
MINISTER FOR AGRICULTURE
GOVERNMENT OF KERALA

20/09/2025

Message

I am very happy that the Kerala State Biodiversity Board is preparing the Kerala State Biodiversity Strategy and Action Plan (K-SBSAP)-2025-2035.

Kerala, with its rich biodiversity, has been scientifically divided into 5 Agro-Ecological Zones (AEZ) and 23 Agro-Ecological Units (AEU), where suitable cropping patterns can ensure both productivity and sustainability. Through initiatives like the Jaiva Karshika Mission and Natural Farming, the Agriculture Department is conserving native varieties, encouraging eco-friendly cultivation, and promoting biodiversity-safe input systems. By working closely with Biodiversity Management Committees (BMCs), we aim to document traditional knowledge, revive underutilized crops, support innovations under the PPV&FR Act, and link biodiversity to food and nutritional security.

Kerala's unique farming heritage also provides opportunities for GI-linked products and biodiversity-based enterprises, especially benefitting women and smallholder farmers. By aligning agricultural policy with ecological principles and empowering farmers as custodians of biodiversity, we can build climate-resilient, sustainable, and equitable food systems, fulfilling the vision of the K-SBSAP.

I congratulate the Kerala State Biodiversity Board for this important work and extend my full support to the implementation of the Action Plan. Together, let's make Kerala the most biodiversity-friendly state by 2035.

P. Prasad



J. CHINCHURANI
MINISTER FOR ANIMAL HUSBANDRY,
DAIRY DEVELOPMENT,
MILK CO-OPERATIVES, ZOOS,
VETERINARY &
ANIMAL SCIENCES UNIVERSITY
GOVERNMENT OF KERALA



THIRUVANANTHAPURAM

Date.....19/09/2025

No. 454/MIN(AH&DD)/2025

MESSAGE

Kerala's domesticated biodiversity, particularly its indigenous breeds of cattle, goats, poultry, and ducks, represents a vital genetic and cultural resource. These breeds are often better adapted to local environmental conditions, resilient to disease, and integral to rural livelihoods and traditions. However, the spread of uniform breeding practices, habitat pressures, and changing dietary preferences threaten their survival. The Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025–2035 places high emphasis on the conservation and sustainable use of animal genetic resources.

The Department of Animal Husbandry is expected to lead efforts to identify, document, and conserve indigenous breeds through both in-situ and ex-situ mechanisms. The K-SBSAP encourages breed registration, establishment of breed conservation farms, community-led breeding programmes, and ethno-veterinary documentation. The plan promotes the integration of biodiversity principles into veterinary care, livestock insurance, fodder development, and health management.

The One Health approach, which connects animal, human, and environmental health, is another strategic focus of the K-SBSAP. The Department's role in promoting this approach through interdepartmental collaboration, disease surveillance, and biodiversity-friendly animal rearing practices is critical. Traditional livestock-forest-agriculture interfaces and the role of tribal and pastoral communities in conserving livestock biodiversity are also highlighted.

By revitalizing indigenous breeds, supporting traditional knowledge, and integrating biodiversity into livestock systems, the Animal Husbandry Department can contribute significantly to Kerala's goals of nutritional security, livelihood resilience, and climate-smart development. Its active engagement will be vital for realizing the domesticated biodiversity targets of the K-SBSAP.

Best Wishes

J CHINCHURANI



SAJI CHERIAN
MINISTER FOR FISHERIES,
CULTURE & YOUTH AFFAIRS
GOVERNMENT OF KERALA



THIRUVANANTHAPURAM

Date: **23-09-2025**

MESSAGE

I am pleased to learn that the Kerala State Biodiversity Board (KSBB) is in the process of updating the Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025-2035. This document is a critical roadmap for the future of our state and its precious natural heritage.

Kerala's identity is inextricably linked to its rich biodiversity. However, these natural treasures face unprecedented challenges. The K-SBSAP is a timely and essential response to these threats, aligning our state's efforts with both national and global frameworks.

I commend the Kerala State Biodiversity Board (KSBB) for its dedication in crafting this important document. It is a declaration of our collective resolve to protect and nurture the natural wealth that defines Kerala.

I wish all those involved great success in implementing this vital plan for a sustainable and prosperous future.

With Regards,


Saji Cherian



M. B. RAJESH
Minister for Local Self Government
Excise & Parliamentary Affairs
Government of Kerala



Thiruvananthapuram

02.09.2025

MESSAGE

Kerala's decentralized governance model has uniquely empowered Local Self-Governments (LSGs) to become pivotal actors in environmental stewardship. Building on this strength, the Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025-2035 positions LSGs and their 1,200 functioning Biodiversity Management Committees (BMCs) as frontline institutions for biodiversity governance, setting the stage for Kerala to emerge as a national leader in grassroots conservation.

The Department of Local Self-Government is uniquely placed to integrate biodiversity concerns into local development planning, budgeting, and monitoring. To realize K-SBSAP's vision, we will focus on institutionally strengthening BMCs, actively utilizing People's Biodiversity Registers (PBRs), and driving convergence with local resource mapping, watershed development, and climate adaptation initiatives. Based on the PBRs, efforts will be made by LSGs to prepare a Local Biodiversity Strategy and Action Plan (LBSAP), which will be implemented by integrating its actions into the existing policies, programmes, and annual plans of the LSGs to achieve the biodiversity conservation targets in line with the K-SBSAP, NBSAP, and KM-GBF.

Furthermore, the Department will champion biodiversity literacy, citizen science, and youth engagement through local bodies. By supporting the preparation of local biodiversity strategies and action plans, and mainstreaming biodiversity into the annual plans of panchayats and municipalities, we can significantly enhance eco-restoration projects, protect urban biodiversity hotspots, create green public spaces, regulate invasive species, maintain tree cover, and promote nature-based solutions across both urban and rural governance. Ultimately, strengthening these local institutions will yield more inclusive, democratic, and context-specific conservation outcomes. The Department's leadership is central to ensuring biodiversity conservation becomes a genuine people's movement in every panchayat.

M.B.Rajesh



K. N. BALAGOPAL
MINISTER FOR FINANCE
GOVERNMENT OF KERALA



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04.10.2025

Message

It gives me great pleasure to endorse the Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025-2035. This document arrives at a critical juncture, and its vision aligns perfectly with our government's commitment to sustainable and equitable development.

Kerala's exceptional biodiversity is one of our state's greatest endowments. The K-SBSAP presents a timely and strategic framework for transforming this natural wealth into a cornerstone of our prosperity. I am particularly impressed by its pragmatic approach to integrating biodiversity into our fiscal architecture ensuring that public investment not only drives growth but also enhances ecological resilience and secures livelihoods.

The focus on innovative financing, such as green budgeting and biodiversity credits, demonstrates a forward-thinking approach to resource mobilization. Furthermore, the plan's emphasis on empowering local institutions from Panchayats to Biodiversity Management Committees ensures that this vision is rooted in community action and delivers tangible benefits to our citizens.

This strategy is a testament to what can be achieved when technical expertise and visionary governance converge. I have full confidence in this roadmap and urge all stakeholders to join hands in its implementation. Together, we can ensure that Kerala's natural heritage remains a source of pride and prosperity for generations to come.

K. N Balagopal



ഡോ. എ. ജയതിലക് ഐഎഎസ്
ചീഫ് സെക്രട്ടറി
Dr. A. JAYATHILAK IAS
CHIEF SECRETARY



കേരള സർക്കാർ
തിരുവനന്തപുരം 695 001
Government of Kerala
Thiruvananthapuram-695 001
2nd September, 2025

MESSAGE

Kerala's biodiversity future will be secured only through a whole-of-government and whole-of-society effort. The Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025–2035 provides a pathway for this; its effective implementation requires robust coordination led by the Chief Secretary across departments, institutions, and tiers of government. To operationalise this, a State Biodiversity Coordination Committee has to be established in the Chief Secretary's office to drive interdepartmental action. This will complement the mandate of the State-level Steering Committee on Biodiversity, activate the already existing Virtual Biodiversity Cadre of nodal officers across 28-line departments, and revitalize District Biodiversity Coordination Committees (DBCCs) to strengthen on-ground convergence.

All departments shall integrate K-SBSAP targets into departmental plans, DPRs, and annual budgets, and include biodiversity safeguards in new projects. They shall adopt goal-level KPIs for biodiversity and report progress through a common reporting system aligned to KM-GBF/NBSAP indicators and the State's SDG framework. At the local level, People's Biodiversity Registers (PBRs) will be used to prepare Local Biodiversity Strategies and Action Plans (LBSAPs), with priority actions integrated into LSG annual plans and line-department schemes. DBCCs will convene quarterly with district heads of line departments and BMCs to resolve bottlenecks, pool resources (LBF/CSR/ABS), and fast-track field execution. Departments will adopt performance-based planning aligned with explicit biodiversity targets and embed these in budgets, review cycles, and monitor frameworks.

By facilitating deep cross-sectoral cooperation, ensuring policy coherence, and institutionalizing biodiversity values across governance, we will make biodiversity conservation a central organizing principle of Kerala's development model.

We will ensure unwavering oversight and strategic coordination across all departments, guaranteeing a whole-of-government approach that delivers measurable outcomes against the K-SBSAP targets. This is our collective commitment to the people of Kerala.

Best Wishes!



MESSAGE

The Department of Environment is the nodal agency for steering biodiversity policy, coordination, and oversight in the state. The Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025–2035 outlines an ambitious and integrated roadmap for biodiversity conservation, sustainable use, and equitable benefit sharing, placing the department at the helm of this transformation.

The department's responsibilities include coordinating the activities of the Kerala State Biodiversity Board (KSBB), mainstreaming biodiversity across sectors, ensuring compliance with the Biological Diversity Act, and overseeing reporting under the Kunming-Montreal Global Biodiversity Framework. The K-SBSAP provides a framework for integrating biodiversity into environmental impact assessments, pollution control, land use planning, and climate policy.

Supporting the preparation of thematic biodiversity reports, enabling ecosystem valuation studies, and strengthening data and monitoring systems are also important priorities.

The department's leadership will ensure coherence between the State Environment Policy and K-SBSAP, while also mobilizing national and international finance for biodiversity actions.

Strengthening institutional capacity, promoting nature-based solutions, and enabling green entrepreneurship are additional pathways through which the department can lead Kerala toward becoming a biodiversity-smart state.



वीरेन्द्र तिवारी, भा.व.से. (सेवानिवृत्त)
अध्यक्ष

Virendra Tiwari, IFS (Retd.)
Chairperson

राष्ट्रीय जैव विविधता प्राधिकरण
भारत सरकार

National Biodiversity Authority
Government of India

MESSAGE

Safeguarding biodiversity underpins sustainable development and secures ecological resilience for future generations. As Chairperson of the National Biodiversity Authority (NBA), I am honoured to present the Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025–2035, developed as mandated under Section 36B of the Biological Diversity (Amendment) Act, 2023. This plan strengthens Kerala's biodiversity governance, aligning with the India's updated National Biodiversity Strategy and Action Plan (NBSAP, 2024-2030) and the Kunming–Montreal Global Biodiversity Framework (KM-GBF).

Kerala's rich biodiversity with over 5,000 flowering plants, 200 freshwater fish species, more than 400 banana cultivars, and vibrant bio-cultural heritage from 36 Scheduled Tribes is central to its sustainable development. The K-SBSAP adopts a 'whole-of-government and whole-of-society approach', guided by the "5-P" Theory of Change: mobilizing People, Practitioners, Panchayats, Promoters, and Private/Public sectors alongside Policymakers.

The strategy focuses on ecosystem restoration, genetic and species conservation, sustainable resource use, and mitigating threats like habitat loss, climate change, invasive species, and pollution. It includes 80 time-bound action targets across eight integrated areas—four Mainstream Biodiversity Target Areas (MBTAs) and four Social-Environmental-Production Target Areas (SEPTAs). Implementation is decentralized through Local Biodiversity Strategy and Action Plans (LBSAPs), empowered Biodiversity Management Committees (BMCs), the gender-responsive She-Bio Strategy, innovative financing via Access and Benefit Sharing (ABS) and the Kerala Biodiversity Fund (KBF), and a robust monitoring framework with the Kerala Biodiversity Information Repository (KBIR). These efforts align with the 23 KM-GBF targets and 17 Sustainable Development Goals (SDGs), aiming to make Kerala India's most biodiversity-friendly state by 2035.

The NBA applauds the Kerala State Biodiversity Board (KSBB) and its partners for their rigorous work, involving over 4,000 stakeholders. Success depends on collective action from policymakers, communities, civil society, and private sectors. This plan is a model for other states, contributing to India's and global biodiversity goals.

I extend my best wishes to the Government of Kerala and all partners for its successful implementation, ensuring biodiversity thrives for human well-being and ecological resilience.

Date: 22nd September, 2025


—(Virendra Tiwari)

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The KSBB Team

The Kerala State Biodiversity Board is a statutory body under the State Environment Department for implementing the Biological Diversity Act 2002 (as Amendment in 2023) and supporting the state to achieve the NBSAP targets. The Board is chaired by Dr. N. Anil Kumar, a distinguished botanist and biodiversity expert, and is administratively led by Dr. V. Balakrishnan, the Member Secretary. The Board comprises a blend of ex officio members representing key government departments, such as Forests, Environment, Agriculture, and Fisheries, and non-official members drawn from academia and civil society with expertise in biodiversity conservation, sustainable development, and traditional knowledge systems.

Chairman

- Dr. N. Anil Kumar

Member Secretary

- Dr. V. Balakrishnan

Ex officio members

- Executive Vice-President, Kerala State Council for Science, Technology & Environment (KSCSTE)
- Secretary / Principal Secretary / Additional Chief Secretary, Department of Forest & Wildlife
- Secretary / Principal Secretary / Additional Chief Secretary, Department of Fisheries
- Agriculture Production Commissioner, Government of Kerala
- Secretary / Principal Secretary / Additional Chief Secretary, Department of Environment

Non-official members

- Dr. R. V. Varma, Former Chairman, KSBB; Former Director, KFRI
- Prof. (Dr) S. D. Biju, Professor, Department of Environmental Studies, University of Delhi
- Dr. A. V. Santhoshkumar, Professor & Head, Forest Biology & Tree Improvement, College of Forestry, Kerala Agricultural University

- Dr. Minimol J. S., Professor & Head (Plant Breeding & Genetics), Cocoa Research Centre, Kerala Agricultural University, Vellanikkara
- Dr. Pramod G. Krishnan, IFS, Additional Principal Chief Conservator of Forests, Kerala Forest Department

Supporting the Board is a dynamic Secretariat based in Thiruvananthapuram, consisting of technical and scientific officers, project staff, and administrative personnel. At the district level, the Board is supported by 14 District Coordinators, each responsible for coordinating biodiversity governance with the Biodiversity Management Committees and the Local Self Government bodies in the implementation of biodiversity-compatible programmes in the district. Further strengthening this decentralised structure are the Technical Support Groups (TSGs) in each district. The KSBB also benefits from a State-level Steering Committee, a Virtual Biodiversity Cadre, drawn from 28-line departments, and District Biodiversity Coordination Committees (DBCCs), ensuring convergence and mainstreaming of biodiversity across governance levels.



Preface

Kerala's ecological wealth and cultural heritage are deeply intertwined, forming a living mosaic of biodiversity, traditional knowledge, and community stewardship. From the rainforests of the Western Ghats to the coastal estuaries and sacred groves, the state's landscapes support a remarkable array of species and ecosystems. Yet, these natural assets face mounting pressures from climate change and habitat fragmentation to unsustainable resource use and socio-economic transitions.

In response, the Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025–2035 has been developed as a forward-looking, inclusive, and action-oriented framework to conserve, restore, and sustainably manage the state's biological diversity. Aligned with India's National Biodiversity Strategy and Action Plan (2024–2030) and the 2030 Kunming-Montreal Global Biodiversity Framework (KM-GBF), this Plan articulates a bold Vision 2035: to transform Kerala into the “Most Biodiverse-Friendly State in India.”

The K-SBSAP is the outcome of an extensive, multi-tiered consultation process that engaged Biodiversity Management Committees (BMCs), tribal communities, youth, women's groups, scientists, and policymakers. It is anchored in the principles of ecological integrity, social equity, and participatory governance. A key innovation of this Plan is the integration of the She-Bio (She harnesses ecosystems for biodiversity-inspired outcomes) Strategy, which positions women as central actors in biodiversity conservation, sustainable use, and benefit-sharing. Through this strategy, the Plan ensures that gender-responsive and inclusive approaches are embedded across all eight strategic Target Areas and 80 targets prioritised for the next 10 years of action.

The Plan also introduces transformative frameworks such as the “5-P” Theory of Change mobilizing People, Panchayats, Promoters, Private/Public sectors, and Policymakers and a KM-GBF-aligned monitoring and evaluation system. It proposes robust mechanisms for resource mobilisation, including Access and Benefit Sharing (ABS), Local Biodiversity Funds (LBFs), and partnerships with global platforms.

The successful implementation of the K-SBSAP will require the collective commitment of Kerala's institutions government departments, research bodies, local self-governments, civil society, and the private sector. The Kerala State Biodiversity Board, as the nodal agency, will continue to facilitate convergence, build capacity, and ensure that biodiversity becomes a cornerstone of Kerala's development trajectory.

As we step into this decisive decade for biodiversity, I invite all stakeholders to join hands in realising this shared vision. Together, we can ensure that Kerala's biodiversity continues to thrive for nature, for people, and for generations to come.

N. Anil Kumar
Chairman, Kerala State Biodiversity Board
October 30, 2025

Thiruvananthapuram





Chapter 1

Introduction

The Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025–2035 sets forth a transformative roadmap to conserve, restore, and sustainably manage the state’s exceptional biological and cultural heritage. Anchored in the principles of ecological integrity, social equity, and participatory and people-led governance, the K-SBSAP 2025-2035 aligns with India’s updated National Biodiversity Strategy and Action Plan (NBSAP 2024–2030), the Kunming-Montreal Global Biodiversity Framework (KM-GBF) and the SDGs (Fig.5.).

Drawing from the findings of Rockström *et al.* (2023), which assess the status of nine planetary boundaries key thresholds that define a safe operating space for humanity the Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025–2035 offers a direct and timely response to this escalating planetary emergency (Fig.4.). The Rockström *et al.*’s study reveals that six of the nine boundaries, particularly those concerning biodiversity integrity, bio-geo chemical cycles and land-system change, have already been breached, placing global ecosystems under acute stress and heightening the risk of irreversible tipping points. In recognition of this crisis, the K-SBSAP’s eight integrated target areas are strategically designed to restore ecological balance,

regenerate degraded landscapes, and strengthen socio-ecological resilience within the state boundaries. By aligning these targets with the Kunming-Montreal Global Biodiversity Framework’s 23 action targets and the 17 Sustainable Development Goals, Kerala positions itself as a proactive leader in reversing biodiversity loss translating global imperatives into locally grounded, actionable solutions.

The strategy was shaped through an inclusive, multi-tiered consultation process that started in early 2023 and engaged over 4000 people from a wide spectrum of stakeholder groups, comprising Biodiversity Management Committees (BMCs), academic experts and tribal communities to youth, women, scientists, and policymakers. These dialogues ensured that the K-SBSAP reflects both grassroots priorities and global commitments. The participatory process culminated in a shared Vision 2035: to make Kerala the “Most Biodiverse-Friendly State in India,” with empowered local institutions and communities at the heart of biodiversity governance.

The process and the approach

5-P

- The multi-stakeholder consultation architecture that informed the K-SBSAP
- Kerala's commitment to global biodiversity frameworks and national policy alignment
- The “5-P” Theory of Change—mobilising People, Panchayats, Promoters, Private/Public sectors, and Policymakers for mainstreaming biodiversity in development
- The core strategy of People-Led Biodiversity Management, leveraging Kerala's decentralised governance and social development strengths.

Together, these elements form the foundation for an integrated, inclusive, and action-oriented biodiversity strategy for the State that is both locally rooted and globally aligned.

Stakeholder Consultations to update the K-SBSAP 2022-2032

The formulation of the K-SBSAP was anchored in a multi-tiered, participatory consultation process that ensured

inclusivity and thematic depth. It commenced at the grassroots with BMCs engaging in discussions around LBSAPs, many of which were drafted in line with the KSBSAP 2022-2032 and released as foundational inputs. This was followed by targeted consultations with students and youth groups to integrate intergenerational perspectives, and with women stakeholders through the *She-Bio* Initiative to foreground gender-responsive priorities.

A focused academic dialogue was then convened to deliberate on the status and conservation needs of Kerala's RED Data species. The process culminated in a high-level expert group consultation that brought together specialists from biodiversity, climate change, social sciences, and sustainable development domains.

Supplementary inputs were gathered through e-mail consultations and strategic discussions with the KSBB-Board members, leading to the finalisation of the Strategy Plan. In addition, KSBB colleagues actively participated in external biodiversity-related discussions and forums, using these opportunities to gather diverse perspectives and insights for enriching the K-SBSAP. (See Table 1 for details)

Table 1: Overview of Multi-Stakeholder Consultations for Updating the K-SBSAP 2022-2023

Level/ Group	Focus Area	Key Outputs	Mode of Engagement	Date(s)	No. of Participants
BMC-Level Consultations	LBSAP preparation and local biodiversity priorities	Drafted and released LBSAPs	In-person meetings, documenta- tion	03.02.2023	30
				15.02.2023	113
				11.04.2023	30
				22.03.2024	80
				24.07.2024	100
				17.11.2024	103
				02.12.2024	88
				03.12.2024	92
				16.12.2024	95
				17.12.2024	102
				18.12.2024	96
				23.12.2024	60
				24.12.2024	25
				28.12.2024	110
				08.01.2025	142
				09.01.2025	54
				21.01.2025	78
				23.01.2025	116
				29.01.2025	206
				21.02.2025	230
				14.03.2025	162
				13.05.2025	20
Student and Youth Consultations	Youth perspectives on biodiversity and sustainability	Recom- mendations integrated into K-SBSAP	Workshops, interactive sessions	12.04.2025	112
				24/05/2025	175
				02/05/2025	89
				23/04/2025	60
				28/04/2025	86
				30.04.2025	92
				30.04.2025	60
She-Bio Women's Group Dialogue	Gender- responsive biodiversity priorities	Gender- inclusive action points	Focus group discussions	10.03.2025	141
Academic Expert Meeting	RED Data species of Kerala	Scientific inputs on threatened species	Thematic roundtable	22.05.2025	145

Multi-sectoral Expert Consultation	Cross-cutting issues: climate, social science, SDGs	Integrated, interdisciplinary recommendations	Expert panel consultation	24.03.2025	60 15
K-SBSAP Monitoring Framework Consultation	Developing state-specific indicators	Monitoring framework inputs; draft state-specific indicators	Consultation workshop	28.02.2025	45
KSBB Board and E-mail Consultations	Strategic review and validation	Finalisation of K-SBSAP	E-mail exchanges, board deliberation	03.05.2025	45
KSBB Participation in External Forums	Broader biodiversity management perspectives	Supplementary insights for strategy refinement	Attendance in external consultations	28.11.2023	50
				09.01.2024	60
				06.05.2024	12
				08.07.2024	12
				11.07.2024	12
Total number of days held, and people consulted				39	4003

Strategic Vision and Policy Alignment

Inspired by the success of countries like Costa Rica, Ecuador, New Zealand and Norway in sustainable biodiversity management, Kerala is to set a model by building the capacity and capability at the local level, focusing on the Biodiversity Management Committees. The strategy is to link them with ABS frameworks, provisions under the Biological Diversity Act 2002 (as Amendment in 2023), incentive mechanisms like Payments for Ecosystem Services (PES), Biodiversity Bonds, Green credits, farm tourism and eco-tourism programmes.

Vision-Mission 2035

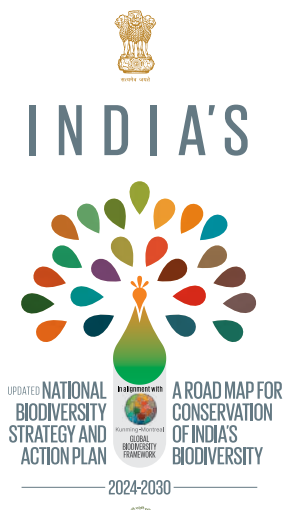


**Most
biodiverse-
friendly State
in India by
2035**

The vision is that the accelerated actions in the next 10-year timeframe by the state of Kerala, a uniquely rich socio-economic and cultural landscape, and one of India's most socially progressive states, will transform into the "Most biodiverse-friendly" state in India by 2035.

Kerala's Commitment to the Global Biodiversity Framework and India's

NBSAP 2024–2030



The Vision-Mission-Action Plan envisaged under this updated K-SBSAP 2025-2035 will help the State reach the 2050 Global Vision of the Convention on Biological Diversity – ‘Living in Harmony with Nature’ and achieve the KM-GBF’s 23 global targets. The Plan ensures vertical and horizontal integration of the priorities from local to national levels described in India’s NBSAP (2024–2030).

Kerala State Biodiversity Board will facilitate collaboration with Global Platforms like CBD, IPBES, UNEP, UNESCO, the Satoyama Initiative and IUCN for accessing and providing the necessary tools and strategic solutions to the key stakeholders for executing the K-SBSAP 2035. The guiding force and plan are the National Biodiversity Authority and the 2030 National Biodiversity Strategy and Action Plan.

Theory of Change: A “5-P” approach boosts the Integrated Biodiversity Management

KSBB’s two decades of experience and learning gained over the years prove that integrated biodiversity management and a whole-of-societal approach will be effective if there are coordinated actions between a 5-Ps Group. The 5 Ps are ‘People’ (farmers, fishermen, manufacturers, workers, healers, artisans, miners, Indigenous Peoples), ‘Panchayats’ (LSGs, Biodiversity Management Committees), ‘Promoters’ (experts, citizen groups, journalists, religious leaders, celebrities), ‘Private and Public industries’ (companies and enterprises utilising traditional knowledge for biodiversity-based products), and ‘Policymakers’ (Concerned Government officials, ministers, political leaders). The ‘5-P’ partnership approach, focusing on the Key Biodiversity Targets and Resource Mobilisation, can effectively lead to integrated biodiversity management in the state and achieve the envisaged goals and targets. (Fig.1.).

By adopting sustainable practices, reducing biodiversity threats, and enhancing livelihoods through benefit-sharing, the 5-P communities can foster an inclusive biodiversity management strategy, conserve biological resources, and strengthen institutional frameworks and policies, ultimately benefiting the local communities while contributing to global biodiversity goals.

Core Strategy: People-Led Biodiversity Management

People-Led Biodiversity Management with the strong involvement of the BMCs and the 5-P approach is our core strategy. Kerala's Panchayati Raj system, with its community participatory planning framework, combined with the state's impressive achievements in key social SDGs such as education, health, and gender equality, creates a strong foundation for a people-led Biodiversity Management action in the state.

The strategy is to empower BMCs to serve as platforms for involving local communities, including children, women, citizen groups, tribal and other marginalised groups, in biodiversity conservation and sustainable use action. As of May 2025, BMCs are operational in 1,200 local self-governments (941 Gram Panchayats, 152 Block Panchayats, 14 District Panchayats, 87 Municipalities, and 6 Corporations) in the state. They are tasked with preparing People's Biodiversity Registers (PBRs), a mandatory requirement to document local biodiversity resources, traditional knowledge, and conservation practices, and use this information for developing the Local Biodiversity Strategy and Action Plan (LBSAP). Kerala has taken the lead in preparing PBRs and LBSAPs across most of its local bodies in the country.

The Implementation Plan envisages collective action by leveraging the power of the existing academic and governance institutions to support BMC. The current plan identified 64 organisations/departments that have different levels of stake in sustainable biodiversity management.

The Key strategic pillars include:

- Leveraging Kerala's decentralised governance system and empowering BMCs
- Strengthening science-policy – society linkages through institutional partnerships and promoting inclusive and gender-responsive governance through the KSBB-She-Bio Strategy
- Embedding biodiversity safeguards into spatial planning, infrastructure development, and climate adaptation and resilience building
- Mobilising innovative financing through Access and Benefit Sharing mechanisms, CSR/CER funds, and green budgeting and other appropriate fundraising opportunities
- Monitoring, Evaluation and Reporting through the State's Environment-Biodiversity Management Steering Committee and the State Biodiversity Board

KERALA STATE BIODIVERSITY 2035 STRATEGY & ACTION PLAN

Our Strategy

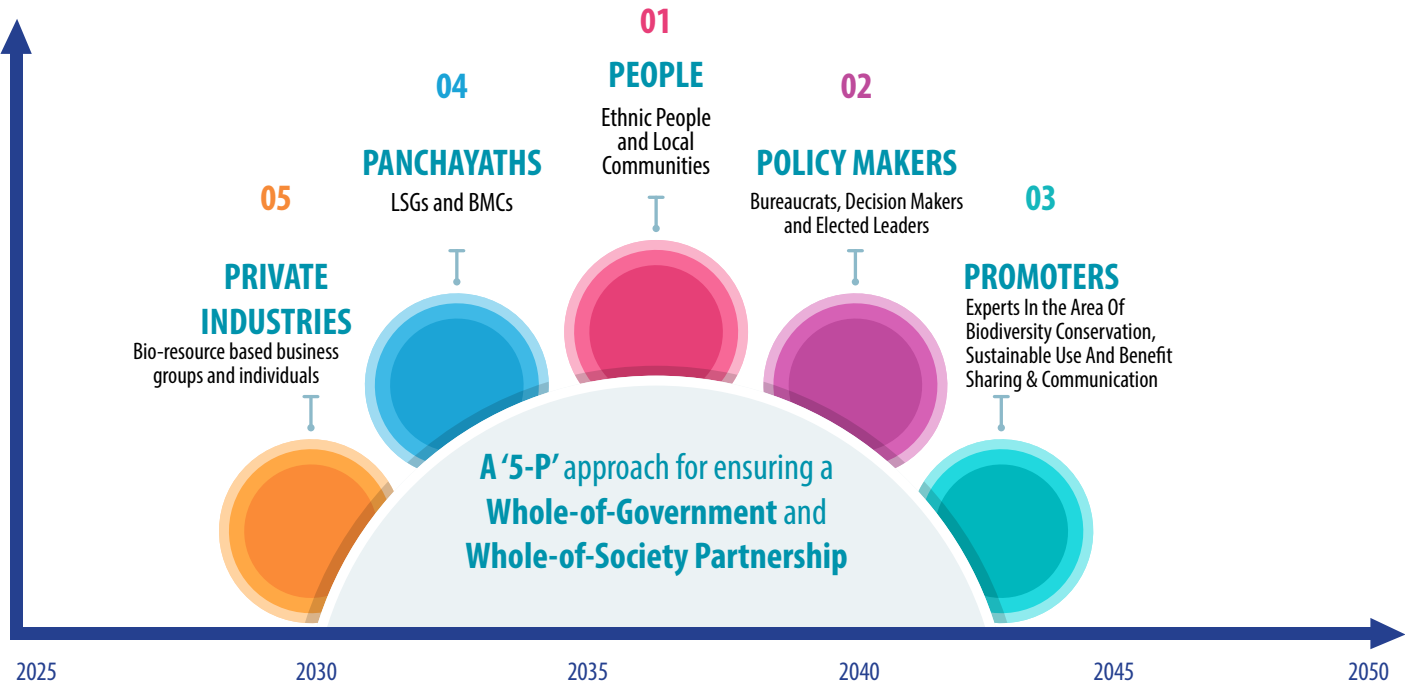
People-led **GENDER RESPONSIVE** Sustainable Biodiversity Management Action

People-led Gender-responsive Biodiversity Management Action is our strategy by fostering a whole-of-government and whole-of-society approach, leveraging the power of Kerala's Local Self-Governance Institutions. Streamlined eight Key Areas of Biodiversity Targets (KABT),

which together carry 80 Key Biodiversity Action Targets (Fig.6.)for intervention, encompassing four Mainstream Biodiversity Areas (MBAs) and four

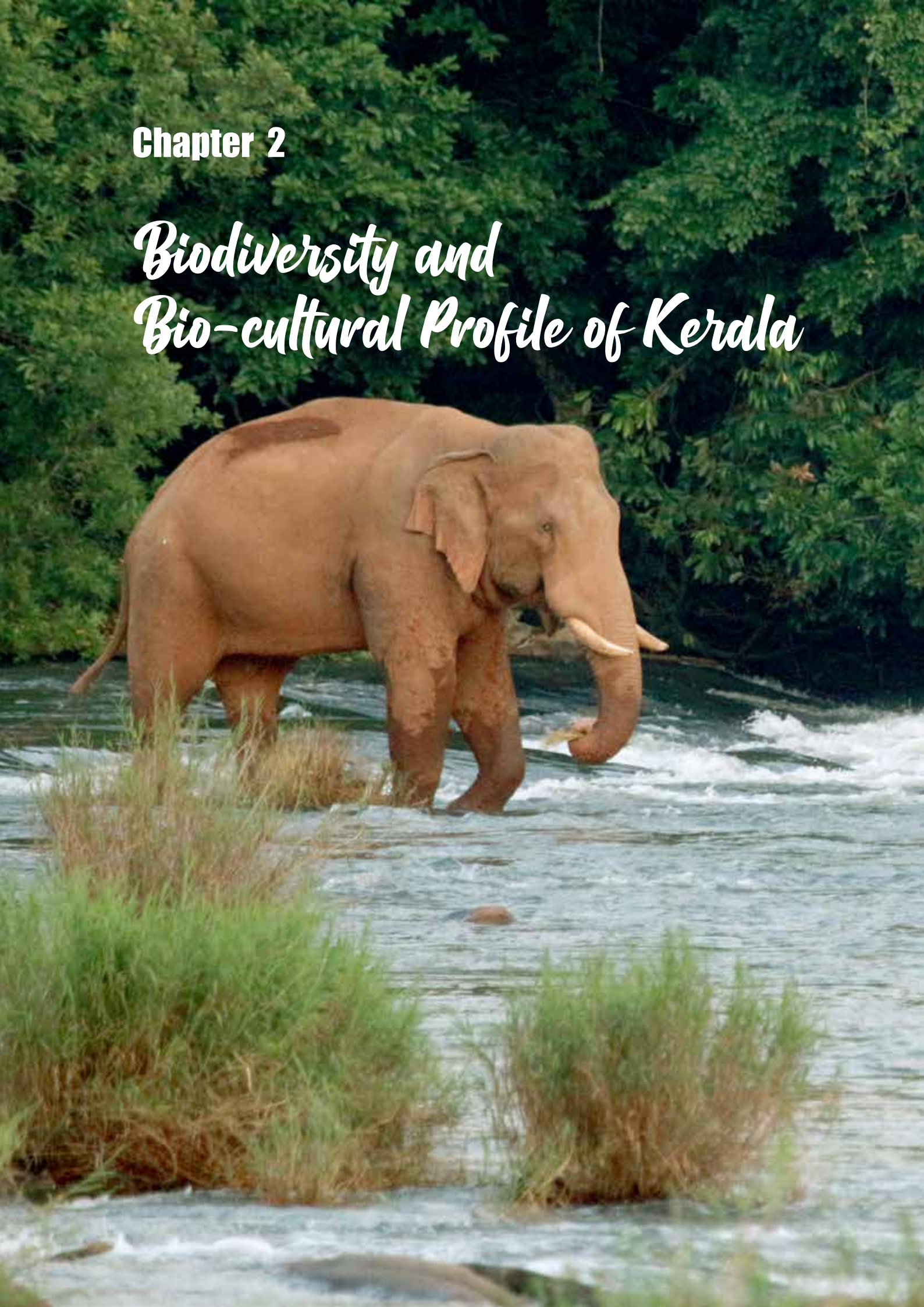
cross-cutting Social Environmental Areas (SEAS) in line with India’s updated National Biodiversity Strategy and Action Plan 2024-2030.

Fig. 1. Matrix of Integrated Biodiversity Management and a 5-P coalition



Chapter 2

Biodiversity and Bio-cultural Profile of Kerala



Kerala, nestled along the southwestern coast of India and spanning the Western Ghats biodiversity hotspot, harbours an extraordinary wealth of ecological and bio-cultural diversity. Despite its ecological abundance, Kerala faces mounting conservation challenges, including habitat fragmentation, invasive species, climate variability, and socio-economic pressures, that threaten the integrity of its ecosystems and the well-being of its communities.

An indicative profile of the state's biodiversity, emphasising its ecological zones, species richness, the ecosystem services, and cultural diversity, is provided under the following eight key thematic components:

- ***Ecological Zones and Habitat Diversity:*** An overview of Kerala's five agro-ecological zones and their associated ecosystems, from coastal plains to montane forests (Map 4).
- ***Ecosystem Services and Natural Capital:*** A valuation of the provisioning, regulating, supporting, and cultural services provided by Kerala's diverse ecosystems.
- ***Threats and Pressures on Biodiversity:*** An analysis of anthropogenic and ecological drivers of biodiversity loss, including land-use change, climate impacts, and invasive species.
- ***Species Richness and Endemism:*** A detailed account of Kerala's flora and fauna, highlighting endemic, threatened, and culturally significant species.
- ***Wild Plant and Animal Diversity:*** Documentation of key taxa such as medicinal plants, orchids, mushrooms, mammals, butterflies, and freshwater fish.
- ***Coastal and Marine Biodiversity:*** Insights into marine mammals, reptiles, ornamental fish, and coastal ecosystems like mangroves and estuaries.
- ***Agrobiodiversity:*** A profile of Kerala's traditional crop varieties, wild relatives, and spice diversity, underscoring their role in food security and climate resilience.
- ***Bio-cultural Diversity and Indigenous Knowledge:*** Exploration of the deep-rooted connections between tribal communities and biodiversity, emphasizing traditional knowledge systems and participatory conservation.



Ecological Zones and Habitat Diversity

Kerala's ecological diversity is shaped by its unique physiography, stretching from the Arabian Sea coast to the crest of the Western Ghats. The state encompasses five major agro-ecological zones: coastal plains, midland laterites, foothills, high ranges, and the Palakkad plains—each supporting distinct ecosystems and land-use patterns (Bastin *et al.*, 2022). These zones host a wide range of habitats, including tropical wet evergreen forests, moist and dry deciduous forests, montane shola-grassland complexes, mangroves, estuaries, riverine systems, and backwaters (Gadgil *et al.*, 2011). The Western Ghats, a UNESCO World Heritage Site, form the ecological backbone of the state and are home to numerous endemics and threatened species. Kerala's wetlands and backwaters (Map 7), such as Vembanad and Sasthamkotta, are Ramsar sites that support rich aquatic biodiversity and migratory bird populations (Narayanan & Latha, 2024). The sacred groves (Kavus) and home gardens represent culturally embedded conservation systems that preserve native flora and agrobiodiversity. Despite its ecological wealth, Kerala faces increasing pressure from land-use change, urbanisation, and climate variability, making the protection of these diverse habitats a conservation priority (Samuel & Gopakumar, 2022).

Ecosystem Services and Natural Capital

Kerala's ecosystems—ranging from tropical forests and wetlands to coastal and marine systems—provide a wide array of ecosystem services that are vital to the state's economy, health,

and cultural identity. These services include provisioning services such as food, freshwater, timber, and medicinal plants; regulating services like climate moderation, flood control, and water purification; supporting services such as nutrient cycling and soil formation; and cultural services that encompass spiritual, recreational, and aesthetic values (Kerala Forest Department, 2024). The Western Ghats forests are critical natural capital assets, delivering high-value services that sustain livelihoods and biodiversity. A recent valuation study using the Millennium Ecosystem Assessment framework in Kerala's moist deciduous forests highlighted the significant but often overlooked economic contribution of these ecosystems to human well-being and sustainable development (Anitha *et al.*, 2024). However, pressures from land-use change, urbanisation, and climate variability threaten the continued flow of these services. Recognising and integrating the economic value of ecosystem services into planning and policy—through tools like green accounting and payment for ecosystem services (PES)—is essential for long-term ecological and economic resilience (Joshi & Vinod, 2015).

Threats and Pressures on Biodiversity

Kerala's biodiversity, though exceptionally rich, is under mounting pressure from a range of anthropogenic and ecological threats. Habitat loss and fragmentation due to unplanned urbanisation, infrastructure expansion, and land-use change remain the most significant drivers of biodiversity decline (SPB Kerala, 2017). The Western Ghats, despite being a UNESCO World Heritage Site, have experienced a 35.3%

loss in forest cover between 1920 and 2013 (Reddy *et al.*, 2016), severely impacting endemic and threatened species. Invasive alien species—such as *Mikania micrantha*, *Penaeus vannamei*, and several exotic fish—have disrupted native ecosystems and outcompeted indigenous flora and fauna (KSBB, 2022). Climate change has further intensified pressures, with rising temperatures, erratic monsoons, and extreme weather events increasing the frequency of floods, droughts, and landslides, particularly in ecologically fragile zones (Map 8) like Wayanad and Idukki (Mishra *et al.*, 2018; Martha *et al.*, 2019). Illegal wildlife trade, overharvesting of medicinal plants, and the ornamental fish trade (e.g., the near extinction of the endemic *Sahyadria denisonii*, or “Miss Kerala” fish) also pose serious threats (Kerala Forest Department, 2024). Additionally, weak enforcement of biodiversity protection laws, limited inter-agency coordination, and gaps in community awareness hinder effective conservation. These cumulative pressures underscore the urgent need for integrated, science-based, and community-driven biodiversity governance in the state.

Species Richness and Endemism

Kerala, located within the Western Ghats–Sri Lanka biodiversity hotspot, is one of India’s most ecologically significant states. Although it occupies just 1.18% of the country’s land area, it harbours over 25% of India’s plant species and a substantial share of its vertebrate and marine biodiversity (SPB Kerala, 2017). The state supports more than 5,000 species of flowering plants, including over 1,100 Western Ghats endemic

species and over 900 species of medicinal plants (KSBB, 2023). Kerala also hosts a rich diversity of fungi (650+ mushroom species), and its faunal diversity includes 905 fish, 151 amphibians, 173 reptiles, 500 birds, and 118 mammals. Endemism is particularly high among amphibians (over 85% of Kerala’s species are endemic to the Western Ghats), reptiles (e.g., *Indotestudo travancorica*, *Vijayachelys silvatica*), and butterflies, with over 60 species shared as endemics between the Western Ghats and Sri Lanka (Dinesh *et al.*, 2015; Anto., 2021).

Kerala’s ecosystems span a wide range of habitats, including tropical rainforests, montane shola-grassland complexes, sacred groves, wetlands, estuaries, and coastal rock reefs, many of which support rare, endemic, and threatened species. The state’s agrobiodiversity is equally notable, with traditional home gardens, wild crop relatives, and diverse food systems that contribute to nutrition, livelihoods, and cultural heritage (KSBB, 2023).

However, this biological richness is under increasing threat from land-use change, habitat fragmentation, invasive species, and climate change. Studies show a marked decline in species populations and ecosystem services, particularly in forested and aquatic systems (Jayadevan *et al.*, 2020; Thatte *et al.*, 2020; Raghavan *et al.*, 2016). These trends highlight the urgent need for integrated, landscape-level conservation strategies that combine scientific research, community stewardship, and policy.



Wild Plant Diversity

Medicinal Plants

Kerala harbours over 900 medicinal plant species, of which at least 540 occur in forests, supporting Ayurveda, Siddha, and Unani systems. High-demand species like *Coscinium fenestratum* and *Santalum album* are now endangered due to overharvesting and habitat degradation. Conservation strategies must blend habitat protection, cultivation, and sustainable harvesting to secure this living pharmacopeia.

Wild Tubers and Aroids

Tribal communities in Wayanad and beyond rely on more than 20 edible species of wild Dioscorea and aroids like *Amorphophallus bonocordensis* for nutrition and medicine. These species reflect deep ethnobotanical knowledge but are increasingly threatened by land-use change and habitat loss.

Wild Fruit Plants

With over 180 species, Kerala's wild fruit flora supports food security, nutrition, and rural economies. Endemics like *Garcinia imbertii* and *Syzygium travancoricum* face habitat loss and require urgent *in-situ* and *ex-situ* conservation.

Orchids

Kerala is home to a remarkable diversity of wild orchids, with over 267 species across 72 genera documented from the region. Of these, 130 species are endemic to India, and 72 species—including 2 subspecies and 2 varieties—are endemic to the Western Ghats. Notable rare and endangered species include *Ipseamalabarica*, *Paphiopedilum druryi*, *Vanda wightii*, and *Aenhenrya rotundifolia*. Studies in protected areas like the Aralam Wildlife Sanctuary have shown that epiphytic orchid richness is highest in wet evergreen habitats, with nearly 38% of recorded species being endemic.

Mushrooms

Over 650 mushroom species, including 165 wild edibles, have been documented, especially in moist deciduous and semi-evergreen forests. They offer vital ecological services and are integral to tribal diets. However, misidentification, habitat loss, and lack of documentation pose threats to sustainable use.

NTFPs

Over 420 species contribute to Kerala's non-timber forest economy. Products like honey, wild herbs, and gums support tribal livelihoods but face declining yields due to overexploitation and weak value chains. Sustainable harvesting protocols and value addition are crucial.





 Dr. M Saleem



Bamboo and Rattans

Kerala supports 28 bamboo and 15 cane species, with *Ochlandra* species being culturally and commercially valuable. Overharvesting in forested zones like Aralam calls for propagation strategies and eco-sensitive enterprise development.

Timber Trees

High-value timber species such as *Tectona grandis* and *Dalbergia latifolia* are key to Kerala's wood economy. However, overharvesting and forest fragmentation threaten their regeneration, calling for agroforestry and sustainable yield management.

Trees Outside Forests

Kerala's 164 commonly found tree species—many of them culturally and ecologically vital—populate home gardens, sacred groves, and roadside avenues. Their contribution to carbon sequestration, biodiversity, and traditional knowledge systems is immense but now under threat

from urbanisation and the decline of sacred groves.

Invasive Alien Species

At least 75 invasive plants disrupt Kerala's native ecosystems, including *Lantana*, *Chromolaena*, and *Parthenium*. These species hinder regeneration, threaten agriculture, and demand sustained monitoring, biocontrol, and regulatory enforcement.

Lower Group of Plants

Kerala hosts around 800 bryophyte taxa—548 mosses, 191 liverworts, and 11 hornworts, with about 60 endemic species. Despite their ecological importance, bryophytes are largely ignored in policy and conservation planning. Major threats include habitat loss, pollution, unsustainable collection, invasive species, and climate change, compounded by limited data and awareness. Over 25 new species have been described since 2000, highlighting Kerala's underexplored bryophyte diversity.



BHS

Kerala- a Hotspot of Bryophytes Diversity

Over the past 25 years, Kerala has emerged as a significant hotspot for bryophyte discovery, with more than 25 new species described between 2000 and 2025. These include mosses, liverworts, and hornworts found across diverse habitats—from sacred groves and protected areas to urban landscapes. Many of these species, such as *Fissidens kammadensis*, *Riccia keralensis*, and *Acidodontium indicum*, are endemic and highlight the ecological uniqueness and underexplored richness of the region's bryoflora. Their discovery underscores the urgent need for systematic documentation, habitat protection, and integration of bryophytes into Kerala's biodiversity conservation agenda.

Dr Manju C. Nair (Associate Professor of Botany) 2025 (Personal Communication to KSBB)

Threatened Flora (IUCN)

At least 495 plant species in Kerala are listed under IUCN threat categories, including 151 trees. Overharvesting, deforestation, and climate stress threaten taxa like *Hopea erosa* and *Memecylon subramanii*. Conservation measures must prioritize hyper-endemics and improve monitoring frameworks.

Animal Diversity

Mammals

Kerala is home to 133 species of mammals across 38 families, including 14 endemics to the Western Ghats and one species endemic to the state itself. These range from iconic megafauna like the Asian Elephant, Tiger, and Lion-tailed Macaque, to elusive species such as the Malabar Civet and Salim Ali's Fruit Bat. Thirty species are listed as threatened under the IUCN Red List, and over 70 are protected under the Wildlife (Protection) Act, 1972. Kerala's mammals inhabit diverse ecosystems—from montane grasslands and rainforests to mangroves and coastal plains—but face mounting threats from habitat fragmentation, road mortality, and illegal trade. Conservation priorities include habitat connectivity, species recovery plans, and community-based coexistence strategies

Butterflies

With 328 species, Kerala hosts the highest butterfly diversity in the Western Ghats, including 31 endemics and 19 IUCN-listed taxa. Silent Valley alone supports 290 species. Conservation efforts must counteract habitat degradation and pesticide use.

Freshwater Fish

Kerala's inland waters support about 200 freshwater fish species—many endemic and microhabitat-specialized. Taxa like *Tor remadevii* and *Pangio bhujia* face habitat loss and pollution. Urgent reassessment of ecological baselines is needed to guide riverine conservation.





Amazing diversity of Fresh water fish in Kerala

Kerala is home to an exceptionally rich and diverse freshwater fish fauna. With over 200 documented species, many of which are endemic, the state's rivers, streams, wetlands, and backwaters form a dynamic mosaic of habitats that support this diversity. Notable ichthyologists, particularly Dr. Mathews Plamoottil, have significantly expanded the taxonomic understanding of Kerala's freshwater fishes in recent years.

The state's ichthyofauna includes a wide range of cyprinids, catfishes, spiny eels, and barbs, with several species newly described from specific river systems such as the Manimala, Pamba, Bhavani, and Chaliyar. Examples include the Travancore Black stinging catfish (*Heteropneustes fuscus*), Kerala Beauty (*Hypseleobarbus nitidus*), and Opsarius cyanochlorus, among others.

This growing list of discoveries reflects both the biological richness and the urgent need for conservation. Habitat degradation, pollution, invasive species, and unregulated development pose serious threats to these fragile aquatic systems. Sustained taxonomic research, habitat protection, and community-based conservation are essential to safeguard Kerala's freshwater biodiversity for future generations.

Freshwater Prawns of the Genus Macrobrachium

The genus *Macrobrachium*, a member of the family Palaemonidae, represents a highly diverse group of freshwater prawns distributed across tropical and subtropical regions worldwide. To date, a total of 28 species of *Macrobrachium* have been recorded from the inland and coastal waters of Kerala.

Caecilians

Thirteen caecilian species—cryptic, limbless amphibians—occur in Kerala, many of them endemic. Limited data, taxonomic ambiguity, and habitat conversion hinder their conservation despite their crucial role in soil ecosystems.

Snakes

Kerala's 111 snake species include 27 Western Ghats endemics and several threatened taxa like the King Cobra (*Ophiophagus hannah*). Major threats include habitat fragmentation, road mortality, and illegal trade, requiring coordinated awareness and protection measures.



 Ramachandran Kotharambath



 Prof. S. D. Biju



 Dr. Linda John



 Dr. V. Unnikrishnan

Birds

Over 500 bird species, including 64 threatened taxa such as Nilgiri Laughingthrush and vultures, inhabit Kerala's forests and wetlands. Wetland degradation and forest fragmentation are major concerns, underscoring the need for robust IBA protection and ecological restoration (Map 2).

Migratory Birds

Over 90 migratory bird species visit Kerala's wetlands annually via the Central Asian Flyway. Sites like Vembanad-Kole support declining populations of shorebirds and ducks. Wetland protection and international cooperation are essential.

EDGE Amphibians

Kerala's unique amphibians—like the Purple Frog and Dancing Frogs—are globally irreplaceable evolutionary relics. Their survival depends on forest stream protection and climate-adaptive conservation.

CMS-listed Species

Kerala's coastal and inland habitats support CMS Appendix I and II species including whales, turtles, migratory shorebirds, and dolphins. Their conservation highlights Kerala's responsibility in sustaining transboundary species migrations.

Threatened Fauna (IUCN)

At least 30 mammals, 35 fish, 54 reptiles, and numerous invertebrates in Kerala face extinction risk. Species like the Lion-tailed Macaque, Dugong, and Purple Frog exemplify the region's need for targeted recovery programmes and habitat integrity.

Coastal and Marine Biodiversity

Marine Mammals

At least 22 species, including Blue Whales, Dolphins, and Dugongs, inhabit Kerala's offshore waters. Bycatch, noise pollution, and habitat degradation pose serious threats, requiring protected areas and fisher engagement.

Marine Reptiles

Four sea turtles and 12 sea snake species occur along Kerala's coast. Olive Ridley turtles frequently nest, while Hawksbills and Leatherbacks migrate offshore. Conservation hinges on beach protection, bycatch mitigation, and public awareness.

Marine Fish

Kerala's marine zone harbors 468 fish species across pelagic, demersal, and reef zones. Shark and ray populations face steep declines from overfishing, demanding species-specific management and trade regulation.

Marine Ornamental Fish

With 117 species, Kerala's reef and rocky coastlines support an internationally traded ornamental fishery. Unsustainable harvest threatens these fragile populations; regulation and habitat stewardship are imperative.

Commercial Marine and Coastal Species

Species such as shrimp, mackerel, green mussels, and clams sustain over a million livelihoods. Continued exploitation, however, raises ecological risks, calling for adaptive fisheries management and habitat restoration.

Brackish water Fish and Shellfish

Species like *Etroplus suratensis* (Karimeen), Asian seabass, mud crabs, and mussels are vital to Kerala's aquaculture sector. Integrated farming and disease-resistant broodstock development enhance sustainability and climate resilience.



Seaweeds

Over 147 seaweed taxa, with 42 of economic value, are found along Kerala's coast. Their role in food, fertilizer, and bio-industries is expanding, but demand needs to be matched with sustainable harvesting and mariculture.

Mangroves

Kerala's mangroves, once over 700 sq. km, now cover less than 18 sq. km. These habitats stabilize coasts and support 2,359 faunal species. Restoration, community stewardship, and buffer zoning are critical to halt further decline (Map 9).



Agrobiodiversity

Agricultural Crop Diversity

Kerala's multi-crop systems include cereals, millets, legumes, vegetables, fruits, tubers, and oilseeds. Traditional landraces like Navara rice and Aryan cassava face erosion from climate stress and monoculture expansion. Farmer-led seed conservation and value addition are key strategies.

Banana Cultivar Diversity

Kerala hosts over 400 banana cultivars, including landraces like Kunnan, Poovan, and WayanadanNendran. These varieties face threats from pests and BBTV yet offer genetic resources for climate-resilient horticulture and food sovereignty.

Wild and Traditional Spices Diversity

Home to global spice icons like black pepper, turmeric, and cinnamon, Kerala also preserves wild relatives like *Piper barberi* and *Curcuma nilamburensis*. Conservation of these gene pools is vital for breeding, bioprospecting, and cultural resilience.

Wild Relatives of Cultivated Crops (CWRs)

Kerala's forests are natural reservoirs of crop wild relatives for pepper, turmeric, cardamom, rice, and yams. Yams, particularly *Dioscorea* species such as *D. belophylla*, *D. pentaphylla*, *D. hamiltonii*, and *D. oppositifolia*, are a staple food for the majority of tribal communities in the Kerala region of the Western

Ghats (Balakrishnan *et al.*, 2003). Their conservation ensures the future-proofing of agriculture and genetic diversity under changing agro-climatic conditions.

Tribal Community and the Cultural Profile

Kerala's bio-cultural diversity is deeply rooted in the interdependence between its ecological richness and the cultural practices of its indigenous and local communities. The state is home to 36 Scheduled Tribes, including the Paniyan, Irular, Kattunaikan, and Cholanaikkan, who have historically lived in close association with forests, rivers, and agroecosystems of the Western Ghats (Kerala Forest Department, 2024). These communities possess rich Traditional Knowledge Systems (TKS)—including Classical and Oral Health Traditions—that have evolved through generations of observation, experimentation, and spiritual connection with nature (Rajasekharan *et al.*, 2013). Their knowledge spans medicinal plant use, sustainable harvesting, agroecological practices, and biodiversity conservation, forming the backbone of Kerala's Ayurveda and local food systems. Sacred groves (Kavus), home gardens, and ritual festivals are living expressions of this bio-cultural heritage, where ecological stewardship is embedded in cultural identity (SPB Kerala, 2017).

Despite their contributions, these communities face marginalisation and erosion of traditional knowledge due to modernisation, habitat loss, and lack of recognition in formal governance. However, initiatives like Participatory



Forest Management (PFM) and community-based ecotourism have shown promise in empowering forest-dependent communities, enhancing livelihoods, and conserving biodiversity (Alexander *et al.*, 2024). Strengthening the role of indigenous knowledge in environmental governance—through legal recognition, capacity building, and equitable benefit-sharing—is essential for achieving both biodiversity and sustainable development goals (Joshy, 2021)⁵. Kerala's decentralised governance model offers a strong platform to integrate these knowledge systems into local biodiversity planning and climate resilience strategies.

Cholanaickan, Kattunayakan and Kadar, face acute risks to their cultural and demographic viability. Meanwhile, heritage-rich communities like the Kurichiyans and Kattunayakans strive to balance traditional lifeways with changing economic and policy contexts. Government departments, cooperatives, and NGOs have made progress in housing, health, and education, yet challenges remain in ensuring culturally appropriate, sustainable, and rights-based development.

There is an urgent need to establish measurable and equitable benefit-sharing mechanisms that acknowledge these communities' role in ecosystem conservation, climate resilience, and agrobiodiversity preservation. Integrating their knowledge into mainstream conservation planning, ensuring fair access to biological resources under the Biological Diversity Act 2002 (as Amendment in 2023), and building capacity for participatory governance are critical next steps.

The Particularly Vulnerable Tribal Groups (PVTGs), such as the



Chapter 3

Institutional Framework and Governance



The key institutions, governance structures, and legal provisions that support biodiversity conservation in Kerala were identified and listed. The roles of KSBB, BMCs, and Local Self-Governments are described, while also examining coordination mechanisms and the broader stakeholder ecosystem. A brief analysis is provided of the strengths and gaps within the Biological Diversity Act, offering insights into opportunities for more effective and inclusive governance.

Responsible Organisations for Implementation

The implementation of the K-SBSAP 2025–2035 is anchored in a robust, multi-tiered institutional framework that brings together 64 entities—government departments, research institutions, local self-governments, and civil society actors (Table 2 (a to c)). At the core are institutions with direct mandates in biodiversity research, conservation, and governance, including the Kerala State Biodiversity Board, Directorate of Environment and Climate Change, Kerala Forest Department, Kerala Forest Research Institute (KFRI), Kerala Agricultural University, Kerala Veterinary and Animal Sciences University, Kerala Fisheries Department, Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI), State Wetland Authority Kerala, and the State Medicinal Plants Board. These agencies lead efforts in biodiversity documentation, protected area management, ecosystem restoration, and policy development.

Supporting them are institutions with indirect but critical roles—such as ICAR–CMFRI, KUAFOS, the Department of Agriculture, and Kerala State Council for Science, Technology and Environment, which contribute through fisheries, agriculture, climate resilience, and environmental governance.

Kerala's strong Local Self-Government Institutions, supported by the Kerala Institute of Local Administration (KILA), MGNREGS, and the State Planning Board, serve as the operational backbone for decentralised biodiversity action. These institutions facilitate the preparation of LBSAPs, mobilise community participation, and ensure convergence across sectors and schemes.

Civil society organisations and NGOs also play a vital enabling role in the K-SBSAP ecosystem. Institutions such as the M. S. Swaminathan Research Foundation, ATREE, WWF-Kerala, Centre for Innovation in Science and Social Action, Thanal, We Grow Forest Foundation, Peermade Development Society, and many others contribute significantly to the state's biodiversity conservation and sustainable management through grassroots conservation, agrobiodiversity stewardship, environmental education, and community-based restoration.

Table 2 (a to c): Institutions/Departments relevant for Biodiversity Conservation and Mainstreaming

(a) Direct Relevance to Biodiversity: These institutions are directly involved in biodiversity research, conservation, governance, or sustainable use

Biodiversity Research & Conservation	1.	Kerala State Biodiversity Board	KSBB
	2.	Kerala Forests Department	KFD
	3.	Zoological Survey of India, Calicut	ZSI
	4.	Regional Centre of Botanical Survey of India	BSI
	5.	Jawaharlal Nehru Tropical Botanic Garden	JNTBGRI
	6.	Malabar Botanic Garden and Institute for Plant Sciences	MBGIPS
	7.	Kerala Forest Research Institute	KFRI
	8.	State Wetland Authority Kerala	SWAK
	9.	Kerala Agriculture University	KAU
	10.	Kerala Veterinary and Animal Sciences University	KVASU
	11.	ICAR–CMFRI	ICAR–CMFRI
	12.	ICAR–CIFT	ICAR–CIFT
	13.	ICAR–NBFGR	ICAR–NBFGR
	14.	Eco-Development Committees and VSSs	EDCs & VSSs
	15.	Vembanad Lake Conservation Authority / LPFs	VLCA / LPFs
	16.	Tropical Institute of Ecological Sciences	TIES
	17.	Kerala Agricultural University	KAU
	18.	National Bureau of Plant Genetic Resources	NBPGR
	19.	Indian Cardamom Research Institute	ICRI
	20.	ICAR–Indian Institute of Spices Research	ICAR–IISR
	21.	Centre for Tuber Crops Research Institute	CTCRI
	22.	M.S. Swaminathan Research Foundation	MSSRF
	23.	Peermade Development Society	PDS
	24.	WWF-India	WWF
	25.	Ashoka Trust for Research in Ecology and the Environment – CERC	ATREE–CERC
	26.	Thanal, Thiruvananthapuram	-

(b) Indirect Relevance to Biodiversity. These institutions contribute to biodiversity through fisheries, marine ecosystems, agriculture, climate, or environmental governance.

Marine & Fisheries	27.	National Institute of Fisheries Post Harvest Technology	NIFPHATT
	28.	Kerala University of Fisheries and Ocean Studies	KUFOS
	29.	State Medicinal Plants Board	SMPB
	30.	Marine Products Export Development Authority	MPEDA
	31.	Matsyafed	-
	32.	Department of Fisheries, Government of Kerala	-
	33.	Department of Aquatic Biology and Fisheries, Kerala University	-
	34.	Department of Marine Sciences, CUSAT	-
	35.	Centre for Marine Living Resources and Ecology	CMLRE
	36.	Council of Scientific and Industrial Research – NIO	CSIR–NIO
Agriculture & Environment	37.	Department of Agricultural Development and Farmers Welfare	-
	38.	Department of Soil Survey & Soil Conservation	-
	39.	Spices Board	-
	40.	State Horticulture Mission	SHM
	41.	Kerala State Council for Science, Technology and Environment	KSCSTE
	42.	Kerala State Remote Sensing & Environment Centre	KSREC
	43.	Pollution Control Board	PCB
	44.	Department of Environment and Climate Change	DoECC
	45.	Institute of Climate Change Studies	ICCS
	46.	CSIR–NIIST	CSIR–NIIST

(c) Enabling Relevance: These institutions are governance, infrastructure, education, or development bodies that influence biodiversity indirectly through policy, planning, or community engagement.

Governance & Development	47.	Department of Forest and Wildlife	-
	48.	Department of Tourism	-
	49.	Rural Development Department	-
	50.	Urban Affairs Department	-
	51.	Director of Panchayats, LSGD	-
	52.	Mahatma Gandhi NREGA State Mission	MGNREGA
	53.	Kerala Institute of Local Administration	KILA
	54.	Kerala Water Authority	KWA
	55.	Kerala Irrigation Department	-
	56.	Department of Mining and Geology	-
	57.	Department of Industries and Commerce	-
	58.	Kerala Institute for Research Training and Development Studies of SC/ST	KIRTADS
	59.	Department of General Education	-
	60.	Department of Health and Family Welfare	-
	61.	Department of Ayush	-
	62.	Haritha Keralam Mission	-
	63.	Rajiv Gandhi Centre for Biotechnology	RGCB
	64.	National Centre for Earth Science	NCESS

Role of the Kerala State Biodiversity Board

The Kerala State Biodiversity Board, a statutory organization established under Section 22(1) of the Biological Diversity Act, 2002, and governed by the Kerala Biological Diversity Rules, 2008 and functioning under the State Environment Department, will be the nodal agency for implementing the K-SBSAP 2025-2035. KSBB is supported by a high-level Steering Committee, a Virtual Biodiversity Cadre across 28 departments, and District Biodiversity Coordination Committees (DBCCs) to ensure convergence and implementation at all levels. Its leadership team, comprising the Chairperson, Member Secretary, and expert members, is backed by a multidisciplinary implementation team operating at both state and district levels. Additionally, every district has a technical support group (TSG) constituted by involving experts from different sectors to support DBCC and BMCs in various capacities to address matters related to the conservation and sustainable management of Biodiversity.

KSBB works in close coordination with Local Self Governments, BMCs, and sectoral departments to mainstream biodiversity into development planning and ensure fair and equitable benefit sharing. For the implementation of the K-SBSAP 2025-2035, the following key governance functions will be performed.

- Advise the State Government and LSGs on biodiversity conservation, sustainable use, and benefit-sharing.
- Regulate access to biological resources and associated traditional knowledge within the state.
- Determine benefit-sharing terms under ABS provisions and facilitate compliance.
- Lead capacity development of BMCs and support the preparation and application of PBRs
- Coordinate with the NBA for reporting, policy alignment, and regulatory enforcement.
- Facilitate partnerships with national and global platforms to enhance Kerala's visibility and contribution to global biodiversity goals.

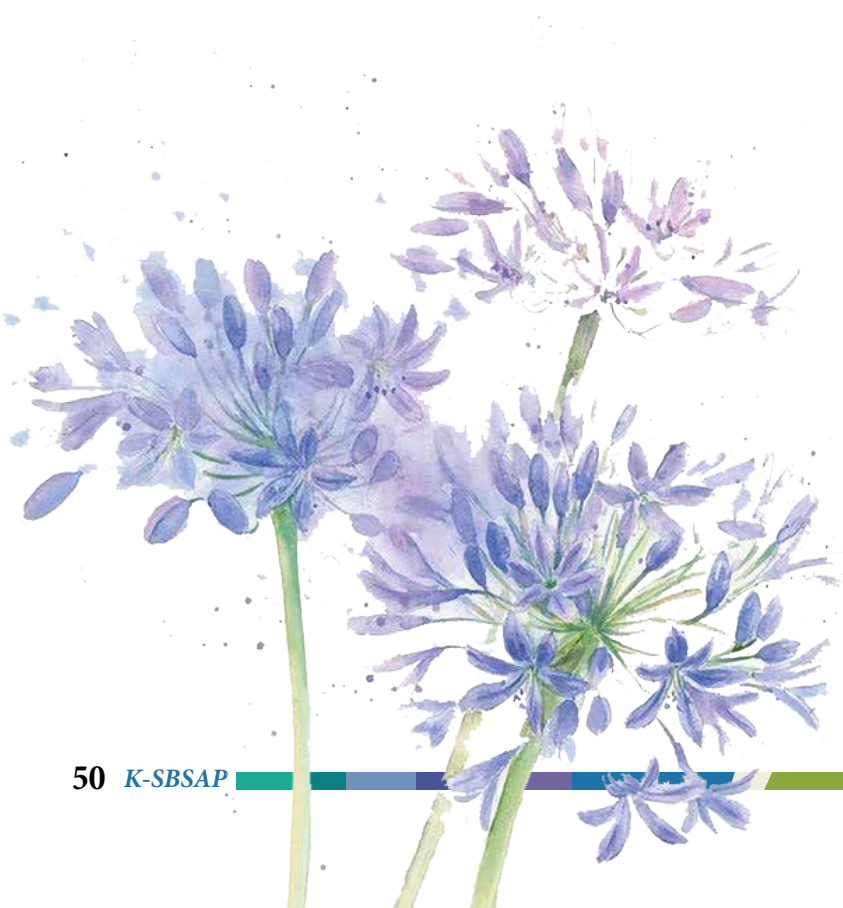


Role of State-Level Steering and Coordination Mechanisms

The Steering committee, notified via G.O. 60/2018/Envt & G.O. 31/2020/Envt, is chaired by the Additional Chief Secretary, Environment Department, and includes senior secretaries from key line departments such as Local Self Government, Forests, Water Resources, Agriculture, Fisheries, Tourism, Animal husbandry, KSCSTE and DoEACC. It serves as the apex interdepartmental platform and will:

- Guide the strategic direction of K-SBSAP implementation
- Facilitate cross-sectoral integration of biodiversity goals
- Review progress and resolve institutional bottlenecks
- Align state actions with national and global biodiversity frameworks

The Steering Committee, which is supported by a Virtual Biodiversity Cadre comprising nodal officers from 28 departments and District Biodiversity Coordination Committees (DBCCs), will ensure decentralised coordination and field-level convergence



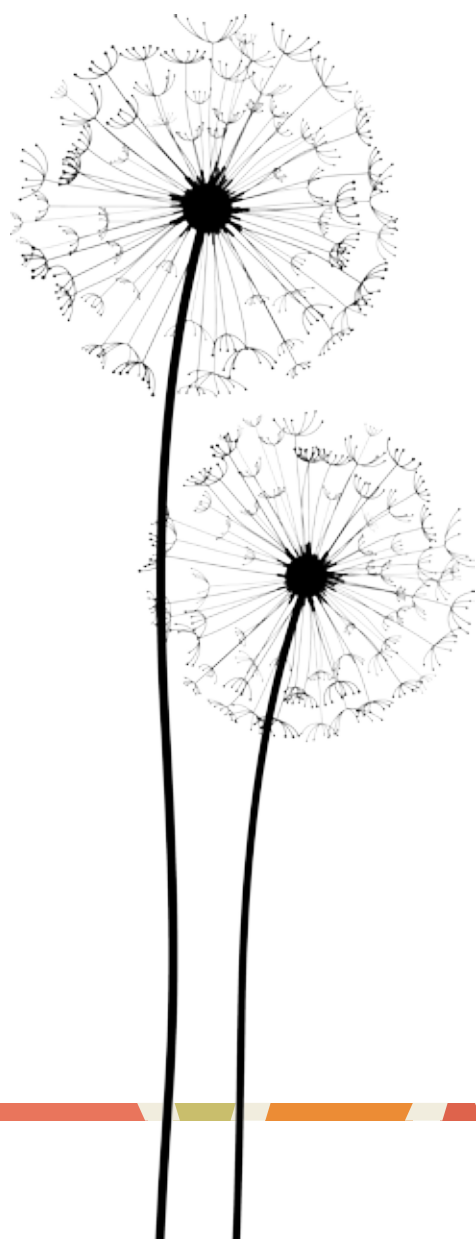
Role of the Biodiversity Management Committees and Local Self-Governments

Since its establishment in 2005, KSBB has played a key role in advancing community-based and inclusive biodiversity conservation. However, like many other State Biodiversity Boards, it continues to face structural limitations, including inadequate core funding, limited staffing, and uneven technical support for decentral implementation. While Kerala's decentralised governance model is strong, many BMCs still require capacity building, and follow-up on tools like PBRs and LBSAPs remains inconsistent. Integration of biodiversity into sectors such as agriculture, infrastructure, and urban planning needs strengthening, and public engagement tends to be event-driven rather than continuous. Data systems for biodiversity monitoring are also fragmented.

Despite persistent challenges, KSBB retains significant potential under the Biological Diversity Act 2002 (as Amendment in 2023). As a statutory body anchored within the Department of Environment, it is uniquely positioned to mobilise institutional support, drive cross-sectoral integration, and scale up decentralised conservation—leveraging its regulatory mandate to translate biodiversity governance into tangible, community-rooted outcomes.

Biodiversity Management Committees, the foundational institutions for decentralised biodiversity governance, are operating in all local bodies, including Grama Panchayats, Municipalities, Corporations, Block Panchayats, and District Panchayats. KSBB will continue to build the capacity of BMCs and LSGs through training, technical handholding, and digital tools. The concerted action will help BMCs empower, in addition to their routine activities of preparing and maintaining the PBR and LBSAPs, to support the implementation of Access and Benefit Sharing provisions, identify and conserve local heritage sites and endemic species, and promote biodiversity awareness and eco-literacy within communities.

The Local Self-Governments will be capacitated to play a vital enabling role in integrating biodiversity considerations into local development planning, allocating financial resources through Local Biodiversity Funds (LBFs), and facilitating the implementation of Local Biodiversity Strategy and Action Plans.

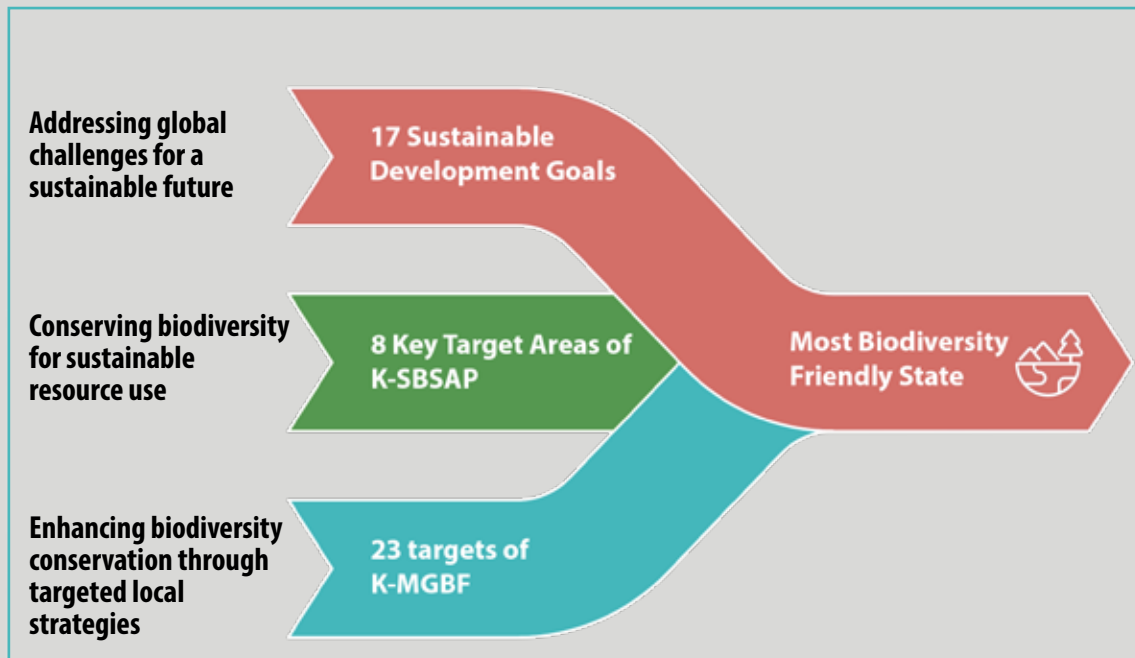


Chapter 4

Objectives, Key Target Areas, and Action Targets



Pathway towards achieving a sustainable future



Guided by the Vision 2035 to make Kerala “*India’s Most Biodiverse-Friendly State*,” the Kerala State Biodiversity Strategy and Action Plan (K-SBSAP) 2025–2035 sets forth an integrated roadmap to conserve, restore, and sustainably manage the state’s rich biological and cultural heritage.

The following eight strategic objectives have been identified for this transformation. Each objective is mapped to one of the K-SBSAP’s Target Areas and contributes directly to the plan’s action targets. Together, they embody Kerala’s commitment to inclusive, ecosystem-based, and community-led biodiversity

governance, ensuring that conservation is not only a policy imperative but a lived reality across landscapes, livelihoods, and institutions.

The objectives are set to advance the “5-P” Theory of Change—mobilizing People, Panchayats, Promoters, Private/Public sectors, and Policymakers—and operationalize nature-based solutions, traditional knowledge systems, and climate resilience strategies. They also reinforce Kerala’s leadership in decentralised biodiversity planning through empowered BMCs, LBSAPs, and gender-responsive implementation via the She-Bio Strategy.

Eight Objectives

Objective 1



To promote inclusive and community-driven conservation strategies to protect and restore forest biodiversity, emphasising habitat preservation, reforestation, and sustainable forest management. This approach aims to strengthen ecosystem services, support wildlife, and ensure long-term ecological resilience through active stakeholder engagement and traditional knowledge integration.

Objective 2



To establish and operationalize integrated conservation and sustainable management strategies for coastal, marine, and inland ecosystems, assuring the protection of critical habitats such as wetlands, estuaries, mangroves, and freshwater systems, while enhancing biodiversity resilience through participatory governance, ecological restoration, and equitable resource use.

Objective 3



To conserve and sustainably utilise agricultural biodiversity by fostering the cultivation of traditional and local crop varieties, protecting native livestock breeds, promoting ecologically sound farming practices, and advancing agro-ecological research and education—thereby safeguarding genetic diversity, enhancing ecosystem services, and building resilient, climate-adaptive agricultural systems.

Objective 4



To enhance the resilience of livestock systems by promoting the conservation of indigenous breeds, improving animal health and productivity through sustainable practices, ensuring the availability of climate-adapted feed and fodder resources, and integrating biodiversity considerations into animal husbandry practices.

Objective 5



To develop and implement comprehensive policies to address environmental degradation and climate change, focusing on Nature-based climate solutions such as reforestation, wetland restoration, and sustainable agriculture. Promote renewable energy sources, enhance community awareness and participation in climate action, and incorporate biodiversity conservation into climate resilience planning.

Objective 6



To preserve and honour the rich social and cultural diversity of Kerala by promoting inclusive development practices, protecting traditional knowledge and cultural heritage, and fostering community participation in biodiversity conservation efforts. Focus on the bio-cultural diversity of the state wherever possible and support the “particularly vulnerable forest-dwelling tribes”, ensuring their integration into conservation initiatives and development programmes.

Objective 7



To strengthen local governance structures to support sustainable development and biodiversity conservation by fostering a “whole of government” and “whole of society” approach. Empower Panchayats and local bodies to implement and monitor environmental policies and initiatives effectively, ensuring participation from various government departments, civil society, communities, and private sectors to create a unified and coordinated effort that integrates biodiversity considerations with the SDG and Climate Change goals.

Objective 8



Develop and maintain climate-resilient infrastructure systems that support sustainable development while integrating biodiversity safeguards across planning, design, and implementation in urban and rural development.

Eight Target Areas

The objectives will be achieved by working through 8 Key Biodiversity Target Areas encompassing a set of four Mainstream Biodiversity Target Areas (MBTAs) and four cross-cutting Social-Environmental-Production Target Areas (SEPTAs). The

division into four Mainstream Biodiversity Target Areas (MBTAs) and four Social-Environmental-Production Areas (SEPTAs) enables a dual-track approach: one that strengthens core biodiversity outcomes, and another that embeds biodiversity values across climate resilience, cultural heritage, governance, and infrastructure. The Eight Key Biodiversity Target Areas are explicitly mapped to the Kunming-Montreal Global Biodiversity Framework (K-MGBF), demonstrating their contribution to global biodiversity goals and reinforcing Kerala's alignment with international commitments (Fig.3.). Each target is accompanied by clearly defined strategies and implementation approaches to ensure operational feasibility and coherence with the broader policy architecture.

Eighty Action Targets

The eight target areas together carry 80 Biodiversity Action Targets (See list of 80 Targets). 80 Biodiversity Action Targets have been identified based on a calibrated assessment of urgency, strategic importance, scientific rigour, and the depth of participatory engagement embedded in each intervention. The action period are categorized into short-term (0–2 years), medium-term (3–5 years), and long-term (6–7 years) horizons. (Annexure 1, KMGBF aligned indicators Framework).

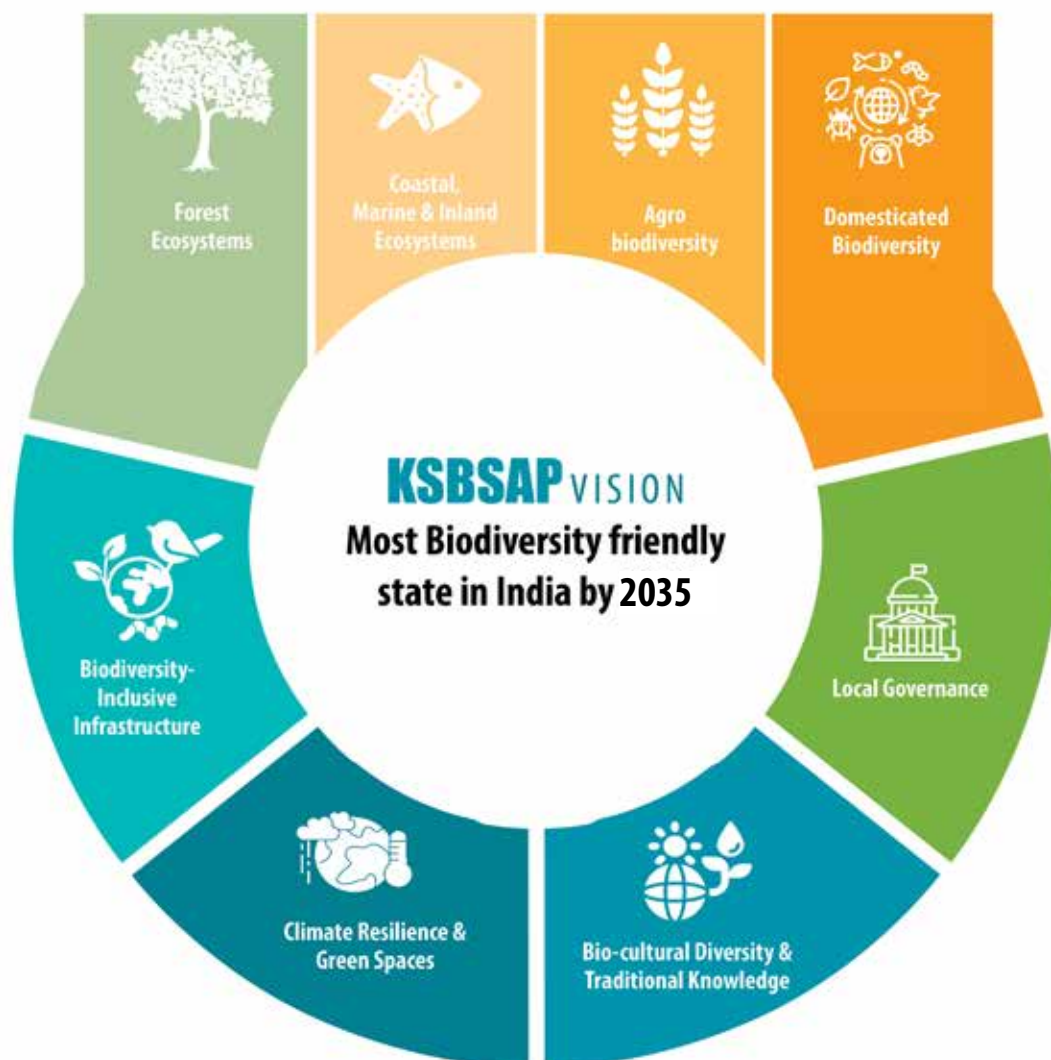


Fig.2. Eight targets area of the K-SBSAP that lead toward the vision of making Kerala India's most biodiversity-friendly state by 2035.

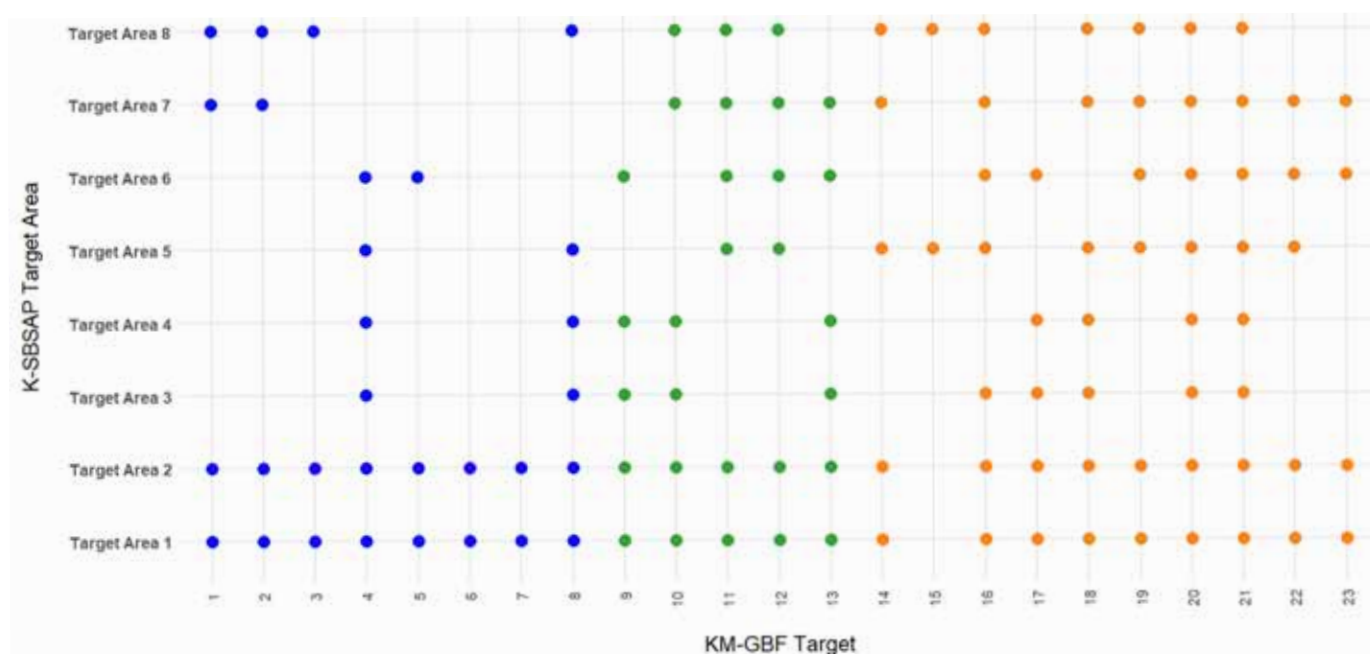


Fig.3. Dot-matrix link map (generated in R/ggplot2) cross-walking Kerala’s K-SBSAP Target Areas (Y-axis) with the 23 KM-GBF targets (X-axis). Dot colours encode KM-GBF categories: blue = Targets 1–8 “Reducing threats”, green = Targets 9–13 “Sustainable use & benefits,” orange = Targets 14–23 “Tools & solutions”. Each dot marks a programmatic linkage; denser clusters indicate multiple/strong alignments and help identify coverage and gaps for reporting.

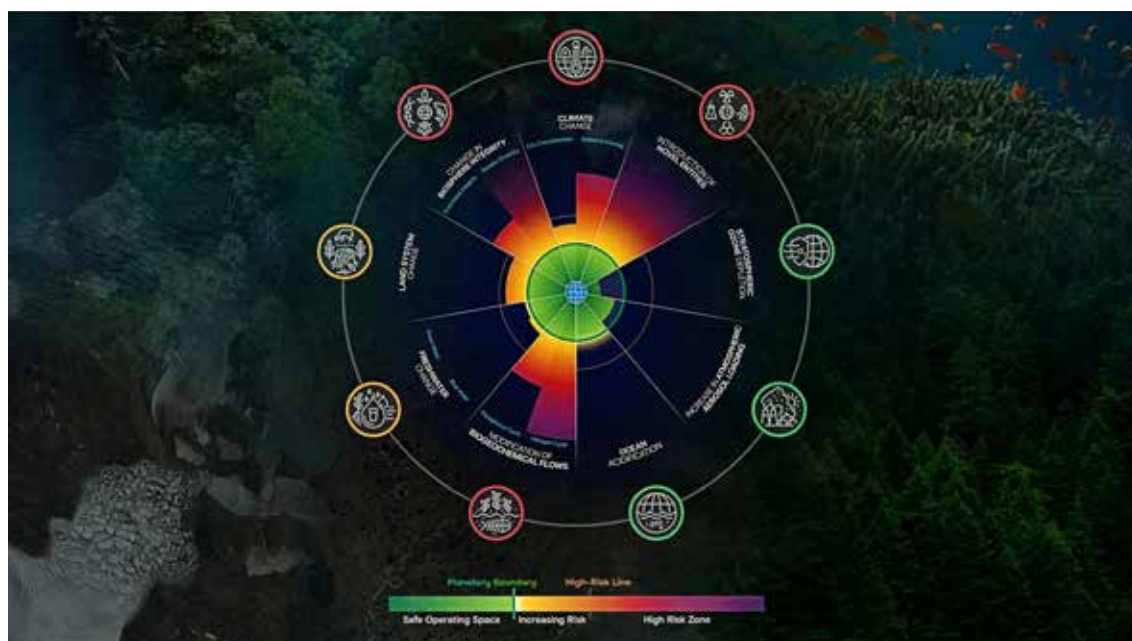


Fig.4. Rockström *et al.* (2023)- The Nine Planetary Boundaries showing that several boundaries, particularly those concerning biodiversity integrity, bio-geo chemical cycles and land-system change, have already been breached, placing global ecosystems under acute stress and heightening the risk of irreversible tipping points. The K-SBSAP’s implementation strategy recognizes the ensures that local actions anchored in its eight integrated target areas contribute meaningfully to a wide spectrum of biodiversity positive outcomes



Fig.5. K-SBSAP 2025 - 2035 Nested Governance Strategy for Biodiversity and the SDGs: This picture echoes the nested approach of the Kerala State Biodiversity Strategy and Action Plan (KSBSAP) 2025–2035, with the central eye envisions Kerala as the most biodiverse-friendly state in India by 2035. Encircling it the innermost conceptual wheel representing KSBSAP’s eight integrated target areas (four mainstream biodiversity domains and four cross-cutting socio-ecological production domains) serves as the operational core. These targets are directly mapped to the 23 action targets of the Kunming-Montreal Global Biodiversity Framework (K-MGBF), forming the central wheel of global biodiversity ambition. Radiating outward, the 17 Sustainable Development Goals (SDGs) form the outermost ring, underscoring how Kerala’s biodiversity stewardship is deeply interwoven with global development priorities.

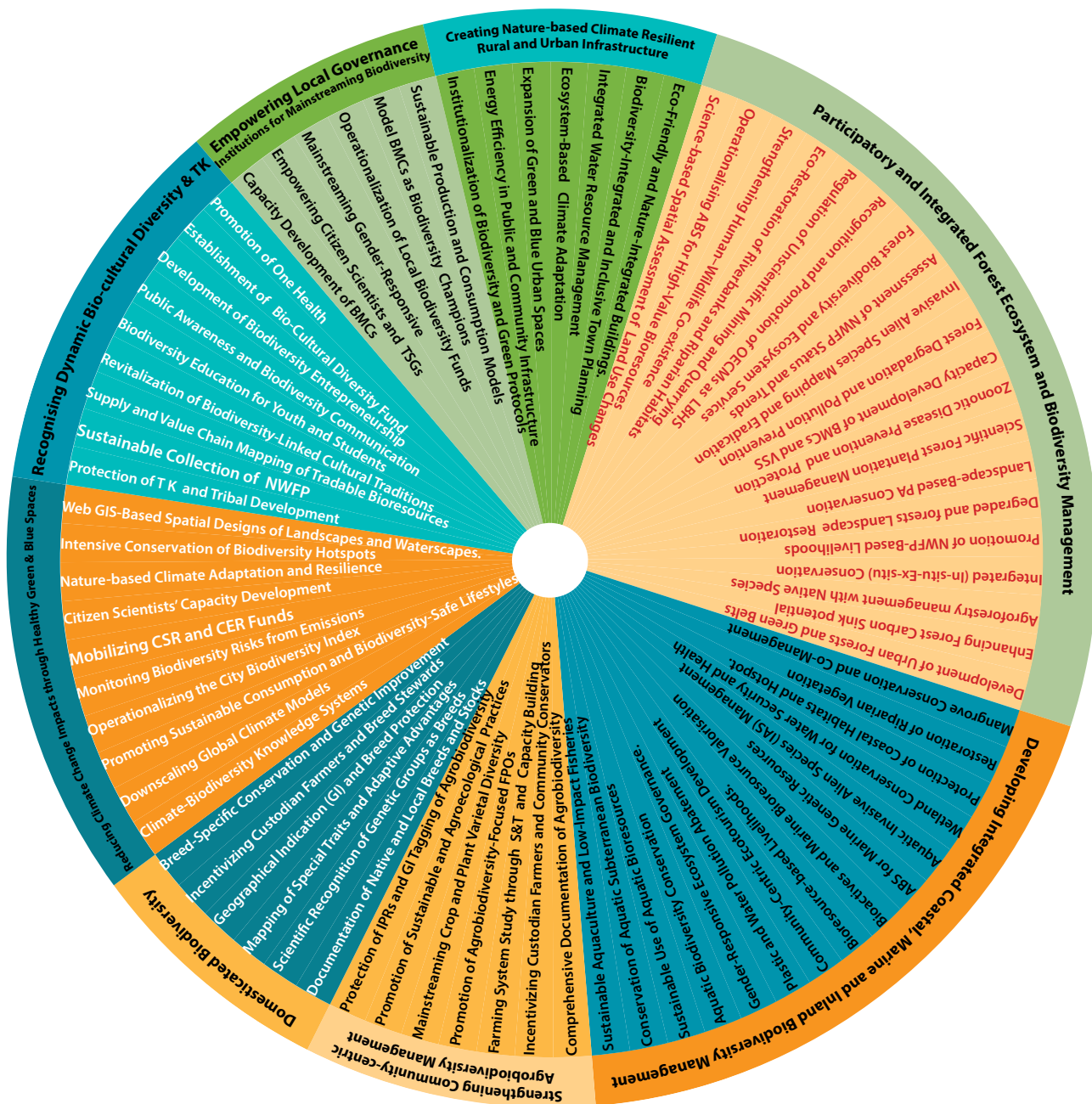


Fig.6 : The combined wheel of the 8 target areas and 80 targets of the K-SBSAP.

K-SBSAP 2025-2035

List of 80 Targets



Mainstream Biodiversity Target Area 1:

Participatory and Integrated Forest Ecosystem and Biodiversity Management

Short - Term Actions (0–2 Years)

1. Science-based Spatial Assessment of Forest and PA Land Use Changes
2. Operationalising ABS for High-Value Timber and Bioresources
3. Strengthening Human–Wildlife Co-existence
4. Eco-Restoration of Riverbanks and Riparian Habitats
5. Regulation of Unscientific Mining and Quarrying
6. Recognition and Promotion of OECMs as Local Biodiversity Heritage Sites (LBHS)
7. Forest Biodiversity Conservation and Ecosystem Services Documentation
8. Assessment of NWFP Status and Trends
9. Invasive Alien Species Mapping and Eradication Planning
10. Forest Degradation and Pollution Prevention
11. Capacity Development of BMCs and VSS
12. Zoonotic Disease Prevention and Crop Protection

Medium - Term Actions (3–5 Years)

Scientific Forest Plantation Management

13. Landscape-Based PA Conservation
14. Landscape-Level Restoration of Degraded Forest Ecosystems
15. Promotion of NWFP-Based Livelihoods
16. Integrated (*In-situ-Ex-situ*) Conservation of RET Species
17. Agroforestry management with Native Species of multiple uses

Long -Term Actions (6–10 Years)

18. Enhancing Forest Carbon Sink potential
19. Development of Urban Forests and Green Belts



Mainstream Biodiversity Target Area 2:

Developing Integrated Coastal, Marine and Inland Biodiversity Management

Short-Term Actions (0–2 Years)

20. Mangrove Ecosystem Conservation and Co-Management
21. Restoration of Riparian Vegetation
22. Protection of Coastal Habitats and Biodiversity Hotspots.

23. Wetland Conservation for Water Security and Health
24. Aquatic Invasive Alien Species (IAS) Management
25. Operationalising ABS for Marine Genetic Resources
27. Bioactive Compounds and Marine Bioresource Valorisation
28. Bioresource-based Livelihood Promotion.
29. Community-Centric Ecotourism Development
30. Plastic and Water Pollution Abatement
31. Gender-Responsive Ecosystem Governance.

Medium-Term Actions (3–5 Years)

32. Aquatic Biodiversity Conservation from Catchment to Coast
33. Sustainable Use of Aquatic Bioresources and Fish Diversity

Long-Term Actions (6–10 Years)

34. Conservation of Aquatic Subterranean Biodiversity
35. Sustainable Aquaculture and Low- Impact Fisheries



Mainstream Biodiversity Target Area 3:

Strengthening Community - Centric Agrobiodiversity Management

Short-Term Actions (0–2 Years)

36. Comprehensive Documentation of Agrobiodiversity
37. Incentivizing Custodian Farmers and Community Conservators
38. Farming System Study through Capacity Building and Application of Science & Technology
39. Promotion of Agrobiodiversity-Focused FPOs

Medium-Term Actions (3–5 Years)

40. Mainstreaming Crop and Plant Varietal Diversity in Government Schemes
41. Promotion of Sustainable and Agroecological Farming Practices

Long-Term Actions (6–10 Years)

42. Protection of IPRs and GI Tagging of Agrobiodiversity Assets



Mainstream Biodiversity Target Area 4:

Domesticated Biodiversity and Animal Husbandry

Short-Term Actions (0–2 Years)

43. Documentation of Native and Local Breeds and Stocks
44. Scientific Recognition of Genetic Groups as Breeds

- 45. Mapping of Special Traits and Adaptive Advantages
- 46. Geographical Indication (GI) and Breed Protection

Medium-Term Actions (3–5 Years)

- 47. Incentivizing Custodian Farmers and Breed Stewards

Long-Term Actions (6–10 Years)

- 48. Breed-Specific Conservation and Genetic Improvement Programmes



Social-Environmental-Production Target Area 1:

Reducing Climate Change Impacts through Healthy Green and Blue Spaces

Short-Term Actions (0–2 Years)

- 49. Building Kerala-Specific Climate-Biodiversity Knowledge Systems
- 50. Downscaling Global Climate Models for Kerala.
- 51. Promoting Sustainable Consumption and Biodiversity-Safe Lifestyles
- 52. Operationalizing the City Biodiversity Index (CBI)
- 53. Monitoring Biodiversity Risks from Emission-Intensive Sectors
- 54. Mobilizing CSR and CER Funds for Biodiversity Compatible Climate Action
- 55. Citizen Scientists' Capacity Development.

Medium-Term Actions (3–5 Years)

- 56. Nature-based Climate Adaptation and Resilience Interventions
- 57. Intensive Conservation of Biodiversity Hotspots and RET Species in Climate-Vulnerable Zones.

Long-Term Actions (6–10 Years)

- 58. Development of a Web GIS-Based Spatial Designs of Landscapes and Waterscapes.



Social-Environmental-Production Target Area 2 :

Recognising Dynamic Bio-cultural Diversity and Traditional Knowledge

Short-Term Actions (0–2 Years)

- 59. Protection of Traditional Knowledge and Tribal Development
- 60. Sustainable Collection of Non-Wood Forest Produce (NWFP)
- 61. Supply and Value Chain Mapping of Tradable Bioresources
- 62. Revitalization of Biodiversity-Linked Cultural Traditions
- 63. Biodiversity Education for Youth and Students
- 64. Public Awareness and Biodiversity Communication

Medium-Term Actions (3–5 Years)

65. Development of Biodiversity Entrepreneurship Programmes

Long-Term Actions (6–10 Years)

66. Establishment of a Permanent Bio-Cultural Diversity Fund

67. Promotion of One Health Rooted in Sustainable Bioresource Use



Social- Environmental- Production Target 3 :

Empowering Local Governance Institutions for Mainstreaming Biodiversity

Short-Term Actions (0–2 Years)

68. Capacity Development of BMCs for K-SBSAP implementation

69. Empowering Citizen Scientists and Technical Support Groups (TSGs)

70. Mainstreaming Gender-Responsive and Inclusive Biodiversity Planning

Medium-Term Actions (3–5 Years)

71. Operationalization of Local Biodiversity Funds (LBFs)

72. Establishment of Model BMCs as Biodiversity Governance Champions

Long-Term Actions (6–10 Years)

73. Promotion of Sustainable Production and Consumption Models



Social-Environmental-Production Target Area 4 :

Creating Nature-based Climate Resilient Rural and Urban Infrastructure

Short-Term Actions (0–2 Years)

74. Institutionalization of Biodiversity and Green Protocols

75. Enhancing Energy Efficiency in Public and Community Infrastructure

Medium-Term Actions (3–5 Years)

76. Expansion of Green and Blue Urban Spaces

77. Ecosystem-Based and Landscape-Level Climate Adaptation

78. Integrated Water Resource Management (IWRM)

Long-Term Actions (6–10 Years)

79. Biodiversity-Integrated and Inclusive Town Planning

80. Promotion of Eco-Friendly and Nature-Integrated Buildings.

Chapter 5

Mainstream Biodiversity Target Areas (MBTAs)



Mainstream Biodiversity Target Area1:

Participatory and Integrated Forest Ecosystem and Biodiversity

Empowering Local Communities for Resilient Forest Ecosystem and Biodiversity through participatory and integrated conservation, restoration, and sustainable management.

Participatory and Integrated Forest Ecosystem and Biodiversity Management Empowering Local Communities for Resilient Forest Ecosystem and Biodiversity through participatory and integrated conservation, restoration, and sustainable management.

Kerala's forest ecosystems and associated biodiversity, stretching from the lowlands to mountain peaks, are critical for maintaining the ecological balance, supporting livelihoods, and combating climate change. These ecosystems provide vital services, including carbon sequestration, soil stabilisation, water regulation, and habitat for diverse species (Map 3). However, the forests face mounting threats from deforestation, habitat fragmentation, invasive species, land degradation,

and extreme climate events like floods, landslides, and forest fires. Prominent among the stakeholders affected are smallholder farming communities in mountainous areas, which endure frequent wildlife attacks, declining soil fertility, and increased vulnerability to climate extremes. Addressing these interconnected challenges requires a nuanced, integrated approach that not only conserves biodiversity but also ensures the well-being of forest-dependent communities.

With this rationale, 20 Action Targets were identified and listed. The aim is to conserve and restore the varied forest ecosystems and protected areas (See tables 3 and 4: Map 6). See Chart 1 for the KM-GBF-Aligned Indicator Framework for Monitoring this Target Area.



Table 3: Types of Forests in Kerala

Sl. No.	Forest Type	Area (Sq.km.)	% of Total area
1	Tropical Wet Evergreen & Semi-Evergreen forests	3877.44	34.28
2	Tropical Moist Deciduous Forests	3615.98	31.97
3	Tropical Dry Deciduous Forests	391.36	3.46
4	Montane Sub-Tropical & Temperate Sholas	386.42	3.42
5	Plantations	1567.43	13.86
6	Grasslands	501.09	4.43
7	Others	969.74	8.58
Total		11309.48	100

Table 4: Wildlife Sanctuaries and National Parks

Sl.No.	Name of the Protected Area	Area In Sq. Km.	Year of Formation
National Parks			
1	Eravikulam National Park	97	1978
2	Silent Valley National Park	237.52	1984
3	Anamudi Shola National Park	7.5	2003
4	Mathikettan Shola National Park	12.817	2003
5	Pambadum Shola National Park	1.318	2003
Wildlife Sanctuaries			
1	Periyar Wildlife Sanctuary (Tiger Reserve)	925	1950
2	Neyyar Wildlife Sanctuary	128	1958
3	Peechi-Vazhani Wildlife Sanctuary	125	1958
4	Parambikulam Wildlife Sanctuary (Tiger Reserve)	643.66	1973
5	Wayanad Wildlife Sanctuary	344.44	1973
6	Idukki Wildlife Sanctuary	70	1976
7	Peppara Wildlife Sanctuary	53	1983
8	Thattekkad Bird Sanctuary	25	1983
9	Shendurney Wildlife Sanctuary	171	1984
10	Chinnar Wildlife Sanctuary	90.44	1984
11	Chimmony Wildlife Sanctuary	85	1984
12	Aralam Wildlife Sanctuary	55	1984
13	Mangalavanam Bird Sanctuary	0.0274	2004
14	Kurinjalimala Wildlife Sanctuary	32	2006
15	Choolannur Pea Fowl Sanctuary	3.42	2007
16	Malabar Sanctuary	74.215	2009
17	Kottiyoor Wildlife sanctuary	30.3798	2011
18	Karimpuzha Wildlife Sanctuary	227.970	2019
Total		2156.21 sq km	

Source: Wildlife Sanctuaries – Kerala Forest Department

Short-Term Actions (0–2 Years)

- 1. Science-Based Spatial Assessment of Forest and PA Land Use Changes**
Deploy remote sensing, GIS, and participatory mapping to monitor encroachments, habitat loss, and infrastructure pressures in forest landscapes and Protected Areas. Leverage datasets from the Kerala Forest Department, KFRI, KSREC, and KSBB to support data-driven planning and impact evaluation.
- 2. Operationalising ABS for High-Value Timber and Bioresources**
Activate Access and Benefit Sharing (ABS) mechanisms for timber and other forest-derived bioresources, especially forest-sourced medicinal plant genetic resources. Ensure equitable benefit flows to local communities and BMCs, while embedding ecological safeguards in licensing and procurement processes.
- 3. Strengthening Human–Wildlife Co-existence**
Expand early warning systems by optimally utilising the AI advantages, buffer zone mitigation, and ex gratia compensation. Establish community-based Rapid Response Teams (RRTs) and promote coexistence strategies in conflict-prone districts such as Wayanad, Palakkad, Malappuram, and Idukki.
- 4. Eco-Restoration of Riverbanks and Riparian Habitats**
Launch micro-watershed–level restoration of degraded riparian corridors using native vegetation, erosion control, and community fencing. Prioritize river systems like the Pampa, Bharathapuzha, Periyar, and Kallada, utilizing MGNREGS and the LSGs for workforce mobilization.
- 5. Regulation of Unscientific Mining and Quarrying**
Enforce zoning and EIA norms in forest-fringe zones. Use satellite imagery to detect illegal quarrying, integrate biodiversity impact assessments, and promote quarry reclamation with native revegetation.
- 6. Recognition of OECMs and Promotion as Local Biodiversity Heritage Sites (LBHS)**
Identify and document Other Effective area-based Conservation Measures (OECMs) such as sacred groves, lakes and swamps or such local community/ tribal-managed habitats. Facilitate legal recognition for the qualified LBHS under the BHS framework to ensure long-term protection and community custodianship.
- 7. Forest Biodiversity Conservation and Ecosystem Services Documentation**
Mobilize scientific institutions and citizen scientists to update floristic and faunal inventories in forests and PAs. Feed data into digital biodiversity atlases and species repositories to inform management planning including Mobile App development for species identification and documentation.

8. Assessment of NWFP Status and Trends

Conduct resource assessments and sustainability studies for Non-Wood Forest Produce (NWFPs) such as honey, wild tubers, and medicinal plants. Integrate tribal knowledge in a gender-responsive manner and develop sustainable harvest protocols.

9. Invasive Alien Species Mapping and Eradication Planning

Map Priority Invasive Alien Species (IAS) such as Mikania, Lantana, and Senna and such troublesome species. Develop district-level eradication plans using mechanical, biological, and community-led methods, supported by research institutions.

10. Forest Degradation and Pollution Prevention

Implement buffer regulations, restore fire-prone degraded zones, and run anti-littering campaigns in ecotourism areas. Strengthen Joint Forest Management Committees (JFMCs) to monitor local pressures and keeping forests free from all forms of plastic pollution.

11. Capacity Development of BMCs and VSS

Provide targeted training on Participatory Forest Management, Forest Rights, PPVFRA, PBR updating, community patrolling, biodiversity-based livelihoods, and man-animal interactions. Align with KSBB–KILA training modules for institutional strengthening.

12. Zoonotic Disease Prevention and Crop Protection

Promote wildlife health surveillance, fencing, and crop protection systems. Collaborate with the Animal Husbandry Department to pilot One Health approaches in forest–human interface areas.

Medium-Term Actions (3–5 Years)

13. Scientific Forest Plantation Management

Transition from monoculture plantations to multi-species, site-appropriate plantations using native species. Integrate biodiversity indicators into Plantation Working Plans and promote soil–water conservation and carbon sequestration.

14. Landscape-Based PA Conservation

Adopt ecologically connected, landscape-level management across adjoining PAs and reserve forests. Integrate eco-sensitive zone guidelines with local development plans and promote habitat corridors through forest–agriculture–agroforestry– matrix management.

15. Landscape-Level Restoration of Degraded Forest Ecosystems

Implement long-term rewilding using native species and natural regeneration in

degraded forests, riverine corridors, and shifting cultivation fallows. Align with the Haritha Kerala Mission, the Green India Mission and MGNREGS for scale and livelihood integration.

16. Promotion of NWFP-Based Livelihoods

Support forest-produce cooperatives, tribal SHGs, and MSMEs to develop value-added NWFP products such as wild pepper, jackfruit, natural dyes, and honey. Link skill development with ethical sourcing and market access.

17. Integrated (*In-situ-Ex-situ*) Conservation of RET Species

Develop species recovery plans for rare, threatened, and endemic (RET) species by giving all the micro-endemic species in the state such as *Palaquium ravii* and *Julostylis polyandra* in case of trees. Enhance forest tree and woody lianas' seed/gene banks at botanical garden and farmers' /planters' fields and establish arboreta in biodiversity hotspots.

18. Agroforestry promotion with Native Species of multiple uses

Promote multi-tiered agroforestry systems using native fruit trees, medicinal plants, and timber species. Align with PM-KUSUM, the State Agroforestry Policy, and carbon-plus agriculture pilots.

Long-Term Actions (6–10 Years)

19. Enhancing Forest Carbon Sink Potential

Refine carbon stock baselines and promote carbon-positive silviculture, moist deciduous forest recovery, and bamboo forest management. Explore and expand voluntary carbon markets with local community benefit-sharing mechanisms.

20. Development of Urban Forests and Green Belts

Identify underutilized urban parcels for afforestation, Miyawaki forests, and community woodlands. Integrate with AMRUT and Smart Cities missions to create biodiversity-inclusive green infrastructure.

Approach/Strategies

Leveraging the Decentralised Governance for Localised Action: Kerala's robust Panchayati Raj system and empowered LSGs will be leveraged to drive participatory forest and biodiversity BMCs, nested within LSGs, will be capacitated to lead PBRs, monitor invasive species, and co-manage OECMs and riparian restoration efforts.

Integrating the Forest and PA Management Portfolio with District and Panchayat Plans: Actions such as agroforestry promotion, NWFP-based livelihoods, and

urban forest development will be embedded in District Plans and Gram Panchayat Development Plans, ensuring alignment with local priorities and convergence of fund flows under the State Plan and centrally sponsored schemes.

Strengthening Science–Society–State Linkages: Kerala’s legacy of ecological literacy and active civil society engagement will be harnessed to co-create spatial assessments, monitor forest biodiversity trends, and pilot landscape-level conservation models. Institutions like KFRI, KSCSTE, and universities will support evidence-based planning and adaptive management.

Institutionalising Interdepartmental and Inter-tier Coordination: The Forest Department, LSGD, Revenue, Health, and Agriculture departments will collaborate through district-level convergence platforms. This coordination will be pivotal for managing zoonotic risks, regulating mining near forest fringes, and aligning ABS implementation with local benefit-sharing mechanisms.

Promoting Man-Assisted, Science-Driven *In-Situ* Restoration: Kerala will advance man-assisted, science-based *in-situ* restoration of degraded forest ecosystems by combining ecological principles with local stewardship. This will include assisted natural regeneration, reintroduction of regionally extinct and keystone species, augmentation of thin populations (e.g., *Hopea*, *Dipterocarpus*, orchids), and participatory microplanning by empowered BMCs. These actions will be backed by research collaborations with KFRI, TBGRI, and other scientific institutions, including credible NGOs and private institutions working around Biodiversity to ensure ecological integrity, genetic diversity, and long-term resilience.

Promoting Kerala-Specific Financing and Recognition Mechanisms: Green budgeting will be pioneered at the LSG level. Conservation-linked livelihoods will be incentivised through eco-labelling of NWFPs, and formal recognition of OECMs and Biodiversity Heritage Sites (BHSs) will be scaled up through state-supported awards and performance-linked grants.

The Linkages with KM-GBF Targets

The Management Action Targets collectively address 22 targets of the Kunming–Montreal Global Biodiversity Framework. The detailed breakdown is as follows:

- **Science-Based Spatial Assessment of Forest and PA Land Use Changes.**
Aligned with KM-GBF Targets 1, 3, 14, and 20. This action supports participatory, biodiversity-inclusive spatial planning (Target 1), enhances Protected Area (PA) management (Target 3), integrates biodiversity into decision-making processes (Target 14), and strengthens local capacity for monitoring and governance (Target 20)

- **Operationalising ABS for Timber and Bioresources.** Aligned with Targets 5, 13, and 20. Ensures sustainable use of forest resources (Target 5), equitable benefit-sharing from genetic resources (Target 13), and institutional capacity-building for Access and Benefit Sharing (ABS) mechanisms (Target 20).
- **Management of Human–Wildlife Conflict.** Aligned with Targets 4, 5, and 20. Addresses species recovery and coexistence (Target 4), promotes sustainable use of wild species (Target 5), and strengthens participatory governance through community-based and gender responsive mechanisms (Targets 20, 22, and 23).
- **Scientific Forest Plantation Management.** Aligned with Targets 2, 8, 10, and 14. Promotes restoration of degraded ecosystems (Target 2), enhances climate resilience (Target 8), supports biodiversity-friendly forestry (Target 10), and integrates biodiversity safeguards into forest working plans (Target 14).
- **Eco-Restoration of Riparian Habitats.** Aligned with Targets 2, 8, 11, and 20. Contributes to ecosystem restoration (Target 2), supports climate adaptation (Target 8), enhances nature's contributions to people (Target 11), and builds community capacity for implementation (Target 20).
- **Regulation of Unscientific Mining and Quarrying.** Aligned with Targets 1, 6, 8, and 14. Reduces threats from land-use change (Target 1), controls the spread of invasive species via disturbed lands (Target 6), mitigates climate impacts (Target 8), and enforces biodiversity-inclusive environmental impact assessments (Target 14).
- **Recognition of OECMs and Biodiversity Heritage Sites.** Aligned with Targets 3, 13, and 20. Expands area-based conservation (Target 3), ensures benefit-sharing with local communities (Target 13), and empowers local custodianship and governance (Target 20).
- **Landscape Approach in PA Conservation.** Aligned with Targets 1, 3, 11, and 12. Advances integrated spatial planning (Target 1), strengthens ecological connectivity (Target 3), supports ecosystem services (Target 11), and integrates biodiversity into urban–rural planning (Target 12).
- **Documentation of Forest Biodiversity and Ecosystem Services.** Aligned with Targets 19, 20, and 21. Enhances biodiversity knowledge systems (Target 19), supports participatory monitoring and governance (Target 20), and ensures access to biodiversity data and information (Target 21).
- **Status and Trends in NWFP Conservation.** Aligned with Targets 5, 9, 13, and 20. Promotes sustainable use of forest products (Target 5), supports ecosystem service benefits (Target 9), ensures equitable benefit-sharing (Target 13), and builds community-based monitoring systems (Target 20).
- **Identification and Eradication of Invasive Alien Species.** Aligned with Targets 6, 8, and 20. Directly supports IAS control (Target 6), reduces climate vulnerability (Target 8), and builds local eradication capacity and institutional coordination (Target 20).

- **Prevention of Forest Degradation and Pollution** Aligned with Targets 7, 8, 10, and 12. Reduces pollution in forest ecosystems (Target 7), enhances resilience to climate impacts (Target 8), supports sustainable tourism and forestry (Target 10), and improves biodiversity in ecotourism zones (Target 12).
- **Capacity Development of RFOs, BMCs and VSSs.** Aligned with Targets 20, 21, and 22. Strengthens institutional capacity (Target 20), ensures access to biodiversity knowledge (Target 21), and promotes inclusive participation in biodiversity governance (Target 22).
- **Prevention of Zoonotic Diseases and Farm Raiding.** Aligned with Targets 4, 11, and 20. Addresses species–human interface and zoonotic risks (Target 4), integrates One Health approaches (Target 11), and builds cross-sectoral capacity (Target 20).
- **Landscape-Level Restoration of Degraded Forest Ecosystems.** Aligned with Targets 2, 8, 9, and 19. Supports large-scale ecosystem restoration (Target 2), enhances carbon sinks and climate resilience (Target 8), promotes ecosystem services (Target 9), and mobilises restoration finance (Target 19).
- **Enhancing Carbon Sink Potential of Forests.** Aligned with Targets 8 and 19. Aligns with climate mitigation and adaptation goals (Target 8) and supports carbon finance mobilisation for biodiversity-positive outcomes (Target 19).
- **Promotion of NWFP-Based Livelihoods.** Aligned with Targets 5, 9, 10, 13, 18, 22 and 23. Promotes sustainable use (Target 5), ecosystem-based livelihoods (Target 9), sustainable consumption (Target 10), equitable benefit-sharing (Target 13), and positive and gender responsive incentives for conservation (Target 18 & 23).
- **In-situ and Ex-situ Conservation of RET Species.** Aligned with Targets 4, 12, and 17. Supports species recovery and genetic diversity (Target 4), enhances biodiversity in urban and peri-urban areas (Target 12), and strengthens biosafety and conservation biotechnology (Target 17).
- **Development of Urban Forests.** Aligned with Targets 12, 14, and 16. Enhances green spaces and urban biodiversity (Target 12), integrates biodiversity into spatial planning (Target 14), and promotes sustainable lifestyles and consumption (Target 16).
- **Adoption of Agroforestry with Native Species** Aligned with Targets 10, 13, 16, and 18. Promotes biodiversity-friendly agriculture (Target 10), ensures benefit-sharing (Target 13), supports sustainable consumption (Target 16), and incentivises positive biodiversity outcomes (Target 18).



Mainstream Biodiversity Target Area 2

Developing Integrated Coastal, Marine and Inland Biodiversity Management

Towards Integrated and Resilient Management of Coastal, Marine, and Inland Biodiverse Ecosystems

The target area of Integrated Coastal, Marine and Inland Biodiversity Management aims to build effectively the conservation and sustainable management of coastal and inland biodiversity and ecosystems. The actions identified are aligned with the NBTs 3, 6,7,8,&11 and SDG 14: Life Below Water, which focuses on conserving and sustainably using marine and freshwater resources. This includes promoting sustainable fisheries, protecting the Arabian Sea and Kerala Backwaters, and mitigating pollution impacts. We will adhere to the Ramsar Convention's principles for the conservation and wise use of wetlands, including the backwaters, recognizing their importance for biodiversity and human well-being. ICZM strategies will be implemented to balance environmental, economic, and social goals, ensuring sustainable development and resilience against climate change impacts.

With this rationale, the following 15 targets were identified for implementation. See Chart 2 for the KM-GBF-Aligned Indicator Framework for Monitoring this Target Area.

Targeted Action/ Mode of Implementation

Short-Term Actions (0–2 Years)

- 1. Mangrove Ecosystem Conservation and Co-Management :** Map, protect, and restore fragmented mangrove belts in estuaries and backwaters (e.g., Kannur, Ernakulam, Kollam). Promote co-management through eco-clubs, BMCs and local communities. Strengthen regulatory buffers and integrate mangrove education into school and community programmes.
- 2. Restoration of Riparian Vegetation :** Restore degraded riverbanks using native vegetation and bioengineering techniques to prevent erosion and enhance aquatic habitats. Engage local self-governments in mapping and implementing micro-level restoration through MGNREGS.
- 3. Protection of Coastal Habitats and Biodiversity Hotspots :** Safeguard sand dunes, turtle nesting sites, and estuarine zones from encroachment and unregulated tourism. Promote seasonal biodiversity monitoring and integrate ecological safeguards into CRZ and Coastal Mission planning.

Medium-Term Actions (3–5 Years)

- 12. Aquatic Biodiversity Conservation from Catchment to Coast:** Secure freshwater and marine biodiversity through integrated planning, *in-situ* sanctuaries, and protection of fish breeding sites for RET species. Institutionalize seasonal biodiversity indexing and align with SAPCC and SBSAP targets.
- 13. Sustainable Use of Aquatic Bioresources and Fish Diversity:** Adopt precautionary harvest thresholds, habitat-linked fisheries management, and bycatch minimization. Recognize traditional fishing practices and align fisheries planning with biodiversity conservation objectives in riverine and estuarine systems.

Long-Term Actions (6–10 Years)

- 14. Conservation of Aquatic Subterranean Biodiversity:** Document and protect unique subterranean biota in laterite aquifers, near-shore habitats, anchialine habitats, and limno-karst systems—especially in northern Kerala and coastal gene pools like Kollam Parappu. Promote research collaborations to advance taxonomy, assess endemism, and evaluate hydrogeological sensitivity.
- 15. Sustainable Aquaculture and Low-Impact Fisheries :** Promote integrated, zero-waste aquaculture using indigenous species, IMTA systems, and non-fed practices like bivalve farming. Prioritize climate-resilient, biodiversity-safe Low-External Sustainable Aquaculture in inland and coastal waters.

Approach/Strategies

Zonation-Based Planning and Habitat Prioritization: Integrated mapping of wetlands, riparian zones, mangroves, and coastal habitats will be undertaken using tools developed by the State Wetland Authority of Kerala (SWAK), KSREC, and the Department of Environment and Climate Change. These spatial datasets shall feed into decentralized biodiversity management plans and Coastal Zone Management Plans to ensure that ecologically sensitive areas are identified, restored, and protected.

Science–Practice Convergence through Institutional Anchoring: Kerala University of Fisheries and Ocean Studies (KUFOS), CMFRI, Department of Agriculture, Fisheries, ADAK—Agency for Development of Aquaculture, Kerala, a key institution dedicated to promoting aquaculture and allied activities across the state, and NBFGR will be engaged to enable data-driven planning, aquatic biodiversity assessments, and value-chain innovation for aquatic genetic resources. These institutions shall jointly guide the development of low-impact aquaculture systems, advance nutraceutical research, and frame sustainable fisheries transition pathways.

Bioresource Governance and ABS Operationalization : The NBA, the Department of Fisheries and KSBB shall jointly pilot Access and Benefit-Sharing (ABS) models for marine genetic resources, including seaweed, microbial consortia, and sponge-associated bioactive compounds. Legal and ethical protocols will be co-developed with local communities, ensuring equitable benefit-sharing while blending traditional knowledge with modern valorisation strategies.

Pollution Control, Surveillance, and Community-Centric Action : Local Self-Governments (LSGs), NGOs, and coastal BMCs will be positioned as key actors in curbing marine debris and plastic inflows. This shall be achieved through behavioural change campaigns, catchment-level waste audits, and convergence with the Suchitwa Mission and Haritha Kerala Mission. Real-time monitoring of water quality and microplastics will be integrated into SWAK-led ecosystem health dashboards.

Inclusive Governance for Climate Resilience and Livelihood Diversification : Gender equity and co-management will be institutionalised in marine and inland bioresource stewardship. Capacity building shall be led by the Fisheries Department with support from KILA, KSBB and Kudumbashree. Women will be trained in biodiversity-based tourism, aquaculture entrepreneurship, and participatory biodiversity monitoring to promote inclusive and climate-resilient livelihoods.

Linkages with KM-GBF Targets

The Target area of Integrated Coastal, Marine, and Inland Biodiversity Management—addresses 22 out of the 23 targets of the Kunming–Montreal Global Biodiversity Framework

- **Conservation and Restoration of Mangrove Ecosystems :** This action supports KM-GBF Targets 2 (restoration of degraded ecosystems) and 3 (area-based conservation) by restoring fragmented mangrove belts and enhancing their ecological function. It also contributes to Target 1 through spatial mapping and participatory planning, and to Target 8 by strengthening coastal climate resilience.
- **Eco-restoration of Riparian Vegetation :** By restoring riverbanks using native vegetation and bio-bunding, this action advances Target 2 (ecosystem restoration), Target 11 (enhancing nature's contributions to people, such as water regulation), and Target 8 (climate adaptation). It also supports Target 20 through LSG-led implementation.
- **Protection and Sustenance of Coastal Habitats :** Safeguarding the dunes, turtle nesting sites, and estuarine zones contributes to Target 3 (effective conservation), Target 4 (species recovery), and Target 12 (biodiversity-friendly urbanisation). It also aligns with Target 1 through integration into CRZ and Coastal Mission plans.

- **Conservation of Wetlands for Water Security and Health :** This action supports Target 2 (restoration), Target 3 (wetland conservation), and Target 11 (ecosystem services). It also contributes to Target 14 by embedding biodiversity into local wetland management plans and to Target 20 through LSG-led governance.
- **Eradication of Aquatic Invasive Alien Species :** Targeting species like Water Hyacinth and Salvinia directly supports Target 6 (IAS control) and Target 8 (resilience of aquatic ecosystems). Community participation and public awareness also reinforce Target 20.
- **Operationalisation of ABS for Marine Genetic Resources :** This action advances Target 13 (equitable benefit-sharing) and Goal C by enabling ABS for marine bioresources. It also supports Target 5 (sustainable use of wild species) and Target 20 through institutional capacity-building.
- **Promotion of Nutraceuticals, Bioactive Compounds, and Microbial Products :** By developing discovery-to-market pipelines for marine bioresources, this action supports Target 13 (benefit-sharing), Target 16 (sustainable consumption), and Target 17 (biosafety and biotechnology governance).
- **Promotion of Bioresource-Based Livelihoods :** Supporting fisherwomen and coastal communities in biodiversity-based enterprises contributes to Target 9 (ecosystem services), Target 10 (biodiversity-friendly production), and Target 18 (positive incentives). It also reinforces Target 23 by promoting women's economic participation.
- **Responsible and Community-Centric Tourism Guidelines :** This action aligns with Target 10 (sustainable tourism), Target 12 (urban biodiversity), and Target 20 (inclusive governance). It also supports Target 16 by promoting waste audits and sustainable visitor practices.
- **Plastic and Water Pollution Abatement :** Efforts to reduce marine debris and promote biodegradable alternatives directly support Target 7 (pollution reduction), Target 8 (ecosystem resilience), and Target 16 (sustainable consumption).
- **Gender-Responsive Biodiversity and Ecosystem Management :** This action advances Target 23 (gender equality), Target 20 (capacity-building), and Target 22 (inclusive participation) by embedding women's leadership in coastal biodiversity governance.
- **Conservation of Aquatic Biodiversity :** Catchment-to-coast planning, fish breeding site protection, and *in-situ* sanctuaries contribute to Target 4 (species recovery), Target 3 (area-based conservation), and Target 11 (ecosystem services).

- **Sustainable Use of Aquatic Bioresources / Fish Diversity:** This action supports Target 5 (sustainable use), Target 10 (biodiversity-friendly fisheries), and Target 9 (benefits from ecosystem services), while recognising traditional knowledge and practices.
- **Conservation of Aquatic Subterranean Biodiversity:** Documenting subterranean biota in aquifers and anchialine habitats contributes to Target 4 (genetic diversity), Target 12 (urban biodiversity), and Target 21 (knowledge access and availability).
- **Sustainable Aquaculture and Fisheries (Low-Impact Systems):** Promoting IMTA, bivalve farming, and non-fed systems supports Target 10 (sustainable aquaculture), Target 5 (wild species use), and Target 8 (climate resilience).
- **Zonation-Based Planning and Habitat Prioritisation :** This strategic approach supports Target 1 (spatial planning), Target 3 (area-based conservation), and Target 14 (mainstreaming biodiversity in governance).
- **Science–Practice Convergence through Institutional Anchoring :** Engaging institutions like CMFRI and KUFOS supports Target 20 (capacity-building), Target 21 (knowledge access), and Target 19 (resource mobilisation through innovation).
- **Bioresource Governance and ABS Operationalisation:** This action reinforces Target 13 (benefit-sharing), Target 5 (sustainable use), and Target 20 (institutional strengthening).
- **Pollution Control, Surveillance, and Community-Centric Action :** Community-led waste audits and real-time monitoring support Target 7 (pollution), Target 8 (ecosystem resilience), and Target 16 (sustainable consumption).
- **Inclusive Governance for Climate Resilience and Livelihood Diversification :** This action advances Target 20 (capacity-building), Target 22 (participation of IPLCs), and Target 23 (gender equality), positioning local communities as key actors in biodiversity stewardship.



 Dr. Linda John

Mainstream Biodiversity TargetArea 3

Strengthening Community - Centric Agrobiodiversity Management

Safeguarding Agricultural Biodiversity for Resilient and Sustainable Food Systems

This Target Area actions are to strengthen Community-centric Agrobiodiversity Management and to promote mainstreaming of agrobiodiversity in sustainable agriculture, fisheries, animal husbandry, and agroforestry practices. By this, we will be conserving genetic diversity, supporting small-scale farmers, ensuring food security, improving nutrition, and achieving resilient food and agricultural production. This commitment is aligned with Target 10 of the Kunming-Montreal Global Biodiversity Framework and SDG2: Zero Hunger. Additionally, it aligns with the updated NBSAP 2024-2030, ensuring a cohesive approach to biodiversity conservation across the state. Key actions include documenting crop and varietal diversity, incentivising custodian farmers, promoting diverse crops and varieties among farming communities, sustainable utilisation of agrobiodiversity, strengthening research, and protecting intellectual property rights. These efforts will be supported by the Kerala Agricultural University, the State Horticulture Mission, and various eco-clubs and NGOs.

With this rationale, the following 6 Action targets were identified for this Area, along with a few key indicators for the monitoring and Evaluation of the interventions. See Chart 3 for the KM-GBF-Aligned Indicator Framework for Monitoring this Target Area.

Targeted Action/ Mode of Implementation

Short-Term Actions (0–2 Years)

- 1. Comprehensive Documentation of Agrobiodiversity :** Inventory traditional crop varieties, livestock breeds, wild crop relatives, and associated traditional knowledge. Ensure local validation through People's Biodiversity Registers (PBRs) and LSG-led data collation, with technical support from KSBB and agricultural institutions.
- 2. Incentivizing Custodian Farmers and Community Conservators :** Design and implement recognition schemes, conservation-linked financial incentives, and awards to valorise on-farm and *in-situ* conservation efforts. Highlight exemplary practices through biodiversity festivals and media outreach.
- 3. Farming System Study through Capacity Building and Application of Science & Technology:** Strengthen institutional and grassroots capacities through farmer field schools, agrobiodiversity literacy campaigns, and conservation farmer networks. Forge partnerships with ICAR–NBPGR, State Agricultural Universities, and KAU to promote participatory research and technology transfer.

4. **Promotion of Agrobiodiversity - Focused FPOs.** Support Farmer Producer Organizations (FPOs) engaged in seed diversity, community seed banks, and value-added traditional crop products. Facilitate access to markets, branding support, and convergence with schemes like SFAC and NABARD.

Medium-Term Actions (3–5 Years)

5. **Mainstreaming Crop and Plant Varietal Diversity in Government Schemes:** Promote diverse cropping systems and intercropping with landraces through convergence with MIDH, PKVY, and RKVY. Scale up seed villages and community seed networks that conserve and propagate native varieties and food and medicinal plant genetic resources.
6. **Promotion of Sustainable and Agroecological Farming Practices:** Facilitate transition to agroecological models such as organic farming, Low External Input Sustainable Agriculture (LEISA), and conservation agriculture. Emphasize practices that enhance ecosystem services and sustain agrobiodiversity on-farm.

Long-Term Actions (6–10 Years)

7. **Protection of IPRs and GI Tagging of Agrobiodiversity Assets:** Facilitate legal protection of Plant Genetic Resources (PGRs) and traditional knowledge through documentation, GI registration, and community IPR claims. Integrate these efforts into Kerala's evolving IPR policy ecosystem to ensure equitable benefit-sharing and innovation safeguards

Strategies/Approach

Strengthening the Knowledge Base through Documentation : A comprehensive inventory of Kerala's traditional crop varieties, livestock breeds, and associated knowledge systems will be developed through community-led documentation, PBRs, seed mapping, and biodiversity fairs. BMCs, supported by Kerala's Agricultural University, ICAR–NBPGR, and KIRTADS, shall coordinate this effort. This dynamic knowledge base will inform *in situ* conservation and planning while forming the legal and scientific foundation for benefit-sharing mechanisms under national and global regimes.

Empowering Custodian Farmers and Community Institutions : Custodian farmers who safeguard native seeds, livestock, and traditional farming systems will be recognised and incentivised through financial support schemes, conservation awards, and improved market access. Farmer Producer Organizations focusing on heritage varieties shall be strengthened as local hubs for community seed banks, low-input agroecological

farming, and value-added crop-based enterprises. These grassroots institutions will link biodiversity conservation to income, nutrition, and cultural continuity.

Promoting Sustainable Agriculture and Genetic Diversity on Farms : Agroecological practices including native seed-based intercropping, regenerative and organic farming, and cultivation of underutilised crops will be scaled up to enhance ecosystem services and reduce input dependence (Map 1). State programmes such as Haritha Keralam, PKVY, and the Organic Farming Policy will be leveraged to mainstream these practices. Varietal diversity across farms shall be promoted to build climate resilience and support pollinators and soil health.

Strengthening Institutional Capacity, Science–Farmer Interface, and Legal Tools :

Capacity-building programmes for farmers, extension personnel, and LSGs will be deployed through farmer field schools, digital learning platforms, and participatory varietal trials led by institutions like KAU, IISR, and ICAR. The Protection of Plant Varieties and Farmers’ Rights Act (PPVFRA) shall be utilised fully to register local varieties, uphold farmers’ custodianship, and operationalise ABS-linked benefit-sharing. Conservation of native livestock breeds such as Vechur and Kasargodan Kullam Cows, Attappady Black goat, and Malabari poultry will be reinforced through the State Livestock Breeding Policy, herd book registration, and breed-specific community societies.

Securing Market Recognition, IPR Protection, and Community Benefits :

Agrobiodiversity assets like Pokkali and Njavara rice and endemic fruits and vegetables’ landraces will be protected and valorised through Geographical Indications (GIs) and community IPR claims. The revised State IPR Policy shall be implemented to safeguard traditional knowledge, support organic certification, and establish linkages to niche markets and agro tourism. Mechanisms will be instituted to ensure that economic benefits from valorisation are returned to local farming communities, supporting equity and ecological stewardship.

Linkages with KM-GBF Targets

Together, these actions under KSB Target Goal 3 address the following KM-GBF (10/23) targets

Comprehensive Documentation of Agrobiodiversity: This action directly supports KM-GBF Target 4 by maintaining and restoring genetic diversity within and between populations of domesticated species. It also contributes to Target 21 by ensuring that biodiversity knowledge especially traditional knowledge is documented, accessible, and used to guide conservation planning.

Incentivising Custodian Farmers and Community Conservators: By recognising and rewarding on-farm conservation efforts, this action reinforces Target 4 (genetic diversity), Target 13 (equitable benefit-sharing), and Target 18 (positive incentives for biodiversity). It also supports Target 20 by strengthening local institutions and participatory governance.

Capacity Building and Science & Technology Application: This action advances Target 20 (capacity-building and knowledge sharing) by empowering farmers, extension workers, and institutions. It also contributes to Target 9 by enhancing ecosystem services through improved agrobiodiversity literacy and stewardship.

Promoting Farmer Producer Organisations (FPOs): Support for FPOs focused on seed diversity and value-added products contributes to Target 10 (biodiversity-friendly agriculture), Target 13 (benefit-sharing), and Target 16 (sustainable consumption). It also reinforces Target 9 by linking biodiversity conservation with livelihoods and ecosystem services.

Promotion of Maximum Crop and Varietal Diversity: This action directly supports Target 4 by conserving intra- and interspecific diversity of cultivated plants. It also advances Target 10 by promoting agroecological practices and Target 18 by embedding diversity into government-supported schemes.

Promotion of Sustainable Agriculture Practices: Agroecological models such as organic farming and conservation agriculture align with Target 10 (biodiversity-friendly production systems), Target 9 (ecosystem services), and Target 16 (sustainable consumption). These practices also contribute to Target 8 by enhancing climate resilience in agricultural landscapes.

Protection of IPRs and GI Tagging of Agrobiodiversity Assets: This action supports Target 13 (fair and equitable benefit-sharing) and Goal C by securing legal protection for genetic resources and associated traditional knowledge. It also contributes to Target 17 by strengthening biosafety and intellectual property governance.



Mainstream Biodiversity Target Area 4

Domesticated Biodiversity and Animal Husbandry

Building Climate-Resilient Livestock Systems through Native and Local Breed Conservation and Biodiversity-Smart Animal Husbandry Practices”

As a Mainstream Biodiversity Target Area for the state, this Area is to focus on Animal Husbandry in the actions on the inventory, enhancement, and protection of all traditional and domesticated animal genetic resources, including native cows, goats, and various breeds of fowl. Emphasis will be given in the conservation of such genetic diversity with an aim to improve the resilience of the total breed diversity of the state, aligned with Target 10 of the KM-GBF and SDG 2, as well as the updated National Biodiversity Strategy and Action Plan (NBSAP) 2024-2030. This initiative will support sustainable agricultural practices, ensure food security, and enhance rural livelihoods across Kerala's mountains, midlands, and coastal areas.

Particularly focused action will be the traditional cattle herding practices of some settled tribe communities in the mountains of Kerala. These communities have developed unique animal husbandry practices that are integral to their culture and survival. Their knowledge and techniques offer valuable insights into sustainable animal management and the conservation of genetic diversity, which are crucial for the resilience of both traditional and modern breeds.

With the above rationale, the following 6 targeted actions were identified. See Chart 4 for the KM-GBF-Aligned Indicator Framework for Monitoring this Target Area.

Short-Term Actions (0–2 Years)

- 1. Documentation of Native and Local Breeds.** Launch district-level inventories of native livestock and poultry, capturing population trends, genetic traits, and associated traditional knowledge. Collaborate with the Animal Husbandry department, KVASU, local BMCs, and LSGs to ensure participatory data collection and validation.
- 2. Scientific Recognition of Genetic Groups as Breeds and Stocks.** Undertake phenotypic profiling and genetic characterization to establish distinct breed identities. Facilitate formal recognition under the National Bureau of Animal Genetic Resources (NBAGR) framework to enable targeted conservation and policy support.

3. **Mapping of Special Traits and Adaptive Advantages.** Identify and document adaptive traits such as disease resistance, climate resilience, and performance under low-input systems. Use this evidence to build the case for conservation-linked utility and inclusion in breeding and livelihood programmes.
4. **Geographical Indication (GI) and Breed Protection.** Initiate GI registration and legal protection for select native breeds and their products (e.g., Vechur cattle, Attappady goat). Leverage support from the State IPR Cell and Central GI Registry to safeguard heritage and promote value addition.

Medium-Term Actions (3–5 Years)

5. **Incentivizing Custodian Farmers and Breed Stewards.** Institutionalize conservation-linked incentives such as direct benefit transfers, breed conservation awards, and preferential access to government schemes. Recognize and support farmers maintaining viable herds or flocks of native breeds through structured benefit-sharing models.

Long-Term Actions (6–10 Years)

6. **Breed-Specific Conservation and Genetic Improvement Programmes.** Implement integrated conservation programmes combining *in-situ* and *ex-situ* strategies. Support genetic improvement, veterinary outreach, and integration with organic and mixed farming systems to maintain healthy, productive native populations aligned with sustainable agriculture goals.

Approach/Strategies

Community-Driven Documentation and Breed Recognition: A coordinated state-wide initiative will be launched to document Kerala's indigenous livestock and poultry varieties, including phenotypic traits, local names, and associated traditional knowledge. BMCs, local veterinary extension officers, and Kerala Veterinary and Animal Sciences University (KVASU) shall be engaged to scientifically characterize and profile genetic groups. These efforts will enable formal breed recognition under the National Bureau of Animal Genetic Resources (NBAGR) and ensure inclusion in national registries and conservation schemes.

Characterization of Traits and Adaptive Value: Unique traits of indigenous breeds such as climate resilience, low-input productivity, and disease resistance will be mapped through participatory research and field trials. Results shall be communicated to farmers and policymakers to reinforce the ecological and economic relevance of native breeds in sustainable farming systems and will support the justification for increased public investment in breed conservation.

Incentivising Custodian Farmers and Breed Communities: Incentive mechanisms will be designed and implemented to reward farmers and communities maintaining viable populations of indigenous livestock and poultry. These shall include direct benefit transfers, conservation-linked insurance, and performance-based awards. Community based conservation societies or breed federations such as for Vechur cattle or Attappady Black goat will function as nodes for herd registration, breeding support, and benefit sharing mechanisms.

Identification of Specialities and Adaptive Traits of Indigenous Genetic Groups: Kerala's indigenous livestock and poultry genetic groups will be systematically mapped to identify distinctive traits and adaptive values. This will include comprehensive profiling of desi chicken varieties and ecologically adapted duck breeds such as the Kuttanad duck. Characterisations shall guide conservation priorities, enhance agro-ecological integration, and build a compelling case for policy support and commercial valorisation.

Legal Protection and Market Recognition: Geographical Indication (GI) registration and community claims for culturally and geographically distinct breeds will be accelerated. Registration of breed-based products like Vechur ghee or native poultry eggs will be facilitated under Kerala's revised IPR Policy. These measures will enhance legal safeguards, create premium market niches, and strengthen the conservation livelihood link. The Animal Husbandry department, KVASU, the State IPR Cell, and NABARD shall jointly support these value-chain development initiatives.

Long-Term Conservation and Breed Improvement: Breed specific conservation plans combining *in-situ* (within natural habitats) and *ex-situ* (e.g. germplasm banks, semen repositories) approaches will be developed. Public livestock farms and veterinary systems shall prioritise indigenous breed health, reproductive services, and nutritional support. Selective breeding based on community-defined priorities will be promoted to preserve genetic diversity while enhancing functional productivity.

Linkages with KM-GBF targets

Together, these actions under the Target Area 4 address the following KM-GBF targets

Documentation of Indigenous Breeds: This action directly supports KM-GBF Target 4 by maintaining and restoring genetic diversity within and between populations of domesticated species. It also contributes to Target 21 by ensuring that traditional knowledge and breed-specific data are documented and accessible for conservation planning.

Recognition of Genetic Groups as Breeds: Scientific characterisation and formal recognition of native livestock and poultry breeds reinforce Target 4 by enabling both *in-situ* and *ex-situ* conservation. This also supports Target 17 by strengthening biosafety and genetic resource governance.

Identification of Specialities and Adaptive Traits: Mapping traits such as flood resilience in Kuttanad ducks or drought tolerance in Vechurcattle links conservation with functional utility, advancing Target 4. It also contributes to Target 10 by promoting biodiversity-friendly livestock systems adapted to local agroecological conditions.

Registration of Geographical Indications (GIs) and Variety Protection: This action supports Target 13 and Goal C by ensuring fair and equitable benefit-sharing from the use of genetic resources and associated traditional knowledge. It also contributes to Target 17 by enhancing legal protection and preventing biopiracy.

Incentivising Custodian Farmers: Providing conservation-linked incentives to farmers maintaining native breeds supports Target 9 (ecosystem services and livelihoods), Target 18 (positive incentives for biodiversity), and Target 20 (capacity-building and participatory governance).

Maintaining Healthy and Productive Local/Native Populations: Breed-specific conservation programmes combining *in-situ* and *ex-situ* approaches contribute to Target 4 (genetic diversity), Target 10 (sustainable livestock systems), and Target 8 (climate resilience through biodiversity-smart practices).





Chapter 6

Social-Environmental-Production Target Areas (SEPTAs)



Social-Environmental-Production TargetArea 1

Reducing Climate Change Impacts through Healthy Green and Blue Spaces

Driving Climate Resilience Through Nature-Based Solutions and Community-Led Environmental Action

This Target Area is to enhance Kerala's biodiversity to mitigate and adapt to climate change by integrating biodiversity conservation practices into climate action plans. The focus will be on conserving and restoring ecosystems, such as forests and wetlands, that act as carbon sinks to enhance carbon sequestration and reduce greenhouse gas emissions. The ability of biodiverse ecosystems to provide critical services such as water purification and soil stabilisation, making them more resilient to climatic shocks, will be effectively communicated and utilised in all developmental interventions.

Nature-based solutions for climate adaptation and mitigation, such as mangrove restoration and reforestation, to benefit both local communities and biodiversity, will be promoted. Addressing climate change and biodiversity loss by maintaining the integrity of planetary boundaries related to land integrity and chemical pollution through sustainable land use practices will be one of the major action targets.

The actions under this Target Area are intended to help achieving Kerala's goal of net-zero carbon emissions by 2050 by leveraging biodiversity for climate resilience, protecting, and enhancing natural carbon sinks. Biodiversity conservation will be integrated across various production sectors, including agriculture, forestry, fisheries, and urban planning, to enhance ecosystem services and resilience.

This holistic approach supports Sustainable Development Goal (SDG) 13: Climate Action, which emphasises urgent action to combat climate change and its impacts.

With this rationale the following 10 Action Targets were identified for this Area. See Chart 5 for the KM-GBF-Aligned Indicator Framework for Monitoring this Target Area.

Short-Term Actions (0–2 Years)

1. **Building Kerala-Specific Climate-Biodiversity Knowledge Systems.** Synthesize climate science, socio-ecological vulnerabilities, and biodiversity linkages through expert networks, academic institutions, and citizen-scientist collaborations. Develop region-specific knowledge products to inform planning and awareness.
2. **Downscaling Global Climate Models for Kerala.** Develop localized climate projections in collaboration with IMD, KSCSTE, and research institutions. Enable integration of climate-risk-informed planning into biodiversity conservation and land-use strategies.
3. **Promoting Sustainable Consumption and Biodiversity-Safe Lifestyles.** Launch awareness campaigns, green procurement guidelines, and LSG-led initiatives to promote resource-efficient lifestyles. Reduce biodiversity footprints through behaviour change communication and community engagement.
4. **Operationalizing the City Biodiversity Index (CBI).** Establish city-level biodiversity baselines using standardized metrics (e.g., Singapore Index). Pilot the CBI in Thiruvananthapuram, Kochi, and Kozhikode to guide urban biodiversity planning and green infrastructure development.
5. **Monitoring Biodiversity Risks from Emission-Intensive Sectors.** Develop sector-specific biodiversity risk assessment protocols. Encourage disclosure and mitigation practices aligned with ESG frameworks, environmental audits, and sustainability reporting.
6. **Mobilizing CSR and CER Funds for Biodiversity compatible Climate Action.** Formulate institutional guidelines to channel Corporate Social Responsibility (CSR) and Compensatory Environmental Responsibility (CER) funds toward biodiversity-centric adaptation, restoration, and capacity-building projects.

7. **Citizen Scientists' Capacity Development.** Empower students, residents, and local institutions through biodiversity monitoring toolkits, mobile apps, and public engagement platforms. Focus on urban and peri-urban ecosystems to build decentralized monitoring networks.

Medium-Term Actions (3–5 Years)

8. **Nature-based Climate Adaptation and Resilience Interventions.** Implement location-specific green infrastructure, microclimate enhancement, and water-sensitive design in farming landscapes and urban ecosystems. Promote nature-based solutions to buffer climate impacts and enhance ecosystem services.
9. **Intensive Conservation of Biodiversity Hotspots and RET Species in Climate-Vulnerable Zones.** Prioritize recovery plans for Rare, Endemic, and Threatened (RET) species. Combine habitat restoration with community-led ex situ conservation in areas most vulnerable to climate change.

Long-Term Actions (6–10 Years)

10. **Development of a Web GIS-Based Spatial Designs of Landscapes and Waterscapes.** Build a dynamic, interactive platform integrating spatial biodiversity data, climate models, and scenario planning tools. Enable evidence based decision making for conservation, land-use planning, and climate adaptation at multiple governance levels.

Approach/Strategies

Grounding Action in the State Climate Policy Framework: Kerala's biodiversity climate integration shall be anchored in the State Action Plan on Climate Change (SAPCC), which defines strategic adaptation and mitigation pathways across agriculture, forestry, water, energy, and urban sectors. All biodiversity interventions from downscaled climate projections to biodiversity mainstreaming in urban planning will be aligned with SAPCC's sectoral missions and implementation timelines. The Directorate of Environment and Climate Change (DoECC), as SAPCC's nodal agency, shall coordinate interdepartmental action, mobilize climate finance (e.g., CSR/CER), and ensure coherence with the State Biodiversity Strategy and Action Plan (SBSAP).

Strengthening Data Systems and Decision Support Tools: The DoECC shall lead the development of a Web GIS-based Spatial Decision Support System integrating climate risk overlays, distribution of Rare, Endangered and Threatened (RET) species, land-use change analytics, and urban ecological data. This platform will enable evidence-based

planning by Local Self-Governments, Forest Departments, and urban agencies. In parallel, climate model downscaling will be undertaken with KSCSTE, IMD, and academic institutions to generate localized forecasts for biodiversity-integrated forest, urban, and coastal management.

Scaling Ecosystem-Based Adaptation and Resilient Urban Planning: Ecosystem-based and landscape-level including source-sink synergy strategy and adaptation approaches will be implemented to enhance Kerala's climate resilience and biodiversity outcomes. This includes wetland and coastal buffer restoration, expansion of green-blue infrastructure, and targeted habitat recovery for RET species. The DoECC, in collaboration with the Forest Department, KWA, and urban local bodies, shall pilot biodiversity-integrated town planning models (e.g., using the City Biodiversity Index) and promote green buildings under Rebuild Kerala and AMRUT 2.0. These efforts will contribute to SAPCC's urban, forestry, and health missions.

Community Participation, Sustainable Practices, and Climate Finance: Community-based action will be prioritised through institutional mechanisms for mobilising CSR and CER funds, particularly for ecosystem restoration, biodiversity education, and local innovation. Public awareness campaigns and green procurement guidelines shall promote sustainable consumption, behaviour change, and resource efficiency. Citizen science platforms, supported by educational institutions and urban clubs, will enhance ecological literacy and feed into real-time biodiversity-climate monitoring networks.

Capacity Building and Multi-Stakeholder Governance: Capacity development modules on biodiversity-sensitive urban planning, nature-based solutions, and emission-ecosystem trade-offs shall be deployed by the DoECC in collaboration with KILA, LSGD, and academic partners. A Climate-Biodiversity Convergence Cell, convened by DoECC with KSBB, KSCSTE, Forest and Urban Affairs departments, and civil society, will oversee implementation, coordinate cross-sectoral efforts, and report Kerala's contributions under the Kunming-Montreal Global Biodiversity Framework and the UNFCCC Global Stocktake process.

Linkages with KM-GBF targets

Together, these actions under KSB Target Goal 5 address 11 out of the 23 KM-GBF targets:

Acquiring Deeper Knowledge of Climate Change Phenomena: This action supports KM-GBF Target 21 by enhancing the availability and accessibility of biodiversity-climate knowledge. It also contributes to Target 8 by informing climate-resilient biodiversity planning and to Target 20 through expert networks and citizen science engagement. Downscaling Global Climate Predictions to Suit Kerala: Localised climate projections contribute to Target 8 by enabling climate-informed biodiversity action. They also

support Target 14 by integrating biodiversity into climate adaptation strategies and Target 20 through institutional collaboration.

Promotion of Sustainable Consumption: Awareness campaigns and LSG-led initiatives promote resource-efficient lifestyles, directly supporting Target 16 (sustainable consumption and waste reduction) and indirectly contributing to Target 15 by encouraging responsible business practices.

Preparation of City Biodiversity Index: Operationalising biodiversity baselines in urban centres supports Target 12 (biodiversity-friendly urbanisation), Target 14 (mainstreaming biodiversity in planning), and Target 20 (institutional strengthening and participatory monitoring).

Monitoring the Impact of Emission-Intensive Businesses on Biodiversity: This action aligns with Target 15 by encouraging businesses to assess and disclose biodiversity-related risks. It also supports Target 16 through ESG-aligned audits and Target 4 by identifying pressures on threatened species and habitats.

Mobilisation of CSR and CER Funds: Redirecting corporate funds to biodiversity-centric restoration and adaptation supports Target 19 (resource mobilisation), Target 18 (positive incentives), and Target 8 (climate resilience through nature-based solutions). Capacity Development of Citizen Scientists: Empowering local communities and students in biodiversity monitoring supports Target 20 (capacity-building), Target 21 (knowledge access), and Target 22 (inclusive participation).

Promotion of Climate Adaptation and Resilient Interventions: Green infrastructure, microclimate enhancement, and water-sensitive design directly support Target 8 by embedding nature-based solutions into climate adaptation. These actions also contribute to Target 11 by enhancing nature's contributions to people.

Intensive Conservation of RET Species in Climate-Vulnerable Zones: This action supports Target 4 by halting species extinction and maintaining genetic diversity. It also contributes to Target 8 by integrating species conservation into climate resilience strategies.

Development of a Web GIS-Based Spatial Decision Support System: This platform supports Target 21 by improving access to biodiversity-climate data, Target 14 by informing spatial planning, and Target 20 by enabling evidence-based governance.

Social-Environmental - Production Target Area 2

Recognising Dynamic Bio-cultural Diversity and Traditional Knowledge

Protecting Kerala's Bio-Cultural Heritage Through Inclusive and Community-Led Conservation"

Kerala, known for its rich tapestry of social and cultural diversity, is uniquely positioned to adopt a whole-of-society approach to biodiversity conservation. Leveraging its consistent performance in achieving several social goals as highlighted by the NITI Aayog's SDG Index, such as advancements in education, health, and gender equality, Kerala aims to channel its societal strengths into actionable frameworks for biodiversity conservation and sustainable and equitable use.

This target area emphasizes the integration of cultural pluralism into environmental stewardship. The traditional knowledge of indigenous communities, participatory governance systems, and vibrant local practices will serve as critical resources for addressing biodiversity challenges. However, Kerala's relatively underwhelming performance in the environmental dimensions of the SDGs highlights the need for a robust intervention. To bridge this gap, actions under this target area will focus on community-driven initiatives such as systematic documentation of traditional knowledge, capacity building for sustainable resource use, and promoting biodiversity education.

The following 9 Action Targets were identified for this Area: See Chart 6 for the KM-GBF-Aligned Indicator Framework for Monitoring this Target Area.

Targeted Action/ Mode of Implementation

Short-Term Actions (0–2 Years)

1. **Protection of Traditional Knowledge and Tribal Development.** Document and safeguard indigenous knowledge systems, bio-cultural practices, and heritage assets—prioritizing Particularly Vulnerable Tribal Groups (PVTGs). Strengthen linkages with development schemes, community rights under FRA, and knowledge-based livelihood programmes.
2. **Sustainable Collection of Non-Wood Forest Produce (NWFP).** Promote ecologically sound and livelihood-secure NWFP harvesting through community micro-plans, sustainable harvest protocols, and value addition by tribal cooperatives and VanaVigyanKendras. Ensure fair market access and benefit-sharing.

3. **Supply and Value Chain Mapping of Tradable Bioresources.** Analyse the flow, pricing, and actors in bioresource trade chains to identify sustainability bottlenecks, policy gaps, and opportunities for enhancing community benefits. Use findings to inform regulatory and incentive frameworks.
4. **Revitalization of Biodiversity-Linked Cultural Traditions.** Support local festivals, food systems, and place-based practices that celebrate biodiversity. Provide cultural grants, develop heritage trails, and integrate biodiversity themes into school and community events.
5. **Biodiversity Education for Youth and Students.** Integrate biodiversity literacy into school curricula, eco-clubs, and student fellowships. Emphasize bio-cultural heritage, intergenerational learning, and experiential education through field visits, art and cultural programmes and storytelling.
6. **Public Awareness and Biodiversity Communication.** Launch community radio programmes, social media campaigns, and storytelling platforms that valorise traditional knowledge and mobilize public support for conservation. Engage youth, artists, and local media in co-creation.

Medium-Term Actions (3–5 Years)

7. **Development of Biodiversity Entrepreneurship Programmes.** Nurture community-based enterprises around wild foods, herbal medicine, eco-tourism, and crafts. Link training, incubation, and marketing support to women's networks such as Kudumbashree and tribal SHGs. Promote ethical sourcing and cultural branding.

Long-Term Actions (6–7 Years)

8. **Establishment of a Permanent Bio-Cultural Diversity Fund.** Create a dedicated financial mechanism to support community-led conservation, tribal development, IPR protection, and bio-cultural revitalization. Use the fund to support the declaration and management of Biodiversity Heritage Sites and other community-conserved areas.
9. **Promotion of One Health Rooted in Sustainable Bioresource Use.** Integrate ecosystem health, human well-being, and biodiversity stewardship into rural health systems and tribal development programmes. Promote cross-sectoral collaboration to embed One Health principles in sustainable resource governance.

Approach/Strategy

Community-Led Documentation and Traditional Knowledge Protection: Kerala will strengthen People's Biodiversity Registers (PBRs) as living, community-owned repositories of traditional knowledge (TK), cultural heritage, and ecological stewardship. Priority shall be accorded to tribal-dominated Panchayats and forest fringe villages. Documentation will be multilingual, capturing oral histories, folk practices, and ethnomedicinal knowledge in tribal languages such as Irula, Kurumba, and Muthuvan. Audio-visual formats will be adopted to ensure intergenerational continuity and reduce reliance on text-based systems. These enriched PBRs shall serve as the legal and cultural basis for benefit-sharing, TK recognition, and cultural valorisation.

Establishing a State-Level TKDL and Bio-Cultural Data Systems: A Kerala-specific Traditional Knowledge Digital Library (TKDL) will be developed, modelled on the national TKDL and tailored to tribal and regional systems. This secure, multilingual, searchable repository will integrate validated knowledge from PBRs, cultural mapping, and ethnobotanical studies. Defensive IP protection shall be enabled under national and global regimes, supported by alignment with the revised State IPR Policy, Access and Benefit-Sharing frameworks, and Geographical Indication (GI) processes to uphold community rights and deter misappropriation.

Tribal Development Through Knowledge-Led Livelihoods: Documented traditional knowledge will be activated as a foundation for community-based, dignity-driven livelihoods. Sustainable NWFP collection, wild food systems, and bio-cultural tourism enterprises shall be designed in accordance with customary norms and local governance. Initiatives to revive festivals, crafts, and healing traditions will be supported through entrepreneurship promotion and value chain integration. Tribal Youth Fellows and Eco-Guardians shall be deployed as cultural and ecological custodians across generations.

Education, Communication, and Intergenerational Learning: Biodiversity education will be enriched with bio-cultural content in formal and non-formal curricula, particularly in tribal regions. Schools shall adopt locally adapted learning modules using audio-visual storytelling and experiential pedagogy. Communication campaigns and community media will celebrate TK as a living knowledge system—linking ancestral wisdom with contemporary science and innovation. Cultural exchanges and public engagement shall foster mutual respect, knowledge transmission, and ecosystem sensitivity.

Linkages with Key KM-GBF targets

Together, these actions under the Target Area 6 address the following 13 out of the 23 KM-GBF targets:

Traditional Knowledge Protection and Tribal Development: This action directly supports KM-GBF Target 13 by safeguarding traditional knowledge and ensuring fair and equitable benefit-sharing. It also contributes to Target 21 by enhancing access to knowledge systems and to Target 22 by upholding the rights and participation of Indigenous Peoples and Local Communities (IPLCs).

Sustainable Collection of Non-Wood Forest Produce (NWFP): Promoting ecologically sound NWFP harvesting supports Target 5 (sustainable use of wild species), Target 9 (ecosystem services and livelihoods), and Target 13 (benefit-sharing). It also reinforces Target 20 through community protocols and capacity-building.

Supply Chain and Value Chain Analysis of Tradable Bioresources: This action contributes to Target 16 by identifying sustainability gaps and promoting responsible consumption. It also supports Target 9 by enhancing the value of ecosystem services and Target 13 by improving benefit-sharing mechanisms.

Revitalisation of Biodiversity-Linked Cultural Traditions: Supporting festivals, food systems, and place-based practices contributes to Target 4 (genetic and cultural diversity), Target 12 (urban and peri-urban biodiversity), and Target 21 (knowledge access and intergenerational learning).

Promoting Biodiversity Education Among Youth and Students: This action supports Target 20 (capacity-building), Target 21 (knowledge access), and Target 23 (gender equality and youth engagement), fostering intergenerational transmission of bio-cultural knowledge.

Promoting Biodiversity Communication and Public Awareness: Community radio, storytelling platforms, and social media campaigns contribute to Target 21 (knowledge availability), Target 22 (inclusive participation), and Target 20 (awareness and education).

Establishment of a Permanent Bio-cultural Diversity Fund: This action supports Target 13 (benefit-sharing), Target 19 (resource mobilisation), and Target 22 (community-led conservation financing), ensuring long-term support for IPLC-driven initiatives.

Development of Biodiversity Entrepreneurship Programmes: Supporting community enterprises around wild foods, herbal medicine, and crafts contributes to Target 9 (ecosystem services), Target 13 (benefit-sharing), and Target 23 (gender-responsive livelihoods).

Promotion of ‘One Health’ Concept rooted in Sustainable Use of Bioresources: This integrative approach supports Target 11 (nature’s contributions to people), Target 4 (species and ecosystem health), and Target 20 (cross-sectoral capacity-building). Community-Led Documentation and Traditional Knowledge Protection: Strengthening People’s Biodiversity Registers (PBRs) and multilingual documentation supports Target 13 (traditional knowledge protection), Target 21 (knowledge access), and Target 22 (Local Community participation and rights recognition).

Establishing a State-Level TKDL and Bio-Cultural Data Systems: Creating a Traditional Knowledge Digital Library (TKDL) supports Target 13 and Goal C by preventing misappropriation and enabling benefit-sharing. It also contributes to Target 17 by strengthening legal and ethical safeguards.

Tribal Development through Knowledge-Led Livelihoods: This action supports Target 9 (ecosystem services), Target 13 (benefit-sharing), and Target 23 (gender and social equity), linking conservation with dignity-based economic empowerment.

Education, Communication, and Intergenerational Learning: Locally adapted curricula, storytelling, and cultural exchanges contribute to Target 21 (knowledge systems), Target 20 (capacity-building), and Target 22 (inclusive governance).



Social-Environmental-Production Target 3

Empowering Local Governance Institutions for Mainstreaming Biodiversity

Empowering Local Governance for Unified, Inclusive Action on Biodiversity and Sustainable Development

KSBB is committed to leveraging the state's strong LSG framework, encompassing Panchayati Raj Institutions and urban local bodies, to drive biodiversity conservation and sustainable development. This target area focuses on empowering BMCs, redefining their roles, and aligning actions with state and national biodiversity goals.

Through initiatives like PBRs, LBSAPs, and the establishment of model BMCs, KSBB aims to enhance participatory governance and integrated planning. By linking local actions to the KM-GBF and National Biodiversity NBSAP 2024–2030, KSBB envisions local institutions as catalysts for bridging social, economic, and environmental goals, ensuring a sustainable and resilient future for Kerala.

The following 6 Action Targets were identified for this Area: See Chart 7 for the KM-GBF-Aligned Indicator Framework for Monitoring this Target Area.

Targeted Action/ Mode of Implementation

Short-Term Actions (0–2 Years)

1. Capacity Development of BMCs for KBSAP: Implementation Launch structured training programmes for BMCs on biodiversity governance, planning, and monitoring & reporting. Align training content with the updated KBSAP and integrate with KSBB–KILA modules.
2. Empowering Citizen Scientists and Technical Support Groups (TSGs): Equip local volunteers, educators, and resource persons with skills in biodiversity documentation, participatory monitoring, and digital tools. Cover all biodiversity domains—terrestrial, aquatic, and agro-ecosystems—to strengthen grassroots data generation and stewardship.
3. Mainstreaming Gender-Responsive and Inclusive Biodiversity Planning: Integrate gender equity and social inclusion into local biodiversity planning, benefit-sharing mechanisms, and leadership roles within BMCs and conservation committees. Promote women's participation in decision-making and recognize gendered ecological knowledge.

Medium-Term Actions (3–5 Years)

4. Operationalization of Local Biodiversity Funds (LBFs): Institutionalize decentralized biodiversity financing mechanisms at Panchayat and Municipal levels. Mobilize resources through ABS receipts, CSR contributions, state allocations, and other legally permissible sources. Ensure transparent governance and community oversight of fund utilization.
5. Establishment of Model BMCs as Biodiversity Governance Champions: Identify and mentor high-performing BMCs through targeted handholding, recognition schemes, and peer learning platforms. Showcase best practices in participatory governance, innovation, and community engagement to inspire replication across the state.

Long-Term Actions (6–10 Years)

6. Promotion of Sustainable Production and Consumption Models: Implement behaviour change campaigns, green procurement standards, and bioresource-based livelihood models across sectors. Anchor biodiversity conservation within local economies, value chains, and everyday lifestyles to ensure long-term sustainability.

Approach/Strategies

Strengthening Local Capacity for Participatory Biodiversity Governance: A unified, multi-tiered capacity development strategy will be established to empower Biodiversity Management Committees (BMCs), Citizen Scientists, Kudumbasree, and MGNREGS members and Technical Support Groups (TSGs). This strategy shall be integrated into Kerala Institute of Local Administration (KILA)'s decentralized training architecture, customized for KBSAP implementation. Bilingual toolkits in Malayalam and English will be developed, covering PBR updating, biodiversity–climate linkages, and participatory monitoring. Academic institutions, civil society, and youth networks will form a decentralized ecosystem of support, transforming BMCs into vibrant custodians of biodiversity knowledge and local action.

Creation of Local Biodiversity Funds: LBFs will be operationalized at Panchayat and urban LSG levels. ABS receipts, environmental fines, and CSR allocations shall be channelled into these funds. Simplified financial protocols and training modules will be instituted to ensure transparent, participatory, and outcome-oriented utilization of funds for conservation, ecological awareness, and sustainable livelihoods.

Promotion of Gender-Responsive and Inclusive Biodiversity Projects

The KSBB-developed She-Bio Strategy will be deployed to embed women's leadership and gender equity across biodiversity governance layers. The strategy will activate the She-Bio Cell as a knowledge and innovation hub for women-led interventions in forest, wetland, coastal, and agrobiodiversity systems. Key actions include:

- Embedding gender-sensitive indicators in LBAPs and BMC performance metrics
- Collaborating with Kudumbasree, tribal cooperatives, and ST development agencies for biodiversity-linked enterprises
- Promoting women's representation and leadership in BMCs, eco-restoration initiatives, and conservation entrepreneurship networks

These actions will align Kerala's governance approach with KM-GBF equity and inclusivity targets, while mobilizing women's ecological innovation.

Building Model BMCs Across Ecological and Governance Archetypes: Model BMCs will be identified, mentored, and showcased to represent Kerala's diverse ecosystems and administrative contexts, serving as demonstration hubs for participatory governance. Special emphasis shall be placed on:

- Remote Mountain Gram Panchayats (e.g., Wayanad, Idukki): To model tribal-integrated governance, endemic species conservation, and agroforestry-landscape integration
- Island Panchayats (e.g., Munroe Island, Perumbalam Panchayath & Kumbalangi Panchayath): For innovations in mangrove management, salinity-resilient farming, and coastal ecotourism
- Disaster-Prone Panchayats (e.g., Mundakkai, Chooralmala in Wayanad): To pilot biodiversity-informed disaster risk reduction, slope restoration, and community early warning
- Urban and Peri-Urban LSGs (e.g., Kochi, Kozhikode): To mainstream biodiversity-sensitive master planning and civic eco-literacy using tools like the City Biodiversity Index

Promotion of Sustainable Production and Consumption: Biodiversity-friendly practices in farming, fisheries, crafts, and procurement will be promoted through targeted campaigns and policy alignment with LSGD and State Planning Board directives. Key actions include:

- Implementation of Green Panchayat rating frameworks
- Development of community-managed food forests
- Adoption of biodiversity-centric local green protocols under Haritha Keralam and LBSAPs

Linkages with KM-GBF Targets

Together, these actions under KSB Target Area 7 address the following 15 out of the 23 KM-GBF targets

Capacity Development of BMCs for KBSAP Implementation: This action directly supports KM-GBF Target 20 by strengthening institutional capacity for biodiversity governance at the local level. It also contributes to Target 14 by embedding biodiversity into decentralised planning and to Target 21 by ensuring that knowledge systems are accessible and actionable.

Capacity Development of Citizen Scientists and Technical Support Groups (TSGs): Training local volunteers and educators in biodiversity documentation and monitoring supports Target 20 (capacity-building), Target 21 (knowledge access), and Target 22 (inclusive participation of local communities).

Promotion of Gender-Responsive and Inclusive Biodiversity Projects: This action advances Target 23 by promoting gender equality in biodiversity governance. It also supports Target 22 by ensuring the participation of marginalised groups and Target 20 through inclusive institutional strengthening.

Creation of Local Biodiversity Funds (LBFs): Operationalising decentralised biodiversity financing mechanisms contributes to Target 19 (resource mobilisation), Target 13 (benefit-sharing through ABS and CSR), and Target 20 (institutional sustainability of BMCs and LSGs).

Building Model BMCs in Biodiversity Governance Performance: Identifying and mentoring high-performing BMCs supports Target 14 (mainstreaming biodiversity in governance), Target 20 (capacity-building), and Target 22 (inclusive and participatory governance).

Promotion of Sustainable Production and Consumption: This action supports Target 10 (biodiversity-friendly production systems), Target 16 (sustainable consumption and waste reduction), and Target 18 (positive incentives for biodiversity conservation at the local level).

Strengthening Local Capacity for Participatory Biodiversity Governance: This overarching strategy reinforces Target 20 by institutionalising training and support systems for BMCs, VSSs, and LSGs. It also contributes to Target 14 by integrating biodiversity into local development plans and to Target 21 through community-based knowledge systems.

Promotion of Gender Equity through the She-Bio Strategy: Embedding women's leadership in biodiversity planning and benefit-sharing mechanisms supports Target 23 (gender equality), Target 22 (inclusive participation), and Target 20 (institutional innovation and equity).

Development of Model BMCs Across Ecological and Governance Archetypes: This action contributes to Target 1 (spatial planning across all areas), Target 2 (ecosystem restoration), Target 11 (ecosystem connectivity), and Target 12 (urban biodiversity), depending on the ecological context of each model BMC.

Integration of Biodiversity into Local Economies and Lifestyles: Promoting biodiversity-linked livelihoods and green procurement supports Target 10 (sustainable agriculture and production), Target 16 (sustainable consumption), and Target 18 (positive incentives for conservation).



Social-Environmental - Production Target Area 4:

Creating Nature-based Climate Resilient Rural and Urban Infrastructure

Building Climate-Resilient Infrastructure with Integrated Biodiversity Safeguards

India, committed to various global environmental accords such as the Paris Agreement and the Convention on Biological Diversity, aligns its infrastructure development with sustainable and adaptive goals. Kerala, known for its diverse ecosystems and unique geographical features, plays a crucial role in this national commitment.

Kerala's focus on resilient infrastructure addresses climate change, supports biodiversity, and promotes sustainable development, aligning with the SDGs. The state is implementing key actions such as integrated water resource management, sustainable ecotourism, enhanced energy efficiency, and eco-friendly transport.

In water resource management, the Plan is to achieve cross-sectoral planning and management, integrated watershed management, soil conservation, and flood risk mitigation. The state targets the completion of multiple projects by 2025 and further expansion by 2027, enhancing water use efficiency and community resilience.

For eco-friendly transport, Kerala focuses on optimising existing infrastructure, developing pedestrian and cycling tracks, and increasing the share of water and rail transport. The state aims to reduce ecological damage and transport emissions significantly by 2030, enhancing overall transport efficiency.

The following 7 Action Targets were identified for this Area: See Chart 8 for the KM-GBF-Aligned Indicator Framework for Monitoring this Target Area.

Targeted Action/ Mode of Implementation

Short-Term Actions (0–2 Years)

- 1. Institutionalization of Biodiversity and Green Protocols:** Introduce biodiversity-inclusive protocols across infrastructure planning, construction, and operations. Update LSGD and sectoral guidelines to incorporate native landscaping, green procurement standards, waste minimization practices, and urban greening mandates. Align implementation with the Haritha Keralam Mission and city-specific master plans for rapid adoption.

2. **Enhancing Energy Efficiency in Public and Community Infrastructure:** Implement demand-side energy management in public buildings, schools, and local institutions through LED retrofits, efficient appliances, and behavioural nudges. Launch awareness campaigns and incentive schemes targeting households and MSMEs, particularly in climate-vulnerable regions.

Medium-Term Actions (3–5 Years)

3. **Expansion of Green and Blue Urban Spaces:** Scale up tree canopy cover, rejuvenate urban waterbodies, and promote biodiversity-friendly infrastructure as part of Kerala's climate-resilient urban planning. Integrate these efforts into Smart City, AMRUT, and LSGD development programmes to enhance ecological connectivity and urban liveability.
4. **Ecosystem-Based and Landscape-Level Climate Adaptation:** Integrate biodiversity into watershed management, coastal zone planning, and forest restoration using ecosystem-based adaptation (EbA) approaches. Promote nature-based solutions to buffer climate risks and enhance ecosystem services across urban and peri-urban landscapes.
5. **Integrated Water Resource Management (IWRM):** Embed basin-scale water budgeting, rainwater harvesting, greywater reuse, and ecosystem-based recharge strategies into urban and rural infrastructure. Develop decentralized water governance models with convergence across irrigation, drinking water, and watershed programmes, ensuring biodiversity safeguards for wetlands and riparian habitats.

Long-Term Actions (6–10 Years)

Structural and regulatory shifts to institutionalize biodiversity in urban planning and construction ecosystems.

6. **Biodiversity-Integrated and Inclusive Town Planning:** Institutionalize biodiversity safeguards and ecosystem service valuation into Master Plans and Development Control Regulations. Ensure green equity, ecological zoning, and resilience in urban expansion and redevelopment projects.
7. **Promotion of Eco-Friendly and Nature-Integrated Buildings:** Mainstream green building codes, passive design principles, and nature-integrated architecture in both public and private construction. Establish incentive frameworks and demonstration pilots for bioresource-based construction materials (e.g., bamboo, laterite, recycled aggregates), especially in ecologically sensitive and climate-vulnerable zones.

Strategies/Approach

Mainstreaming Biodiversity and Green Protocols: Biodiversity considerations will be institutionalised across all stages of infrastructure development—from planning and design to implementation and maintenance. LSGD manuals, urban bylaws, and public works codes shall be updated to reflect green procurement standards, use of native species in landscaping, and sustainable construction practices including waste minimisation. Biodiversity-sensitive checklists will be mandated for all public infrastructure proposals and LSG planning submissions to ensure ecological safeguards are embedded in routine development.

Enhancing Energy Efficiency and Resource Optimization: Energy efficiency in public and community infrastructure will be accelerated through LED retrofits, high-efficiency appliances, and passive design principles. These interventions shall be linked to public awareness campaigns and targeted incentive schemes for households and MSMEs in climate-vulnerable regions. A convergence mechanism will be established with Kerala's Energy Conservation Strategy and Climate Resilience Pathway to maximize synergies and policy coherence.

Eco-Friendly and Climate-Responsive Building Practices

- **Green Home Guidelines and Incentives:** Kerala's green building incentive framework will be leveraged to encourage adoption of eco-design principles in public and private construction. Tax rebates and expedited approvals shall be extended for compliance with standards on energy, water, and sustainable materials—especially in climate-sensitive zones.
- **Pachathuruth(green islets) Initiatives under Haritha Keralam:** The establishment of mini-forests and green islets in urban and peri-urban settings with location specific native species will be integrated into infrastructure projects. These micro-ecosystems shall serve as biodiversity hotspots, urban cooling buffers, and nature-access nodes.
- **Nature-Integrated Architecture:** Use of vernacular materials like laterite, bamboo, and mud blocks will be promoted, along with passive cooling techniques and rainwater harvesting. Successful models, such as the Green Home in Thrissur, shall be showcased to scale adoption and innovation in climate-responsive design.
- **Demonstration Zones and Innovation Hubs:** Eco-building clusters will be developed in collaboration with Nirmithi Kendra, IGBC-certified architects, and local governments. These demonstration hubs shall serve as learning platforms for sustainable construction in coastal, highland, and climate-sensitive urban areas.
- **Integrated Water Resource Management:** A landscape-level approach to water resource management shall be adopted, integrating wetland conservation, rainwater harvesting, and greywater reuse into infrastructure systems. Convergence will be enabled among Jal Jeevan Mission, MGNREGS, and AMRUT to facilitate decentralized Water Security Plans at the LSG level. Nature-based solutions including oxbow lake rejuvenation, terracing, and recharge pond development will be implemented to enhance ecological integrity and mitigate hydrological risks.

Linkages with KM-GBF Targets

Together, these actions under the Target Goal 8 address the following 14 out of the 23 KM-GBF targets:

Promoting Biodiversity and Green

Protocols: Institutionalising biodiversity-inclusive protocols across infrastructure planning and operations directly supports KM-GBF Target 14 (mainstreaming biodiversity in decision-making). It also contributes to Target 12 (biodiversity-friendly urbanisation) and Target 8 (climate resilience through nature-based solutions).

Enhancing Energy Efficiency: Demand-side energy management in public buildings and MSMEs contributes to Target 16 (sustainable consumption and waste reduction) and Target 8 (climate mitigation). It also supports Target 15 by encouraging businesses and institutions to reduce their biodiversity-related impacts.

Enhancement of Green and Blue Urban

Spaces: Scaling up tree canopies, waterbody rejuvenation, and biodiversity-friendly infrastructure directly supports Target 12 (urban biodiversity and equitable access to ecosystem services). It also contributes to Target 11 (nature's contributions to people) and Target 1 (spatial planning for ecosystem integrity).

Ecosystem-Based and Landscape-Based Adaptation to Climate Change: Integrating biodiversity into watershed management, coastal planning, and forest restoration supports Target 8 (climate resilience), Target 2 (ecosystem restoration), and Target 11 (ecosystem services such as flood mitigation and water regulation).

Integrated Water Resource Management:

Embedding biodiversity safeguards into water budgeting, rainwater harvesting, and recharge strategies contributes to Target 11 (nature's contributions to people), Target 14 (biodiversity in infrastructure planning), and Target 8 (climate adaptation).

Biodiversity-Integrated and Inclusive

Town Planning: Institutionalising biodiversity safeguards into Master Plans and Development Control Regulations supports Target 14 (mainstreaming biodiversity), Target 12 (urban biodiversity), and Target 1 (spatial planning across all areas).

Promotion of Eco-Friendly Buildings:

Mainstreaming green building codes and nature-integrated architecture contributes to Target 16 (sustainable consumption), Target 8 (climate mitigation), and Target 10 (biodiversity-friendly production systems, particularly in construction and materials).

Green Home Guidelines and Incentives:

Providing tax rebates and fast-track approvals for eco-sensitive construction supports Target 18 (positive incentives for biodiversity) and Target 19 (resource mobilisation through fiscal innovation).

Pachathuruth(Green Islets) Initiatives:

Establishing mini-forests in urban and peri-urban areas contributes to Target 12 (urban biodiversity), Target 11 (ecosystem services), and Target 3 (area-based conservation in non-traditional spaces).

Demonstration Zones and Innovation

Hubs: Creating eco-building clusters and demonstration hubs supports Target 20 (capacity-building), Target 14 (mainstreaming biodiversity), and Target 21

Chapter 7

Implementation Framework



Implementation Framework

A roadmap is developed for translating Kerala's 2035 Biodiversity Vision into action through clearly defined time horizons short-term (0–2 years), medium-term (3–5 years), and long-term (6–10 years). The integration of state-level priorities with Local Biodiversity Strategy and Action Plans, ensuring alignment across governance levels, is emphasized while highlighting the catalytic role of Model Biodiversity Management Committees and citizen science platforms in driving innovation and community engagement. A key focus is placed on gender-responsive and inclusive implementation through the She-Bio Strategy.

Action Horizons

Each target area is defined by a clear objective and supported by a set of targeted actions, which are further categorised into three implementation horizons.

- **Short-Term (0–2 Years):** Immediate, policy-ready interventions leveraging existing programmes and institutional mechanisms
- **Medium-Term (3–5 Years):** Phased actions requiring capacity building, interdepartmental coordination, and systemic integration
- **Long-Term (6–10 Years):** Transformative, resource-intensive initiatives aimed at structural reform and long-term ecological resilience.

Integration with Local Biodiversity Strategy and Action Plans (LBSAPs)

Local Biodiversity Strategy and Action Plans embody a whole-of-society approach through the “5-P” partnership model People, Panchayats, Private-Public Sectors, Promoters, and Policy Makers. They function as key instruments for implementing Access and Benefit Sharing, managing local heritage sites, and mobilizing resources via the State Biodiversity Fund. Additionally, LBSAPs enhance Kerala's capacity to report on biodiversity progress, supporting India's commitments under the NBSAP and SDGs.

For effectively involving the BMCs, KSBB has initiated the LBSAP preparation in about 100 LSG bodies as a pilot. The LBSAP process enables each LSG to identify its unique biodiversity assets, threats, and opportunities, and to develop time-bound action plans that feed directly into the K-SBSAP's eight strategic action areas and 80 targeted actions.

Why LBSAP Matters

- Kerala's ecological complexity ranging from landslide-prone Western Ghats to rapidly changing marine ecosystems demands decentralized, site-specific strategies and action.

- With 941 Grama Panchayats, 87 Municipalities, and 6 Corporations, Kerala has a robust institutional base for local biodiversity governance through BMCs.

Key Features of LBSAP as a K-SBSAP Implementation Tool

- **Localization of KM-GBF Targets:** LBSAPs contextualize global and state biodiversity goals such as ecosystem restoration, sustainable use, and benefit sharing within the ecological and socio-economic realities of each LSG.
- **Participatory Planning:** Through BMCs and Technical Support Groups, LBSAPs ensure community ownership, traditional knowledge integration, and gender-responsive planning.
- **Risk-Informed Action:** LBSAPs incorporate local climate and disaster risk assessments (e.g., landslide-prone zones, coastal vulnerability) to prioritize nature-based solutions and ecosystem resilience.
- **Monitoring and Evaluation:** LBSAPs are designed to align with the KM-GBF-aligned monitoring framework, using headline, component, binary, and complementary indicators to track progress
- **Mainstreaming Biodiversity:** By linking biodiversity actions with local development plans, LBSAPs promote integration across agriculture, fisheries, forestry, health, and urban planning sectors.

Role of Model BMCs and Citizen Science Platforms

Model Biodiversity Management Committees: From Policy to Practice KSBB has operationalized the concept of Model BMCs by supporting over 75 local bodies across all districts through targeted funding, technical guidance, and capacity building. These BMCs have implemented a wide range of site-specific conservation projects, demonstrating how decentralized biodiversity governance can be both participatory and impactful.

Highlights from Model BMC Projects

- **Ecosystem Restoration:** Projects include mangrove conservation in Kollam and Malappuram, riparian vegetation planting in Kozhikode and Wayanad, and sacred grove restoration in Palakkad and Idukki.
- **Agrobiodiversity Conservation:** Initiatives such as the conservation of Pokkali rice in Ernakulam, Palakkadan Matta rice in Palakkad, and Wayanadan turmeric in Wayanad, Alleppey turmeric in Alappuzha showcase the protection of traditional crop varieties.
- **Biodiversity Parks & Gardens:** Over 30 BMCs have established biodiversity parks, butterfly gardens, and medicinal plant gardens in schools and public spaces, enhancing ecological literacy and community engagement.
- **Heronry and Wetland Protection:** Conservation of bird habitats in Kireedampalam,

and Karappuzha reflects Kerala's commitment to avian biodiversity.

- **Local Biodiversity Heritage Sites (LBHS):** BMCs in Pathanamthitta, Thiruvananthapuram, and Kottayam have led the conservation of iconic trees and landscapes, integrating cultural heritage with ecological stewardship.
- **Innovative Models:** Projects like the Miyawaki forests, Harithagramam (village forests), and Theerathanal coastal conservation demonstrate scalable, community-led restoration models.

These projects serve as living laboratories for implementing K-SBSAP at the grassroots level.

Citizen Science Platforms: Expanding the Knowledge Base

The Centre for Citizen Science and Biodiversity Informatics (CCSBI), hosted by KSCSTE-KFRI, has fostered a vibrant network of citizen scientists contributing to biodiversity documentation, monitoring, and awareness. To further strengthen this ecosystem, similar citizen forums are proposed to be established in each district of Kerala by KSBB, involving existing Technical Support Groups, youth clubs, Biodiversity Clubs, farmers, nature enthusiasts, and BMCs. These platforms are to enhance BMC's efforts by generating real-time data, promoting ecological literacy through community engagement, and can support the proposed Kerala Biodiversity Information Repository (KBIR). In synergy with Model BMCs, citizen science platforms can form a core pillar of K-SBSAP implementation, translating strategic targets into local action, enabling community-led monitoring aligned with KM-GBF indicators, integrating traditional and scientific knowledge, and showcasing scalable models for restoration.

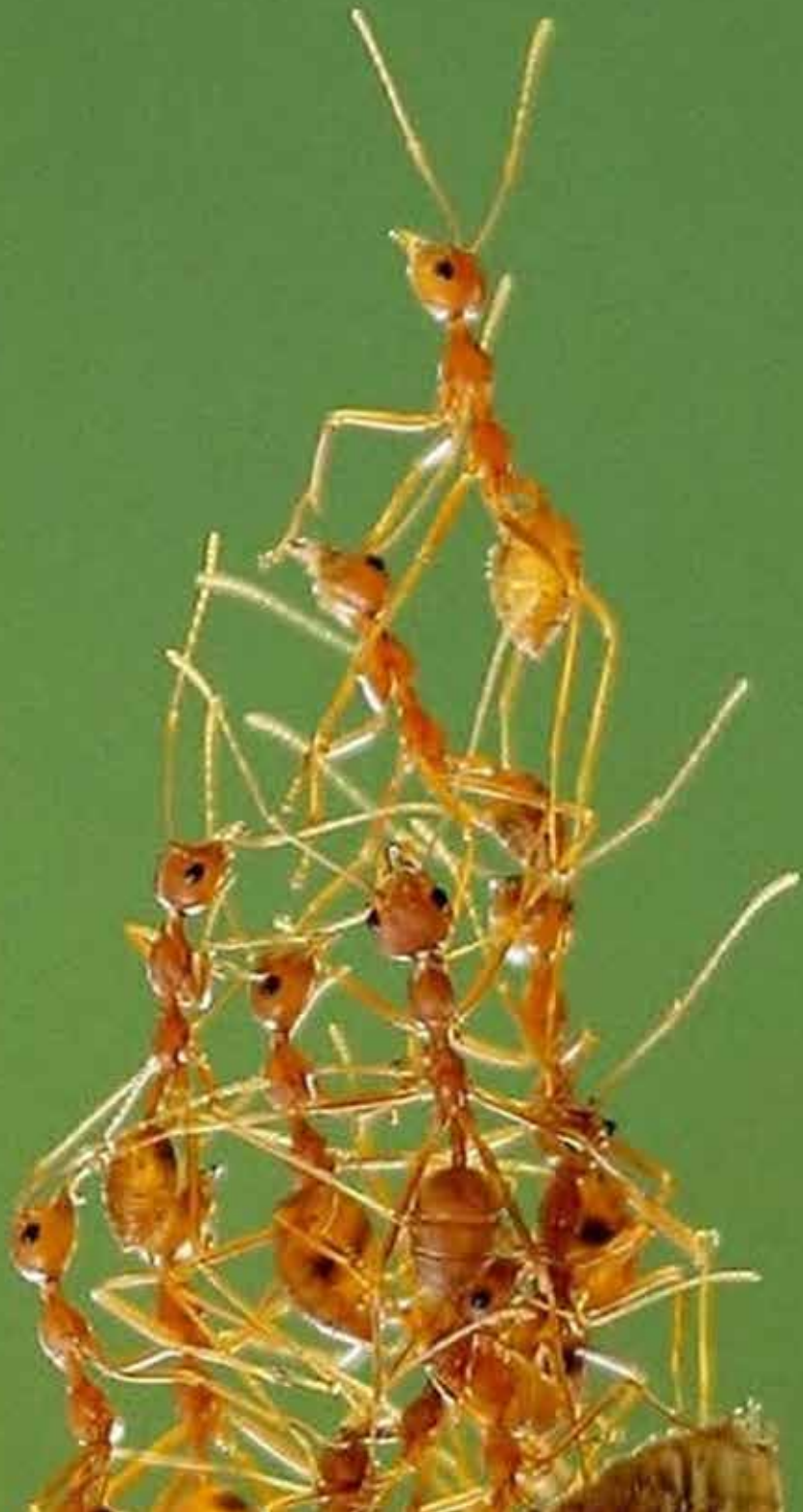
Gender-Responsive and Inclusive Implementation: The She-Bio Strategy

The She-Bio Strategy—She harnesses ecosystems for biodiversity-inspired outcomes is a flagship initiative by KSBB to mainstream gender equity in biodiversity governance, aligned with KM-GBF Targets 22 and 23. It positions women as central actors in conservation, sustainable use, and benefit-sharing. A dedicated She-Bio Cell, proposed as a Technical Support Group, will support BMCs in implementing gender-responsive actions through monitoring, capacity building, and policy advocacy, in partnership with Kerala University and Kudumbasree.

The She Bio strategy outlines ecosystem-specific interventions across forests, wetlands, coastal zones, and farmlands, promoting women-led initiatives such as afforestation, eco-enterprises, and seed sovereignty. It also introduces KM-GBF-aligned indicators to track women's participation, access to resources, and institutional reforms. By embedding gender equity into the K-SBSAP framework, She-Bio enhances inclusive governance, empowers women through biodiversity linked livelihoods, and reinforces Kerala's leadership in community-driven conservation.

Chapter 8

Monitoring, Evaluation and Reporting



Monitoring, Evaluation, and Reporting

A KM-GBF-aligned indicator framework encompassing ecological, institutional, and socio-economic dimensions is introduced to track progress across scales. The role of digital platforms and decision support tools in enabling real-time data integration and evidence based planning, along with the reporting guidelines to the National Biodiversity Authority and global platforms, is also detailed. (See Charts 1 to 8).

Monitoring and Evaluation Framework

The K-SBSAP evaluation framework adopts a multi-dimensional approach that combines precision, participation, and adaptability. Each thematic targets such as forest ecosystems, marine biodiversity, agrobiodiversity, and traditional knowledge is linked to a dedicated suite of indicators, enabling focused tracking of progress and identification of gaps.

The framework emphasizes digital integration through GIS-based tools, open-access dashboards, and mobile applications to support real-time data collection, visualization, and reporting, laying the foundation for platforms like the proposed Kerala Biodiversity Information Repository (KBIR). Participatory monitoring will be central to the approach, with BMCs, citizen scientists, and Technical Support Groups actively contributing to data generation, validation, and local-level reporting.

Adaptive management is embedded through mid-term reviews and feedback loops that allow for recalibration of strategies based on indicator trends, ecological baselines, and community insights. The framework also supports Kerala's reporting obligations to the National Biodiversity Authority, the Convention on Biological Diversity, and other global platforms, ensuring vertical integration and accountability.

KM-GBF-Aligned Indicator Framework for K-SBSAP Implementation Monitoring & Evaluation

The K-SBSAP 2025–2035 adopts a robust, multi-dimensional monitoring framework aligned with the Kunming–Montreal Global Biodiversity Framework. (See Charts 1 to 8). This framework is designed to ensure transparent, participatory, and adaptive evaluation of biodiversity outcomes across ecological, institutional, and socio-economic dimensions.

Core Features of the Monitoring Framework

- **Alignment with KM-GBF Targets:** Each of the 80 targets and eight K-SBSAP Target Areas is mapped to specific KM-GBF targets (covering 23 global targets- Annexure II), ensuring coherence with national (NBSAP 2024–2030) and global biodiversity goals.
- **Indicator Typology:** The four-tiered indicator typology adopted under the Kunming–Montreal Global Biodiversity Framework (KM-GBF)- headline, component, complementary, and binary indicators is followed.

Headline Indicators : Measure ecosystem extent, species status, and governance performance.

Component Indicators : Track sectoral integration, institutional capacity, and community participation.

Complementary Indicators: Reflect regional or ecosystem-specific priorities, such as endemic species, traditional knowledge, or local governance innovations.

Binary Indicators: Assess policy adoption, institutionalization, and digital integration.

A multi-tiered Institutional Responsibility is also ensured in collaboration with sectoral departments (e.g., Forest, Fisheries, Agriculture), research institutions (e.g., KFRI, JNTBGRI, CMFRI), and local self-governments (LSGs), supported by digital platforms and citizen science networks.

Digital Platforms & Decision Support Tools for KSBSAP Implementation

The K-SBSAP recognises the critical role of digital infrastructure in enabling evidence-based planning, participatory governance, and integrated biodiversity management. Kerala is home to several institutional digital platforms that already contribute to biodiversity documentation and monitoring. See the existing digital infrastructure (Table 4). To strengthen this ecosystem, the KSBB is currently conceptualising two flagship platforms—the Kerala Biodiversity Information Repository (KBIR) and the State-level Traditional Knowledge Digital Library (TKDL) to serve as future-ready digital backbones for KSBSAP implementation.

Kerala Biodiversity Information Repository (KBIR) (Proposed)

The KBIR is envisioned as an AI-enhanced, interactive web portal that will function as the central biodiversity intelligence system for Kerala. Currently in the discussion and design stage, KBIR aims to consolidate validated biodiversity data across all taxonomic

groups, integrating inputs from People's Biodiversity Registers (PBRs), citizen science platforms, and institutional databases. Its proposed features include:

- Real-time species monitoring and spatial mapping
- Taxonomic and ecological databases aligned with KM-GBF targets
- Decision-support tools for ecosystem restoration, invasive species management, and climate resilience
- Interoperability with platforms like India Biodiversity Portal, ENVIS, and GBIF

Traditional Knowledge Digital Library (TKDL – Kerala) (Proposed)

The State-level TKDL is also in the conceptual phase, intended to digitally preserve and protect the traditional ecological knowledge of Kerala's native tribal communities. Anchored in the Biological Diversity Act (2002, amended 2023), the TKDL will document oral traditions, medicinal practices, sustainable agriculture, forest management, and cultural expressions. The proposed implementation strategy includes:

- *In-situ* documentation through community engagement and Prior Informed Consent
- Desktop research to consolidate existing knowledge
- Digitisation and classification using TKRC and IPC to prevent biopiracy
- Access and Benefit Sharing mechanisms to protect community rights

Once operational, the TKDL will serve as a secure, searchable archive for researchers, policymakers, and educators, while empowering local communities through recognition and benefit-sharing.

The Kerala Biodiversity Information Repository (KBIR) and Traditional Knowledge Digital Library (TKDL) will serve as key digital enablers of K-SBSAP, enhancing evidence-based planning, inclusive governance, and knowledge integration. They support spatial prioritization (Targets 1, 2, 10), community-led monitoring (Target 22), and the fusion of traditional and scientific knowledge (Targets 13, 14, 21).

Overall, together with the KSBB, bodies like the Biodiversity Steering Committee and the Virtual Biodiversity Cadre will monitor, evaluate the implementation of the KSBB-Mission, and report. The Steering Committee comprising senior secretary-level decision-makers from 11 key apex departments and institutions will ensure the convergence among all line departments for biodiversity mainstreaming, with quarterly meetings recommended for monitoring progress. The Virtual Biodiversity Cadre includes officials from 28-line departments and institutions, and District Biodiversity Coordination Committees (DBCC) at the district level will do the local level monitoring.

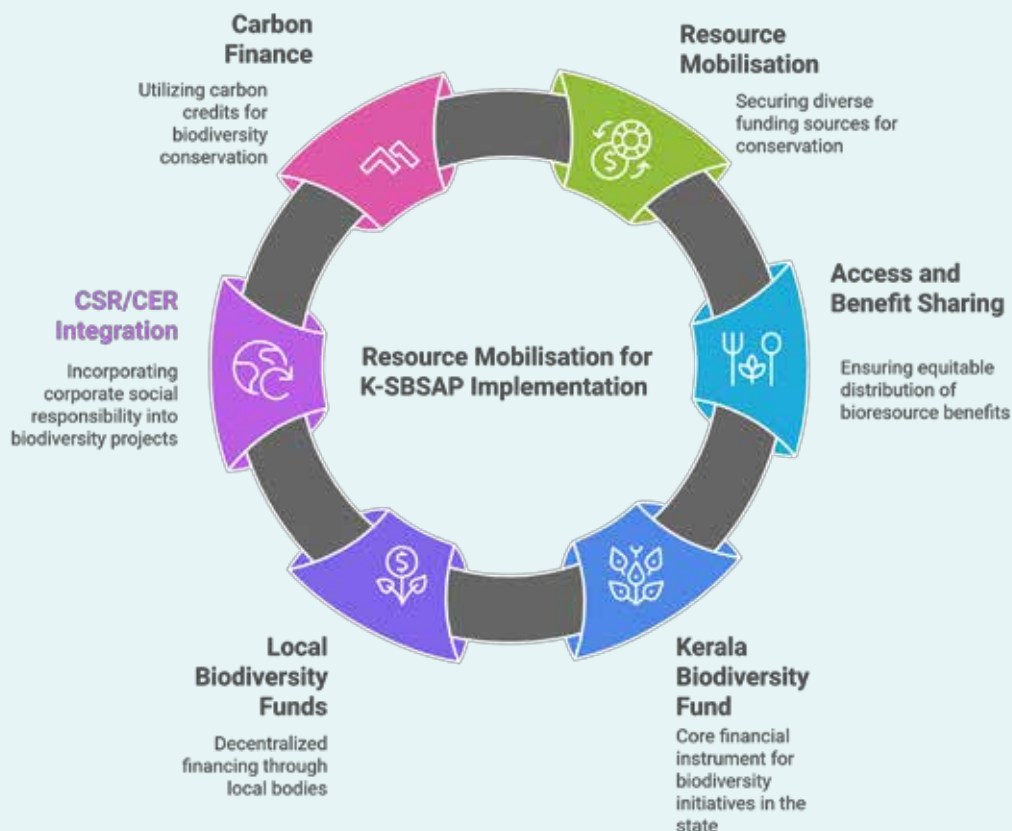
Table 4: Integration with Kerala's Existing Digital Biodiversity Infrastructure

Platform	Host Institution	Role in KSBSAP
e-PBR Platform	KSBB	Digitized People's Biodiversity Registers: a foundational data layer for both KBIR and TKDL.
Centre for Citizen Science and Biodiversity Informatics (CCSBI)	KSCSTE-KFRI	Mobilizes citizen science data for biodiversity monitoring and feeds into KBIR.
India Biodiversity Portal – Kerala Node	Collaborative	Provides species occurrence data and ecological observations; interoperable with KBIR.
Kerala BioBlitz	KSBB + IBP	Engages students and citizens in biodiversity documentation; supports awareness and data generation.
JNTBGRI Plant Database	KSCSTE-JNTBGRI	Hosts a curated digital repository of over 2,000 plant species with ethnomedicinal and cultural data: a key contributor to TKDL and KBIR.
KFSTAT Database	Kerala Forest Department + KFRI	Provides spatial-temporal data on forest biodiversity, forest dynamics, and community-based forest management; supports decision support tools under KSBSAP.
CMFRI Marine Biodiversity Repository	ICAR-CMFRI	Offers validated marine species data, ecosystem modelling, and biodiversity assessments; contributes to KBIR and marine targets of KSBSAP.
KUFOS Research Outputs	KUFOS	Supports fisheries biodiversity assessments, marine ecosystem studies, and contributes to knowledge generation for KBIR.



Chapter 9

Resource Mobilisation and Partnership Building for K-SBSAP Implementation



Financial and collaborative architecture is the most critical aspect in implementing the Kerala State Biodiversity Strategy and Action Plan (K-SBSAP). By aligning with KM-GBF Target 19 on resource mobilisation, the umbrella of the BIOFIN initiative, and Sections 21 and 43(1) of the Principal Biological Diversity Act, 2002, the Kerala State Biodiversity Board is advancing a comprehensive framework for biodiversity finance.

It is proposed to explore diverse resource streams, mainly the Access and Benefit Sharing (ABS) mechanisms, Local Biodiversity Funds (LBFs), and leveraging the emerging carbon credits markets, to ensure sustained investment in biodiversity conservation and restoration action. The integration of Corporate Social Responsibility (CSR) and Corporate Environmental Responsibility (CER) into incentive-based financing models has also been explored. Strategic partnerships with global platforms, along with the development of innovation hubs and knowledge networks, are emphasised as critical drivers for scaling impact in Kerala's biodiversity conservation efforts.

Access and Benefit Sharing (ABS):

As part of its mandate under the Biological Diversity Act 2002 (as Amendment in 2023), and in alignment with the objectives of the KSBSAP, KSBB commits to proactively leveraging Access and Benefit Sharing as a strategic instrument for biodiversity finance, community empowerment, and sustainable use of biological resources. To cite an example, a 2022 KSBB study estimated an annual ABS potential of ₹30.39 lakh from Kerala's fisheries sector—₹20.79 lakh from marine and ₹9.60 lakh from inland fisheries. With 194 domestic seafood industries and 141 exporters (MPEDA, 2020) sourcing raw materials from local waters, full-scale ABS enforcement in this sector could generate up to ₹30 crore annually.

Under the revised framework, KSBB Will work to Institutionalize ABS Compliance Across Sectors. :

KSBB will work closely with the State Government, including sectoral departments, particularly AYUSH, agriculture, fisheries, forestry, and industry, by invoking the following provisions of the Biodiversity Act and undertaking ABS-linked resource mobilization activities.

- Indian entities must obtain prior approval from KSBB for accessing biological resources for commercial purposes (Section 7, Rule 16).
- ABS contributions are levied at 0.2% – 0.6% of annual gross ex-factory sales, depending on turnover.
- For high-value resources like sandalwood, KSBB has negotiated a 5% share of auction proceeds from the Forest Department, to be institutionalised through a forthcoming Government Order.

Developing Sector-Specific ABS Protocols and Model Agreements. KSBB will formulate simplified ABS protocols tailored to key bioresource-using sectors. Pre-approved model agreements will be developed in consultation with stakeholders to reduce procedural delays and enhance legal clarity.

Promoting ABS-Linked Community Enterprises. A portion of ABS revenues will be earmarked to support community-led biodiversity enterprises, with a focus on women-led initiatives under the She-Bio framework. KSBB will facilitate incubation, technical support, and market access for such enterprises.

Ensuring Transparency and Equitable Benefit Distribution. KSBB will establish a state-level ABS registry to track approvals, benefit-sharing flows, and compliance. Mechanisms will be instituted to ensure that benefits reach local communities and are reinvested in conservation and sustainable livelihoods.

Through these commitments, KSBB aims to transform ABS from a compliance obligation into a catalytic mechanism for biodiversity stewardship, equitable development, and climate resilience in Kerala.

Kerala Biodiversity Fund (KBF): Core Financial Instrument

Established under G.O. (Rt) No. 7/2020/Env, the KBF is the primary vehicle for mobilizing and managing biodiversity-related funds in the state. It draws from:

- State and Central budgetary allocations
- Grants from the National Biodiversity Authority (NBA)
- Fees, royalties, and cess from biodiversity-impacting activities
- CSR contributions, international donor support, and benefit-sharing revenues
- Interest accruals and voluntary donations

Administered by KSBB, the fund supports conservation, restoration, research, capacity building, and implementation of K-SBSAP and LBSAPs.

Local Biodiversity Funds (LBFs): Decentralised Financing for Conservation

Section 43 (1) empowers local bodies to constitute Local Biodiversity Funds (LBFs), which can receive revenues from ABS, state grants, and other sources, including fees levied by BMCs for commercial access to bioresources.

Building on this legal foundation, KSBB is proposing to empower BMC to leverage a diverse set of revenue generation mechanisms to support K-SBSAP implementation. These include:

- Levying user fees for the commercial collection of medicinal plants, reeds, canes, and

marine resources such as shells and ornamental fish

- Special biodiversity impact taxes on ecotourism operators—such as houseboats, cruises, caravans, and nature resorts—operating in ecologically sensitive zones
- Royalties or green access fees for bioresource-based industries, including mineral-based sectors, where ecological restoration and offsetting are mandated
- Permit-based systems for butterfly parks, botanical gardens, and biodiversity-themed recreational zones
- Voluntary green contributions from pilgrims and visitors to the heritage sites in forest areas like the famous Sabarimala, Kottiyoor, and others, including sacred groves.
- Payments for Ecosystem Services (PES) in catchment areas, wetlands, and agroecological landscapes

These instruments are designed not only to mobilise resources but also to incentivise sustainable practices, internalise ecological costs, and empower local communities through equitable benefit-sharing.

CSR/CER Integration and Incentive-Based Financing: Private Sector Engagement

Kerala's Corporate Social Responsibility (CSR) inflows have grown steadily, with top contributors including the Lulu Group, Federal Bank, KEIL, and Manappuram Finance. K-SBSAP leverages this momentum by promoting:

- **ABS - linked CSR contributions:** Encouraging companies to invest in biodiversity-positive projects in return for green certification and recognition
- **Private sector participation:** In eco-tourism, agroecology, and habitat restoration, especially in areas with high conservation value
- **Incentive-based models:** Supporting biodiversity-friendly enterprises through blended finance, tax incentives, and public-private partnerships

Leveraging Carbon Finance for Biodiversity Conservation

To enhance the financial sustainability of the State Biodiversity Fund, Kerala can strategically tap into emerging carbon finance mechanisms linked to tree conservation and ecosystem restoration. The recently launched Green Credit Programme (GCP) offers a direct incentive for afforestation and reforestation on degraded lands, with credits awarded for verified ecological outcomes. The Voluntary Carbon Market (VCM), supported by approved national methodologies for mangrove restoration and agroforestry, also presents an opportunity to monetize community-led conservation efforts. Kerala could explore alignment with Article 6.2 of the Paris Agreement to attract international finance through cooperative approaches and ITMO-based transactions. By integrating these mechanisms into the KSBSAP framework—supported by robust MRV systems and equitable benefit-sharing models—the state can generate sustained revenue while advancing its commitments to the KM-GBF and India's climate goals.

Reporting to the National Biodiversity Authority and Global Platforms

The Kerala State Biodiversity Board (KSBB) remains committed to ensuring transparent and timely reporting on the implementation of the Kerala State Biodiversity Strategy and Action Plan (K-SBSAP). Under the leadership of its Member Secretary, KSBB regularly coordinates with implementing institutions to compile progress updates and submit them to the National Biodiversity Authority. These reports cover key areas such as ABS implementation, PBR and LBSAP progress, and biodiversity governance outcomes.

KSBB is also taking proactive steps to strengthen institutional interfaces—both vertically and horizontally. This includes facilitating structured engagement between the Board and NBA, and between BMCs and NBA, to ensure alignment, compliance, and knowledge exchange.

Partnerships with Global Platforms

KSBB is actively forging partnerships with leading global biodiversity platforms to elevate Kerala's role in international conservation efforts. These include the Convention on Biological Diversity (CBD), Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES), United Nations Environment Programme (UNEP), International Union for Conservation of Nature (IUCN), and the Satoyama Initiative. Through these collaborations, Kerala aims to enhance its visibility in global biodiversity dialogues and contribute substantively to international assessments, policy platforms, and reporting frameworks under the KM-GBF.

These partnerships will enable knowledge exchange, technical cooperation, and alignment of Kerala's biodiversity strategies with global best practices. They also open pathways for joint research, capacity building, and access to international funding mechanisms. By engaging with these platforms, KSBB positions Kerala as a proactive contributor to global biodiversity governance, showcasing community-led models, traditional knowledge systems, and inclusive governance innovations that can inform and inspire biodiversity action worldwide.

Annexures

KM-GBF-Aligned Indicator Framework Charts for Monitoring the K-SBSAP 2025-2035 Eight Target Areas

Chart 1: MBTA1: Participatory and Integrated Forest Ecosystem and Biodiversity Management

Type	Indicator	Means of Implementation	Responsible Agencies	Linked KM-GBF Targets*
Headline	Extent of natural ecosystems (forests, rivers, wetlands)	Remote sensing, GIS, land cover change analysis, participatory mapping, Prakrithi Vibhava Data Bank	KSBB, KFD, KSREC, Land Use Board	1, 2, 3, 8
	% of land and seas under biodiversity-inclusive spatial plans	GIS-based mapping, integration into LBSAPs, canal and highway median mapping	KSBB, LSGD, State Planning Board	1, 3, 20
	Red List of Ecosystems	Periodic assessments, threat status documentation, and monitoring protocols	KFRI, JNTBGRI, KSBB	1, 4, 6
	% of forest-dependent communities with secure tenure and benefit-sharing mechanisms	Tenure mapping, ABS implementation, and community forest rights documentation	Forest Dept., Tribal Welfare Dept., KSBB	5, 9, 20
	% of forest ecosystems with functional ecological connectivity	Landscape-level planning, corridor restoration, and ecological network modelling	KFD, KFRI, KSBB	2, 3, 5, 9
Component	Protected Area Representativeness and Connectedness Index (PARC-i)	Enhance PA networks, ecological corridors, participatory conservation, and mapping of linear habitats	KFD, KSBB, KFRI	3, 4, 5, 9, 20
	Status and trends in NWFP resource use	Sustainability studies, tribal knowledge integration	Forest Dept., Tribal Welfare Dept., KSBB	5, 9, 13
	Number of IAS eradication action plans implemented	Mapping, mechanical/biological control, community action	KFRI, KFD, LSGD	6, 20
	Area of degraded forests under landscape-level restoration	Native rewilding, natural regeneration, GIM-MGNREGS	KFD, LSGD, KSBB	2, 8, 9
	Number of RET species recovery and conservation programmes	Species recovery plans, gene banks, and arboreta	KFRI, JNTBGRI, Forest Dept.	4, 12

Complementary	Number of LBSAPs linked to KSBAP/NBSAP	BMC training, spatial planning integration	KSBB, KILA, BMCs	1, 20
	Number of ICZM plans ensuring biodiversity conservation	Coastal mapping, vulnerability assessments	DoECC, SWAK, KSBB	1, 3, 8
	% of spatial plans using Key Biodiversity Areas (KBAs)	Mandate KBA integration in planning	KSBB, LSGD	1, 3
	Number of integrated projects reducing habitat fragmentation	Wildlife corridors, riparian habitat restoration	KFD, KFRI, KSBB	2, 3, 5, 9
	Number of training programmes on biodiversity-inclusive planning	Capacity-building for BMCs, VSS, LSGs	KSBB, KILA, KFD	20
	Number of ABS mechanisms operationalised for forest bioresources	Licensing reforms, benefit-sharing with BMCs	KSBB, Forest Dept., BMCs	5, 13, 20
	Number of humans-wildlife conflict mitigation systems	RRTs, buffer zone programmes, and compensation schemes	KFD, Revenue Dept., KSBB	4, 5, 20
	% of plantations converted to native multi-species systems	Revised working plans, biodiversity indicators	KFD, KSBB, KFDC	2, 8, 10
	Area of riparian zones restored	Native vegetation, erosion control, MGNREGS	WRD, LSGD, KSBB	2, 8, 9
	Enforcement of mining/quarrying regulations in forest fringes	Satellite monitoring, biodiversity ELAs, and reclamation	Dept. of Mining & Geology, KFD, PCB	1, 6, 8
	Number of OEMs recognised and notified as BHS	Sacred groves, tribal-managed habitats, and legal recognition	KSBB, Forest Dept., BMCs	3, 13, 20
	Number of updated forest biodiversity inventories	Citizen science, institutional collaboration	KSBB, KFRI, BMCs	12, 19, 20
	Number of forest degradation and pollution control initiatives	Fire-prone zone restoration, anti-littering campaigns	KFD, LSGD, KSBB	8, 10, 12
	Number of zoonotic disease prevention programmes	Wildlife health surveillance, One Health pilots	Forest Dept., Health Dept., KSBB	4, 11

Binary	Number of BMCs trained in forest biodiversity governance	PBR updates, community patrolling, KSBB-KILA modules	KSBB, KILA, BMCs	20
	Carbon stock enhancement in forest ecosystems	Carbon-positive silviculture, bamboo management	KFD, KFRI, DoECC	8, 19
	Number of NWFP-based livelihood enterprises	SHGs, MSMEs, value-added products, market access	Forest Dept., Tribal Welfare Dept., KSBB	5, 9, 13
	Number of urban forest initiatives launched	Urban afforestation, Miyawaki forests, Smart City integration	LSGD, Forest Dept., Smart City Mission	12, 14
	Area under native agroforestry systems	Farmer incentives, carbon-plus pilots, PM-KUSUM	Dept. of Agriculture, KSBB, KAU	10, 13, 19
	Initiation of participatory, integrated spatial planning	Launch of spatial planning at local levels	KSBB, LSGD, State Planning Board	1, 20
	Initiation of effective land and sea-use change management	Legal enforcement, EIA integration	DoECC, SEIAA, KSBB	1, 3, 8
	Initiation of GIS-based biodiversity planning	GIS tool development and deployment	KSBB, KRSAC, Digital University	1, 20
	Is biodiversity-inclusive governance integrated into forest working plans?	Policy review, working plan audits, and inclusion of biodiversity indicators	KFD, KSBB	1, 14, 20
	Is community participation institutionalised in forest biodiversity monitoring?	VSS/BMC protocols, participatory biodiversity registers	KFD, KSBB, BMCs	9, 20
*Annexure II	Are biodiversity indicators integrated into annual forest performance reviews?	Departmental review formats, biodiversity-linked KPIs	KFD, Planning Board	14, 20
	Are forest biodiversity data sets publicly accessible through digital platforms?	Open data portals, KSBB/Forest Department integration	KSBB, KFD, NIC	19

Type	Responsible Institutions
Direct	Kerala Forest Department; Department of Forest and Wildlife, Kerala Forest Research Institute (KFRI), Kerala State Biodiversity Board (KSBB), Jawaharlal Nehru Tropical Botanic Garden (JNTBGRJ), Eco-Development Committees (EDCs), VSSs, WWF-India
Indirect	Department of Environment and Climate Change (DoECC), Kerala State Remote Sensing & Environment Centre (KSREC), Institute of Climate Change Studies, CSIR-NIIST
Enabler	Local Self-Government Institutions (LSGIs), Kerala Institute of Local Administration (KILA), State Planning Board, Digital Resurvey Dept., Geo-informatic Centre in Kerala University, Digital University, Department of Mining and Geology, Dairy Development Department

Chart 2: MBTA2: Developing Integrated Coastal, Marine and Inland Biodiversity Management

Type	Indicator	Means of Implementation	Responsible Agencies	KM-GBF Targets*
Headline	Extent and condition of mangrove ecosystems	GIS mapping, restoration, co-management, buffer enforcement	Forest Dept., KSBB, LSGD, BMCs	2, 3, 8
	% of coastal and marine areas under biodiversity-inclusive spatial plans	CRZ integration, ICZM plans, KBA mapping	DoECC, KCZMA, KSBB, LSGD	1, 3, 6
	Number of wetlands with integrated management plans	Ramsar/NWCP-linked LSG plans, water-health-biodiversity integration	SWAK, KSBB, LSGD	2, 3, 12
	Net carbon sequestration from mangroves and coastal wetlands	Satellite imagery, carbon models, IPCC Tier II methods	DoECC, KFRI, KSBB	8, 19
Component	Number of aquatic IAS eradication plans implemented	Mechanical/biological control, community action	SWAK, KFRI, LSGD, Fisheries Dept.	6, 8
	Number of ABS agreements for marine genetic resources	Licensing, benefit-sharing, collaboration with CMFRI, CSIR-NIO	KSBB, NBA, Research Institutes	5, 13
	Number of subterranean aquatic ecosystems documented	Anchialine/laterite aquifer surveys, endemism studies	CWRDM, KSBB, Universities	12, 19
	Number of sustainable aquaculture systems adopted	IMTA, bivalve farming, non-fed systems	Fisheries Dept., CMFRI, KUFOs	5, 9, 10

Complementary	Number of bioresource-based enterprises supported	SHGs, MSMEs, value-added products, Kudumbashree integration	LSGD, Fisheries Dept., KSBB	5, 9, 13
	Number of biodiversity-sensitive tourism guidelines adopted	Carrying capacity, waste audits, ecotourism codes	Tourism Dept., KSBB, LSGD	10, 12, 20
	Number of plastic-free tourism circuits and port waste programmes	Clean-up drives, biodegradable alternatives, and port audits	PCB, Fisheries Dept., LSGD	7, 8, 10
	% of women-led initiatives in coastal biodiversity governance	She-Bio strategy, fisherwomen SHGs, mangrove restoration	KSBB, Kudumbashree, LSGD	13, 20, 23
	Number of marine bioresource innovations reaching the market	Discovery-to-market pipelines, IPR safeguards	KSBB, KSCSTE, Research Institutes	13, 16
Binary	Has Kerala initiated integrated coastal and marine spatial planning?	ICZM, CRZ, and biodiversity overlays in spatial plans	DoECC, KCZMA, KSBB	1, 3
	Has Kerala implemented ABS for marine and microbial resources?	ABS agreements, digital tracking, and benefit-sharing	KSBB, NBA, Research Institutes	13
	Are women's groups formally represented in coastal BMCs and wetland committees?	Gender audits, She-Bio integration	KSBB, LSGD, Kudumbashree	23
	Are subterranean aquatic ecosystems included in biodiversity assessments?	Inclusion in PBRs, research collaborations	KSBB, CWRDM, Universities	12

*Annexure II

Type	Responsible Institutions
Direct	State Wetland Authority Kerala (SWAK), Kerala State Biodiversity Board (KSBB), Vembanad Lake Conservation Authority / LPPs, Ashoka Trust for Research in Ecology and the Environment – CERC (ATREE-CERC), WWF-India
Indirect	ICAR-CMFRI, ICAR-NBFGR, Kerala University of Fisheries and Ocean Studies (KUFOs), Department of Fisheries, Marine Products Export Development Authority (MPEDA), Centre for Marine Living Resources and Ecology (CMLRE), CSIR-NIO
Enabler	Department of Environment and Climate Change (DoECC), LSGIs, Kerala Coastal Zone Management Authority, Kudumbashree, Kerala Institute of Local Administration (KILA), Suchitwa Mission, Haritha Keralam Mission

Chart 3: MBTA3: Strengthening Community-centric Agrobiodiversity Management

Type	Indicator	Means of Implementation	Responsible Agencies	KM-GBF Targets*
Headline	Number of traditional crop varieties, livestock breeds, and wild relatives documented and validated	PBR-based inventory, farmer interviews, institutional collaboration (e.g., ICAR-NBPGR, KAU)	KSBB, BMCs, KAU, ICAR-NBPGR, LS GD	10, 13, 20
	Number of custodian farmers and community conservators recognised and incentivised	Design and rollout of awards, conservation-linked subsidies, and recognition schemes	KSBB, Dept. of Agriculture, LS GD	10, 13, 18
	Protected Area Representativeness and Connectedness Index (PARC-i)	Enhance PA networks, ecological corridors, participatory conservation, and mapping of linear habitats	KFD, KSBB, KFRI	3, 4, 5, 9, 20
Component	Status and trends in NWFP resource use	Sustainability studies, tribal knowledge integration	Forest Dept., Tribal Welfare Dept., KSBB	5, 9, 13
	Number of IAS eradication action plans implemented	Mapping, mechanical/biological control, community action	KFRI, KFD, LS GD	6, 20
	Area of degraded forests under landscape-level restoration	Native rewilding, natural regeneration, GIM-MGNREGS	KFD, LS GD, KSBB	2, 8, 9
	Number of RET species recovery and conservation programmes	Species recovery plans, gene banks, and arboreta	KFRI, JNTBGRI, Forest Dept.	4, 12
	Number of sustainable agriculture models adopted (e.g., LEISA, organic, conservation agriculture)	Scheme convergence, farmer incentives, certification support	Dept. of Agriculture, Organic Kerala Mission, KSBB	10, 16
Complementary	Number of agrobiodiversity assets with GI tags or IPR protection	GI registration, community IPR claims, integration into IPR policy	KSBB, IPR Cell, KSCSTE, Dept. of Agriculture	13, 17
	Number of community seed banks established and maintained	Local seed saving initiatives, training, and infrastructure support	KSBB, BMCs, NGOs, KAU	10, 13

Binary	Has Kerala developed a state-level agrobiodiversity conservation and incentive policy?	Policy formulation and notification	KSBB, Dept. of Agriculture, Planning Board	10, 18
	Are custodian farmers included in biodiversity planning and benefit-sharing mechanisms?	Inclusion in LBSAPs, ABS-linked incentives	KSBB, BMCs, LSGD	13, 20

***Annexure II**

Type	Responsible Institutions			
Direct	Kerala Agricultural University (KAU), ICAR–Indian Institute of Spices Research (ICAR–IISR), National Bureau of Plant Genetic Resources (NBPGR), Indian Cardamom Research Institute (ICRI), Centre for Tuber Crops Research Institute (CTCRI), Peermade Development Society (PDS), M.S. Swaminathan Research Foundation (MSSRF), KSBB and the BMCs			
Indirect	Department of Agricultural Development and Farmers Welfare, State Horticulture Mission (SHM), Spices Board, LSGs			
Enabler	LSGIs, KIRTADS, Department of General Education, Department of Industries and Commerce, State Planning Board			

Chart 4: MBTA4: Domesticated Biodiversity and Animal Husbandry

Type	Indicator	Means of Implementation	Responsible Agencies	KM-GBF Targets*
Headline	Number of indigenous livestock and poultry breeds documented and validated	District-level inventories, PBR integration, collaboration with KVASU and BMCs	KSBB, KVASU, Dept. of Animal Husbandry, BMCs	4, 13, 20
	Number of native breeds formally recognized under NBAGR framework	Phenotypic profiling, genetic characterization, submission to NBAGR	KVASU, NBAGR, Dept. of Animal Husbandry	4, 17
	Number of native breeds with mapped adaptive traits (e.g., disease resistance, climate resilience)	Trait mapping, field trials, participatory validation	KVASU, KAU, ICAR Institutes	4, 10

	Number of native breeds/products registered with GI or IPR protection	GI tagging, community IPR claims, integration with Kerala IPR policy	KSBB, IPR Cell, Dept. of Industries, KVASU	13, 17
	Number of custodian farmers receiving conservation-linked incentives	Direct benefit transfers, awards, and scheme-linked access	Dept. of Animal Husbandry, KSBB, LSGD	10, 13, 18
	Number of in situ and ex-situ conservation programmes for native breeds	Breed-specific conservation plans, gene banks, and veterinary outreach	KVASU, Dept. of Animal Husbandry, KAU	4, 10, 20
	Number of RET species recovery and conservation programmes	Species recovery plans, gene banks, and arboreta	KFRI, JNTBGR, Forest Dept.	4, 12
Complementary	Number of native breeds integrated into organic and mixed farming systems	Promotion through organic certification, agroecological models	Dept. of Agriculture, Organic Kerala Mission, KSBB	10, 16
	Number of awareness and training programmes on indigenous breed conservation	Farmer training, vet extension, and community outreach	KVASU, KSBB, LSGD, NGOs	4, 20
Binary	Has Kerala developed a state-level strategy for indigenous breed conservation?	Policy formulation, integration into SBSAP and livestock plans	KSBB, Dept. of Animal Husbandry, Planning Board	4, 13
	Are indigenous breeds included in biodiversity benefit-sharing mechanisms (e.g. ABS, GI-linked revenue)?	ABS-linked agreements, community fund allocation	KSBB, BMCs, Dept. of Animal Husbandry	13, 20

***Annexure II**

Type	Responsible Institutions
Direct	Kerala State Biodiversity Board (KSBB), BMCs
Indirect	Department of Agricultural Development and Farmers Welfare, State Horticulture Mission (SHM), Spices Board, LSGs
Enabler	Department of Animal Husbandry, Dairy Development Department
	Kerala Veterinary and Animal Sciences University (KVASU), State IPR Cell, NABARD, LSGIs

Chart 5: SEPTA1: Reducing Climate Change Impacts through Healthy Green and Blue Spaces

Type	Indicator	Means of Implementation	Responsible Agencies	Linked KM-GBF Targets*
Headline	Number of Kerala-specific climate-biodiversity knowledge products developed	Expert networks, citizen science, synthesis of socio-ecological vulnerability data	KSBB, KSCSTE, IMD, Academic Institutions	8, 19, 21
	Number of cities with operational City Biodiversity Index (CBI)	Use of Singapore Index, baseline assessments in major urban centers	KSBB, LS GD, Urban Local Bodies	12, 14
	Number of climate-resilient biodiversity interventions implemented	Green infrastructure, microclimate enhancement, water-sensitive design	DoECC, LS GD, KSBB, KWA	8, 12
Component	Number of localized climate projections developed and used in biodiversity planning	Downscaled models, scenario planning, integration into SAPCC and LBSAPs	IMD, KSCSTE, CWRDM, KSBB	8, 14
	Number of RET species recovery programmes in climate-vulnerable zones	Species-specific plans, habitat restoration, ex situ conservation	KSBB, KFRI, Forest Dept., Universities	4, 8
	Number of citizen scientists trained and engaged in biodiversity monitoring	Toolkits, mobile apps, school and community programmes	KSBB, KSCSTE, Education Dept., NGOs	20, 21
	Number of emission-intensive businesses disclosing biodiversity risks	ESG-aligned audits, biodiversity risk protocols, voluntary disclosures	PCB, Industries Dept., KSBB	15, 16
	Number of sustainable consumption campaigns and LSG-led initiatives	Awareness drives, procurement guidelines, and school programmes	KSBB, DoECC, LS GD, Food Safety Dept.	10, 16
Complementary	Number of CSR/CER-funded biodiversity projects implemented	Institutional guidelines, project tracking, and fund utilisation reports	KSBB, Industries Dept., Planning Board	19, 20
	Number of spatial decision support systems integrating biodiversity and climate data	Web GIS platforms, scenario tools, open-access dashboards	KSBB, KSREC, DoECC, KSDI	8, 14, 20

	Has Kerala integrated biodiversity into climate adaptation and mitigation strategies?	Review of SAPCC, LBSAPs, and sectoral plans	DoECC, KSBB, Planning Board	8, 14
	Has Kerala adopted a framework for biodiversity-inclusive ESG reporting?	ESG guidelines, sector-specific protocols, and voluntary disclosures	KSBB, Industries Dept., PCB	15
	Are citizen science platforms institutionalized for biodiversity monitoring?	Portal development, integration with KSBB dashboard	KSBB, KSCSTE, Education Dept.	20

**Annexure II*

Type	Responsible Institutions
Direct	Kerala State Biodiversity Board (KSBB), WWF-India
Indirect	Department of Environment and Climate Change (DoECC), Institute of Climate Change Studies (ICCS), Kerala State Council for Science, Technology and Environment (KSCSTE), Pollution Control Board (PCB), CSIR-NIIST
	Department of Animal Husbandry, Dairy Development Department
Enabler	IMD, LSGIs, Department of General Education, Kerala Water Authority (KWA), Urban Affairs Department, State Planning Board, CSR/CER platforms

Chart 6: SEPTA2: Recognising Dynamic Bio-cultural Diversity and Traditional Knowledge

Type	Indicator	Means of Implementation	Responsible Agencies	Linked KM-GBF Targets*
Headline	Number of indigenous knowledge systems and bio-cultural assets documented and safeguarded	PBR-linked inventories, tribal consultations, integration with FRA and TK registers	KSBB, Tribal Welfare Dept., KIRTADS, BMCs	13, 21, 22
	Number of NWFP micro-plans and community protocols implemented	Participatory planning, sustainable harvest guidelines, Van Dhan Kendras	Forest Dept., Tribal Development Dept., KSBB	5, 9, 13

Component	Number of bioresource trade chains mapped and analyzed	Value chain studies, pricing audits, policy gap identification	KSBB, SMPB, Tribal Cooperatives, Research Institutes	9, 16
	Number of cultural traditions and festivals supported for biodiversity conservation	Cultural grants, heritage trails, school engagement	Dept. of Culture, KSBB, LS GD, Education Dept.	12, 21
	Number of biodiversity education programmes targeting youth and students	Curriculum integration, eco-clubs, student fellowships	Education Dept., KSBB, KSCSTE	21, 23
	Number of biodiversity communication platforms launched	Community radio, social media, storytelling campaigns	KSBB, I&PRD, NGOs, Tribal Welfare Dept.	21, 22
Complementary	Number of community-led projects supported by a Bio-cultural Diversity Fund	Fund establishment, grant disbursal, monitoring	KSBB, Planning Board, Tribal Welfare Dept.	13, 19, 22
	Number of biodiversity-based enterprises supported (e.g., wild foods, crafts, eco-tourism)	Training, incubation, market access, Kudumbashree linkage	KSBB, MSME Dept., Kudumbashree, Tribal Development Dept.	9, 13, 23
	Number of One Health pilots integrating biodiversity and rural health	Cross-sectoral pilots, ecosystem-health-livelihood integration	Health Dept., Forest Dept., KSBB, Tribal Welfare Dept.	11, 20
	Has Kerala developed a policy framework for the protection of traditional knowledge and bio-cultural heritage?	Policy notification, integration with IPR and biodiversity laws	KSBB, Law Dept., Tribal Welfare Dept.	13, 22
Binary	Are tribal and marginalised communities represented in biodiversity governance structures?	Inclusion in BMCs, Wetland Committees, LBSAPs	KSBB, LS GD, Tribal Welfare Dept.	

*Annexure II

Type	Responsible Institutions
Direct	Kerala State Biodiversity Board (KSBB), KIRTADS, Eco-Development Committees (EDCs), VSSs, ATREE-CERC, WWF-India
	Department of Agricultural Development and Farmers Welfare, State Horticulture Mission (SHM), Spices Board, LS Gs

Indirect	Department of Agricultural Development and Farmers Welfare, Department of Forest and Wildlife
Enabler	LSGIs, Department of General Education, Department of SC/ST Development, State IPR Cell, Kudumbashree, Department of Tourism

Chart 7: SEPTA 3: Empowering Local Governance Institutions for Mainstreaming Biodiversity

Type	Indicator	Means of Implementation	Responsible Agencies	Linked KM-GBF Targets*
Headline	Number of BMCs trained in biodiversity governance and KBSAP implementation	Structured training programmes, modules on planning, monitoring, and reporting	KSBB, KILA, LSGD, BMCs	14, 20
	Number of citizen scientists and TSG members trained and engaged	Toolkits, digital platforms, participatory monitoring, school and community outreach	KSBB, KSCSTE, Education Dept., NGOs	20, 21
	Number of BMCs with gender-responsive and inclusive biodiversity plans	Gender audits, inclusion in PBRs, LBSAPs, and benefit-sharing mechanisms	KSBB, Kudumbashree, LSGD	22, 23
Component	Number of Local Biodiversity Funds (LBFs) operationalized	Fund creation at Panchayat/Municipal level, supported by ABS, CSR, and state allocations	KSBB, LSGD, Planning Board	13, 19, 20
	Number of model BMCs recognised for governance performance	Peer learning platforms, recognition schemes, and innovation documentation	KSBB, KILA, LSGD	14, 20, 22
	Number of sustainable production and consumption initiatives led by BMCs	Behavioural change programmes, green procurement, bioresource-based livelihoods	KSBB, LSGD, Kudumbashree, DoECC	10, 16
Complementary	Number of inter-departmental convergence programmes anchored by BMCs	Integration with agriculture, forestry, health, and education sectors	KSBB, Line Departments, LSGD	14, 20
	Has Kerala adopted a state framework for decentralised biodiversity financing?	Policy notification, integration with LSG budgeting and ABS revenue	KSBB, Planning Board, Finance Dept.	19, 20
	Are BMCs evaluated periodically for performance and inclusivity?	Performance audits, gender and youth representation tracking	KSBB, KILA, LSGD	22, 23

	Are citizen science and TSG platforms institutionalised in biodiversity monitoring?	Portal development, integration with KSBB dashboard	KSBB, KSCSTE, Education Dept.	20, 21
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**Annexure II*

Type	Responsible Institutions			
Direct	Kerala State Biodiversity Board (KSBB), BMCs			
Indirect	Department of Environment and Climate Change (DoECC), Department of Agricultural Development and Farmers Welfare			
	Department of Agricultural Development and Farmers Welfare, Department of Forest and Wildlife			
Enabler	Kerala Institute of Local Administration (KILA), LSGDs, State Planning Board, Kudumbashree, Department of Panchayats, Department of Urban Affairs			

Chart 8: SEPTA 4: Creating Nature-based Climate Resilient Rural and Urban Infrastructure

Type	Indicator	Means of Implementation	Responsible Agencies	Linked KM-GBF Targets*
Headline	Number of biodiversity-inclusive green protocols adopted in infrastructure and urban planning	Integration into LSGD manuals, sectoral guidelines, Haritha Keralam, and Smart City plans	KSBB, LSGD, DoECC, Town Planning Dept.	8, 12, 14
	Number of public institutions implementing energy efficiency programmes	LED retrofits, appliance upgrades, behaviour change campaigns	Energy Management Centre, KSEB, LSGD	8, 16
	Area of green and blue urban spaces enhanced	Urban greening, waterbody rejuvenation, biodiversity-friendly infrastructure	LSGD, KSBB, Smart City Mission, Forest Dept.	12, 14
Component	Number of ecosystem-based adaptation projects implemented	Watershed restoration, coastal zone planning, forest-based adaptation	DoECC, Forest Dept., WRD, KSBB	8, 11
	Number of IWRM projects integrating biodiversity safeguards	Basin-scale planning, rainwater harvesting, greywater reuse, wetland protection	WRD, KWA, KSBB, LSGD	11, 14
	Number of Master Plans and DCRs with biodiversity safeguards	Inclusion of ecosystem services, green equity, and resilience criteria	Town Planning Dept., KSBB, LSGD	12, 14

Complementary	Number of eco-friendly buildings constructed or retrofitted	Green building codes, passive design, bioresource-based materials	PWD, KSBB, EMC, Industries Dept.	8, 10, 16
	Number of incentive schemes for green construction and procurement	Financial incentives, demonstration pilots, procurement standards	KSBB, Planning Board, LSGD	16, 18
Binary	Has Kerala adopted a state-level green protocol for biodiversity-inclusive infrastructure?	Policy notification, integration into sectoral guidelines	KSBB, DoECC, LSGD	14, 18
	Are biodiversity safeguards integrated into all new Master Plans and DTP schemes?	Review of planning documents, compliance audits	Town Planning Dept., KSBB	12, 14

* Annexure II

Type	Responsible Institutions
Direct	Kerala State Biodiversity Board (KSBB), WWF-India
Indirect	Department of Environment and Climate Change (DoECC), Kerala State Remote Sensing & Environment Centre (KSREC), Pollution Control Board (PCB), Institute of Climate Change Studies (ICCS), CSIR-NIIST
Enabler	Department of Agricultural Development and Farmers Welfare, Department of Forest and Wildlife LSGDs, Kerala Water Authority (KWA), Kerala Irrigation Department, Department of Mining and Geology, Department of Industries and Commerce, Urban Affairs Department, Haritha Keralam Mission, Nirmithi Kendra, IGBC-certified architects

Annexure: II

THE KUNMING-MONTREAL GLOBAL BIODIVERSITY FRAMEWORK: 2030 TARGETS

1. Reducing threats to biodiversity

TARGET 1: Plan and Manage all Areas to Reduce Biodiversity Loss

TARGET 2: Restore 30% of all Degraded Ecosystems

TARGET 3: Conserve 30% of Land, Waters and Seas

TARGET 4: Halt Species Extinction, Protect Genetic Diversity, and Manage Human- Wildlife Conflicts

TARGET 5: Ensure Sustainable, Safe and Legal Harvesting and Trade of Wild Species

TARGET 6: Reduce the Introduction of Invasive Alien Species by 50% and Minimize Their Impact

TARGET 7: Reduce Pollution to Levels That Are Not Harmful to Biodiversity

TARGET 8: Minimize the Impacts of Climate Change on Biodiversity and Build Resilience

2. Meeting people's needs through sustainable use and benefit-sharing

TARGET 9: Manage Wild Species Sustainably to Benefit People

TARGET 10: Enhance Biodiversity and Sustainability in Agriculture, Aquaculture, Fisheries, and Forestry

TARGET 11: Restore, Maintain and Enhance Nature's Contributions to People

TARGET 12: Enhance Green Spaces and

Urban Planning for Human Well-Being and Biodiversity

TARGET 13: Increase the Sharing of Benefits from Genetic Resources, Digital Sequence Information and Traditional Knowledge

3. Tools and solutions for implementation and mainstreaming

TARGET 14: Integrate Biodiversity in Decision-Making at Every Level

TARGET 15: Businesses Assess, Disclose and Reduce Biodiversity-Related Risks and Negative Impacts

TARGET 16: Enable Sustainable Consumption Choices to Reduce Waste and Overconsumption

TARGET 17: Strengthen Biosafety and Distribute the Benefits of Biotechnology

TARGET 18: Reduce Harmful Incentives by at Least \$500 Billion per Year, and Scale Up Positive Incentives for Biodiversity

TARGET 19: Mobilize \$200 Billion per Year for Biodiversity From all Sources, Including \$30 Billion Through International Finance

TARGET 20: Strengthen Capacity-Building, Technology Transfer, and Scientific and Technical Cooperation for Biodiversity

TARGET 21: Ensure That Knowledge Is Available and Accessible to Guide Biodiversity Action

TARGET 22: Ensure Participation in Decision-Making and Access to Justice and Information Related to Biodiversity for all

TARGET 23: Ensure Gender Equality and a Gender-Responsive Approach for Biodiversity Action

Acronym	Expanded form
ABS	Access and Benefit Sharing
AYUSH	Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homoeopathy
BHS	Biodiversity Heritage Site
BIOFIN	Biodiversity Finance Initiative
BMC	Biodiversity Management Committee
BSI	Botanical Survey of India
CBD	Convention on Biological Diversity
CBI	City Biodiversity Index
CCSBI	Centre for Citizen Science and Biodiversity Informatics
CER	Corporate Environment Responsibility
CIFT	Central Institute of Fisheries Technology
CMFRI	Central Marine Fisheries Research Institute
CMLRE	Centre for Marine Living Resources and Ecology
CMS	Convention on the Conservation of Migratory Species of Wild Animals
CRZ	Coastal Regulation Zone
CSIR-NIIST	Council of Scientific and Industrial Research – National Institute for Interdisciplinary Science and Technology
CSIR-NIO	Council of Scientific and Industrial Research – National Institute of Oceanography
CSR	Corporate Social Responsibility
DBCC	District Biodiversity Coordination Committee
DoECC	Directorate of Environment and Climate Change
e-PBR	Electronic People's Biodiversity Register
EbA	Ecosystem-based adaptation
EDC	Eco-Development Committee
EMC	Energy Management Centre
GCP	Green Credit Programme
GI	Geographical Indication
GIM	Green India Mission
IAS	Invasive Alien Species
IBP	India Biodiversity Portal
ICRI	Indian Cardamom Research Institute
ICZM	Integrated Coastal Zone Management
IGBC	Indian Green Building Council
IISR	Indian Institute of Spices Research

IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPC	International Patent Classification
IPLC	Indigenous Peoples and Local Communities
ITMO	Internationally Transferred Mitigation Outcome
IUCN	International Union for Conservation of Nature
IWRM	Integrated Water Resources Management
JFMC	Joint Forest Management Committee
JNTBGRI	Jawaharlal Nehru Tropical Botanic Garden and Research Institute
KAU	Kerala Agricultural University
KBF	Kerala Biodiversity Fund
KBIR	Kerala Biodiversity Information Repository
KVASU	Kerala Veterinary and Animal Sciences University
KFD	Kerala Forest Department
KFRI	Kerala Forest Research Institute
KFSTAT	Kerala Forest Statistics/Monitoring Database
KILA	Kerala Institute of Local Administration
KIRTADS	Kerala Institute for Research, Training and Development Studies of SC/ST
KM-GBF	Kunming–Montreal Global Biodiversity Framework
KSBB	Kerala State Biodiversity Board
K-SBSAP	Kerala State Biodiversity Strategy and Action Plan
KSCSTE	Kerala State Council for Science, Technology and Environment
KSREC	Kerala State Remote Sensing and Environment Centre
KUFOS	Kerala University of Fisheries and Ocean Studies
KVASU	Kerala Veterinary and Animal Sciences University
KWA	Kerala Water Authority
LBF	Local Biodiversity Fund
LBHS	Local Biodiversity Heritage Site
LBSAP	Local Biodiversity Strategy and Action Plan
Low	External Input Sustainable Agriculture (LEISA)
LSGIs	Local Self Government Institutions
MBGIPS	Malabar Botanic Garden and Institute for Plant Sciences
MBTA	Mainstream Biodiversity Target Areas
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MPEDA	Marine Products Export Development Authority
MSME	Micro, Small & Medium Enterprises
NBAGR	National Bureau of Animal Genetic Resources

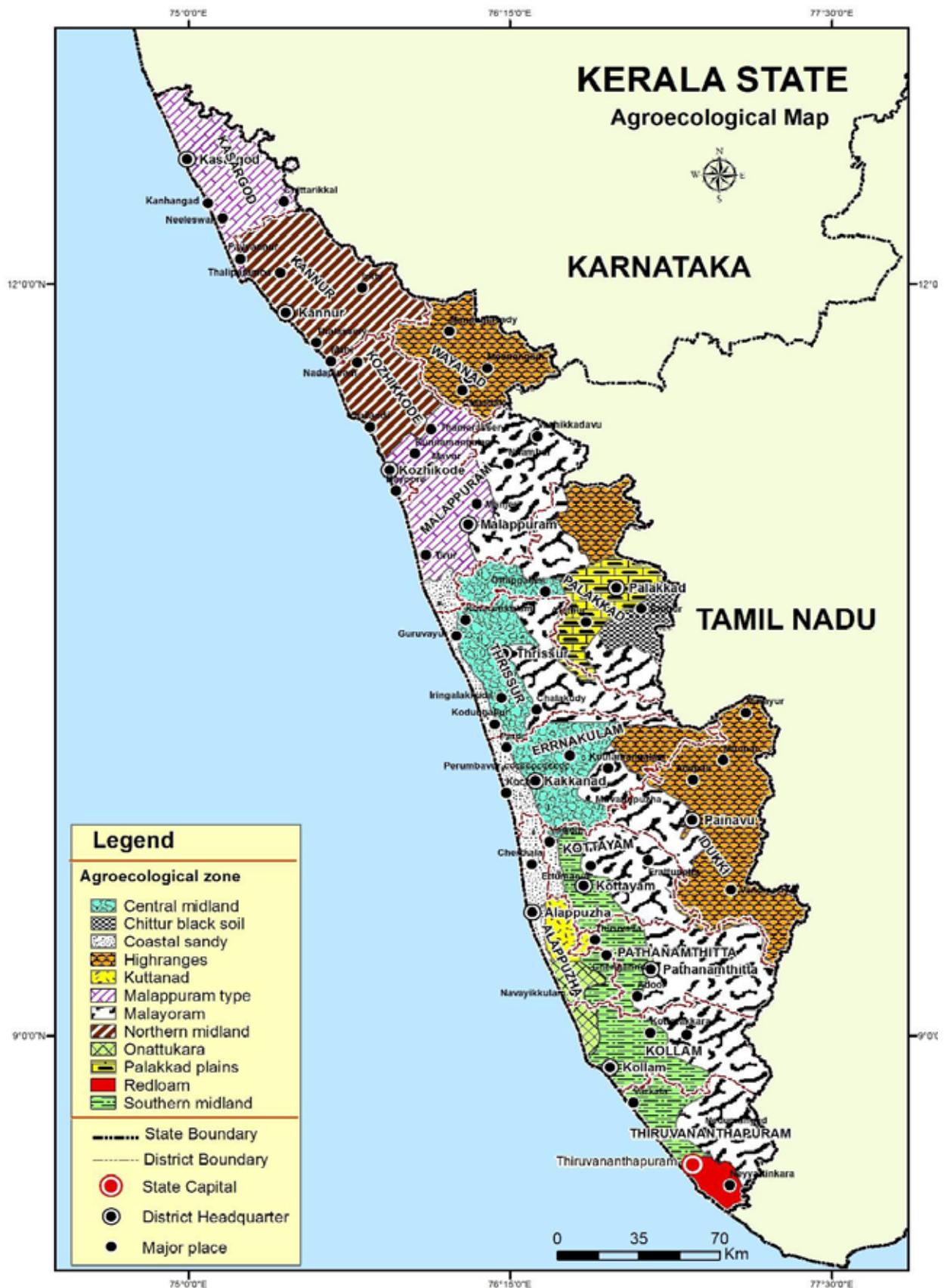
NBA	National Biodiversity Authority
NBFGR	National Bureau of Fish Genetic Resources
NBPGR	National Bureau of Plant Genetic Resources
NBSAP	National Biodiversity Strategy and Action Plan
NCESS	National Centre for Earth Science Studies
NIC	National Informatics Centre
NIFPHATT	National Institute of Fisheries Post Harvest Technology and Training
NTFP	Non-Timber Forest Products
NWCP	National Wetlands Conservation Programme
NWFP	Non-Wood Forest Produce
OECM	Other Effective area based Conservation Measures
PA	Protected Area
PBR	People's Biodiversity Register
PCB	Pollution Control Board
PES	Payments for Ecosystem Services
PGR	Plant Genetic Resources
PPV & FR Act	Protection of Plant Varieties and Farmers' Rights Act
PVTG	Particularly Vulnerable Tribal Groups
PWD	Public Works Department
RGCB	Rajiv Gandhi Centre for Biotechnology
SAPCC	State Action Plan on Climate Change
SDGs	Sustainable Development Goals
SEPA	Social Environmental Production Area
SHG	Self Help Groups
SHM	State Horticulture Mission
SMPB	State Medicinal Plants Board
SWAK	State Wetland Authority Kerala
TK	Traditional knowledge
TKDL	Traditional Knowledge Digital Library
TKRC	Traditional Knowledge Resource Classification
TSG	Technical Support Group
UNEP	United Nations Environment Programme
UNESCO	United Nations Educational, Scientific and Cultural Organization
UNFCCC	United Nations Framework Convention on Climate Change
VCM	Voluntary Carbon Market
VSS	VanaSamrakshanaSamithi
ZSI	Zoological Survey of India

References

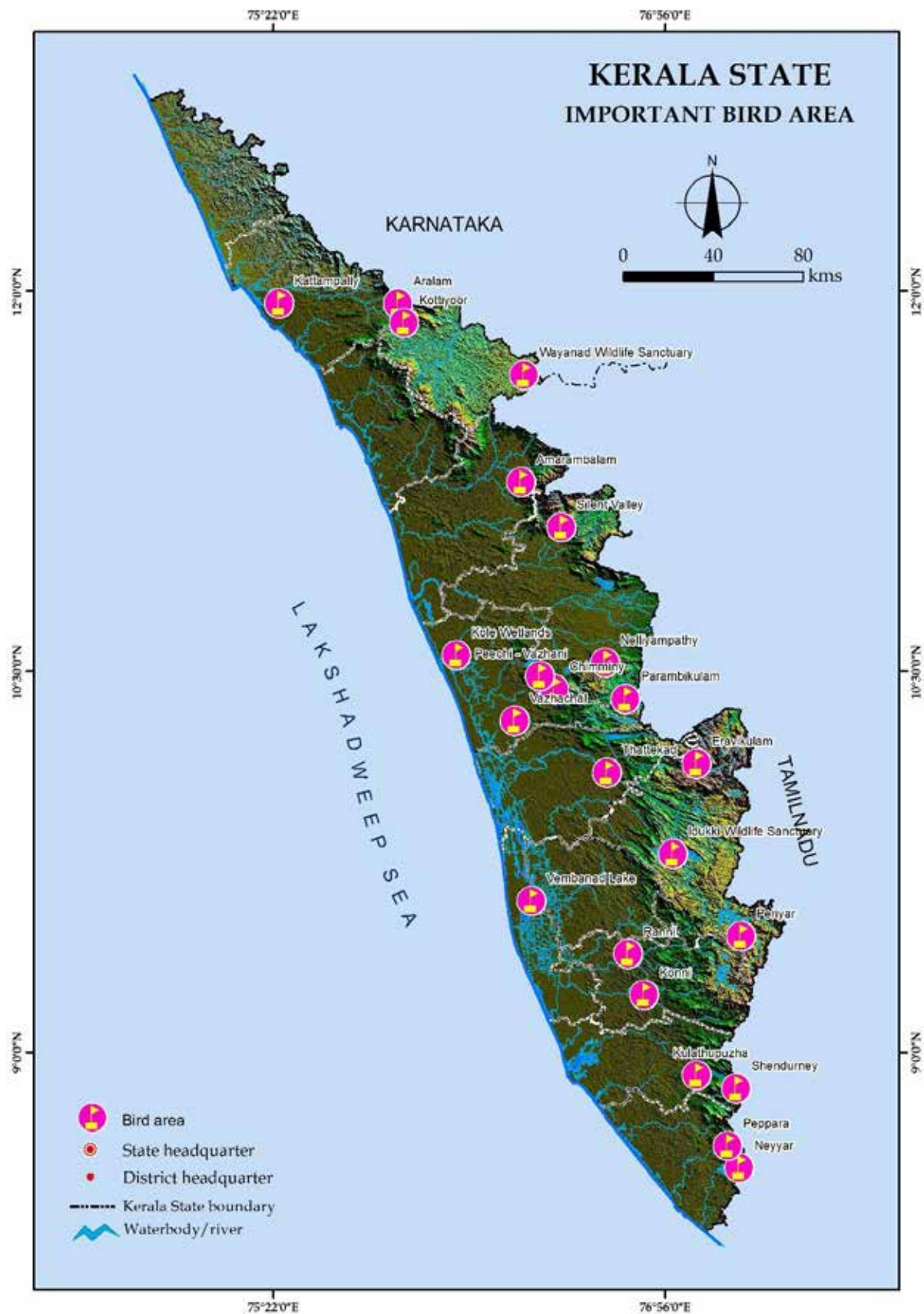
1. Alexander, G., George, L. P., & Jayakumar, M. S. (2024). Local community participation in ecotourism: Empowering Forest dependent & indigenous communities in Kerala. *Antrocom: Journal of Anthropology*, 20(2), 383–397.
2. Anitha, V., Soman, D., Sandeep, S., Sreejith, K. A., & Sreekumar, V. B. (2024). The nexus of ecosystem services and human well-being: Case study from the forests of Western Ghats, Kerala, India. In *Ecosystem Services Valuation for Sustainable Development* (Chapter 4, pp. 77–100). Springer.
3. Anto, M. (2021). Endemism-based butterfly conservation: Insights from a study in Southern Western Ghats, India. *Basic and Applied Zoology*, 2, e380.
4. Balakrishnan, V., Narayanan, M. K. R., & Kumar, N. A. (2003). Ethnotaxonomy of *Dioscorea* among the Kattunaikka people of Wayanad District, Kerala, India. *Plant Genetic Resources Newsletter*, 135, 24–32.
5. Bastin, B., Beena, V. I., Rajimol, R. P., & Dey, P. (2022). Evaluation of soil fertility status of agro-ecological zones of Kerala using nutrient index approach. *Agricultural Science Digest*. <https://doi.org/10.18805/ag.D-5509>
6. Dinesh, K. P., Radhakrishnan, C., Deepak, V., & Aravind, N. A. (2015). A checklist of amphibians of Kerala State, India. *Journal of Threatened Taxa*, 7(13), 7961–7970. <https://doi.org/10.11609/jott.2300.7.13.7961-7970>
7. Gadgil, M., Nair, K. S. S., & Daniels, R. J. R. (2011). Western Ghats Ecology Expert Panel Report (Vol. 1). Ministry of Environment and Forests, Government of India.
8. Jayadevan, A., Nayak, R., Karanth, K. K., Krishnaswamy, J., DeFries, R., Karanth, K., & Vaidyanathan, S. (2020). Navigating paved paradise: Evaluating landscape permeability to movement for large mammals in two conservation priority landscapes in India. *Biological Conservation*, 247, 108613. <https://doi.org/10.1016/j.biocon.2020.108613>
9. Joshi, P. S., & Vinod Kumar, V. (2015). Economic valuation of cultural ecosystem services: A case of tropical reservoir ecosystem. *Journal of Environmental Biology*, 45(5), 576–585.
10. Joshy, P. M. (2018). The ‘local’ in environmental governance in Kerala: Indigenous knowledge systems in public policy. *Journal of Parliamentary Studies*, 10(1), 62–72.
11. Kerala Forest Department. (2024). Ecosystem services.
12. Kerala Forest Department. (2024). Indigenous communities of Kerala.
13. Kerala State Biodiversity Board. (2022). Annual report 2021–22.
14. Kerala State Biodiversity Board. (2023). Biodiversity status and initiatives in Kerala.
15. Kerala State Planning Board. (2017). Report of the Working Group on Biodiversity, Thirteenth Five-Year Plan (2017–2022). Government of Kerala.
16. Martha, T. R., Kerle, N., Jetten, V. G., van Westen, C. J., & Kumar, K. V. (2019). Landslide risk analysis in the Western Ghats using high-resolution terrain models. *Landslides*, 16(3), 541–558. <https://doi.org/10.1007/s10346-018-1124-z>

17. Mishra, A., Bhawe, A. G., & Raghavan, K. (2018). Impact of climate change on water resources in the Western Ghats. *Environmental Research Letters*, 13(7), 074019. <https://doi.org/10.1088/1748-9326/aacb74>
18. Narayanan, N., & Latha, C. (2024). Evaluating the seasonal diversity and habitat preference of waterbirds in agroecosystems of central Kerala. *Journal of Advanced Zoology*, 45(3), 522–556. <https://doi.org/10.53555/jaz.v45i3.4369>
19. Plamoottil, M. & Vineeth (2022). *Hypselobarbus nitidus* from Pallangod, Kasaragod. *Egyptian Journal of Aquatic Biology & Fisheries*, 26(2):511-528.
20. Rajasekharan, S., Vinodkumar, T. G., Navas, M., & Latha, P. G. (2013). Traditional/ folk practices of Kerala – Case studies. *Journal of Traditional and Folk Practices*, 1(1), 50–68.
21. Raghavan, R., Das, S., Nameer, P. O., Kumar, B., & Dahanukar, N. (2016). Protected areas and imperilled endemic freshwater biodiversity in the Western Ghats hotspot. *Aquatic Conservation: Marine and Freshwater Ecosystems*, 26(S1), 78–90. <https://doi.org/10.1002/aqc.2653>
22. Reddy, C. S., Jha, C. S., & Dadhwal, V. K. (2016). Assessment and monitoring of long-term forest cover changes (1920–2013) in Western Ghats biodiversity hotspot. *Journal of Earth System Science*, 125(1), 103–114. <https://doi.org/10.1007/s12040-015-0641-6>
23. Samuel, L., & Gopakumar, K. (2022). Eco-sensitive zones and ecologically fragile lands in Kerala. *Ecology, Environment and Conservation*, 28(Suppl.), S213–S216.
24. State Planning Board, Kerala. (2017). Economic review 2017 – Chapter on environment and biodiversity. https://spb.kerala.gov.in/economic-review/ER2017/web_e/ch71.php
25. Thatte, P., Chandramouli, A., Tyagi, A., Patel, K. G., Baro, P., Chhattani, H., & Ramakrishnan, U. (2019). Human footprint differentially impacts genetic connectivity of four wide-ranging mammals in a fragmented landscape. *Diversity and Distributions*, 26(10), 1303–1316. <https://doi.org/10.1111/ddi.13022>

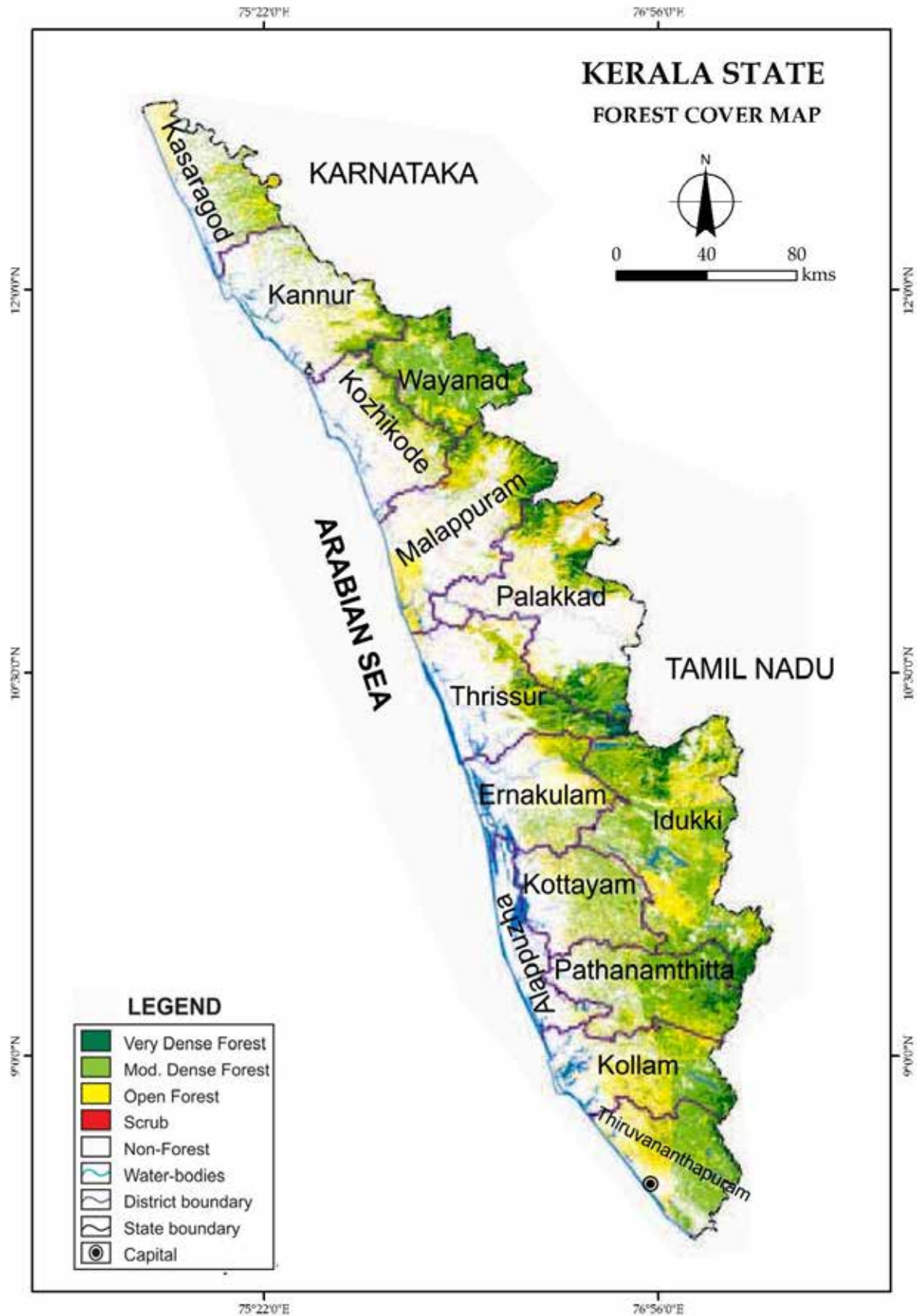
Map 1 : Kerala State Agroecological



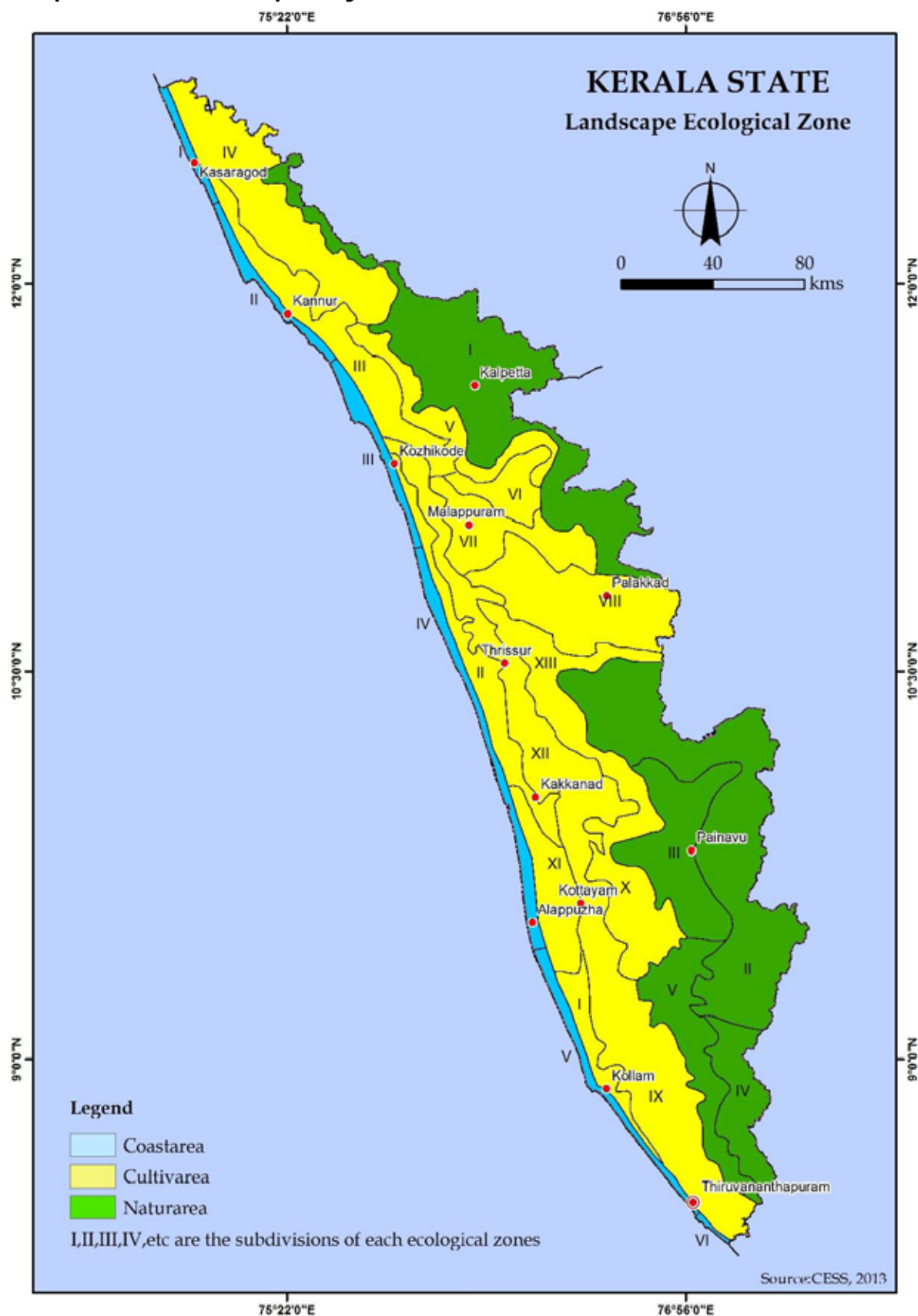
Map 2 : Kerala State Important Bird Area



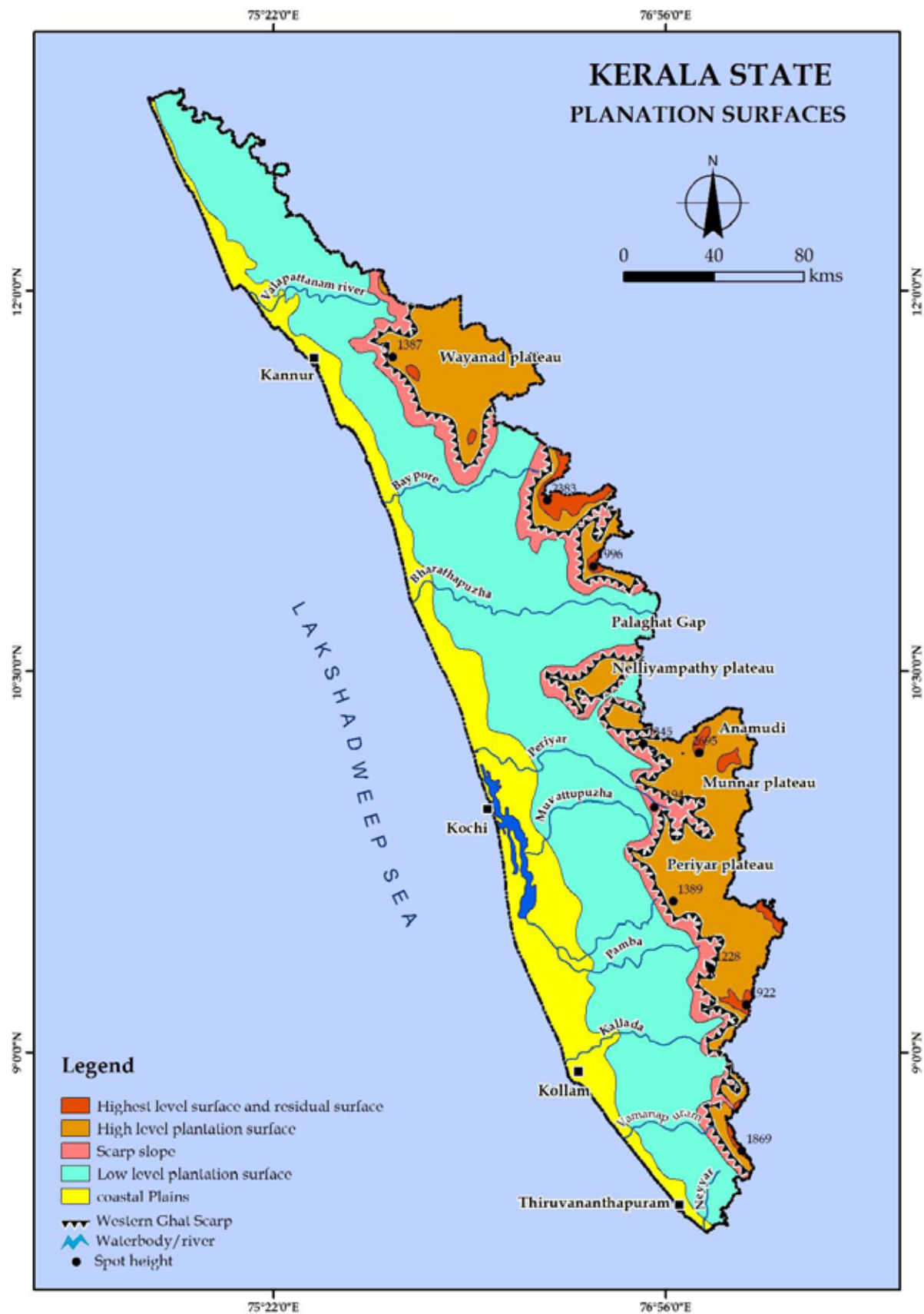
Map 3 : Kerala State Forest Cover



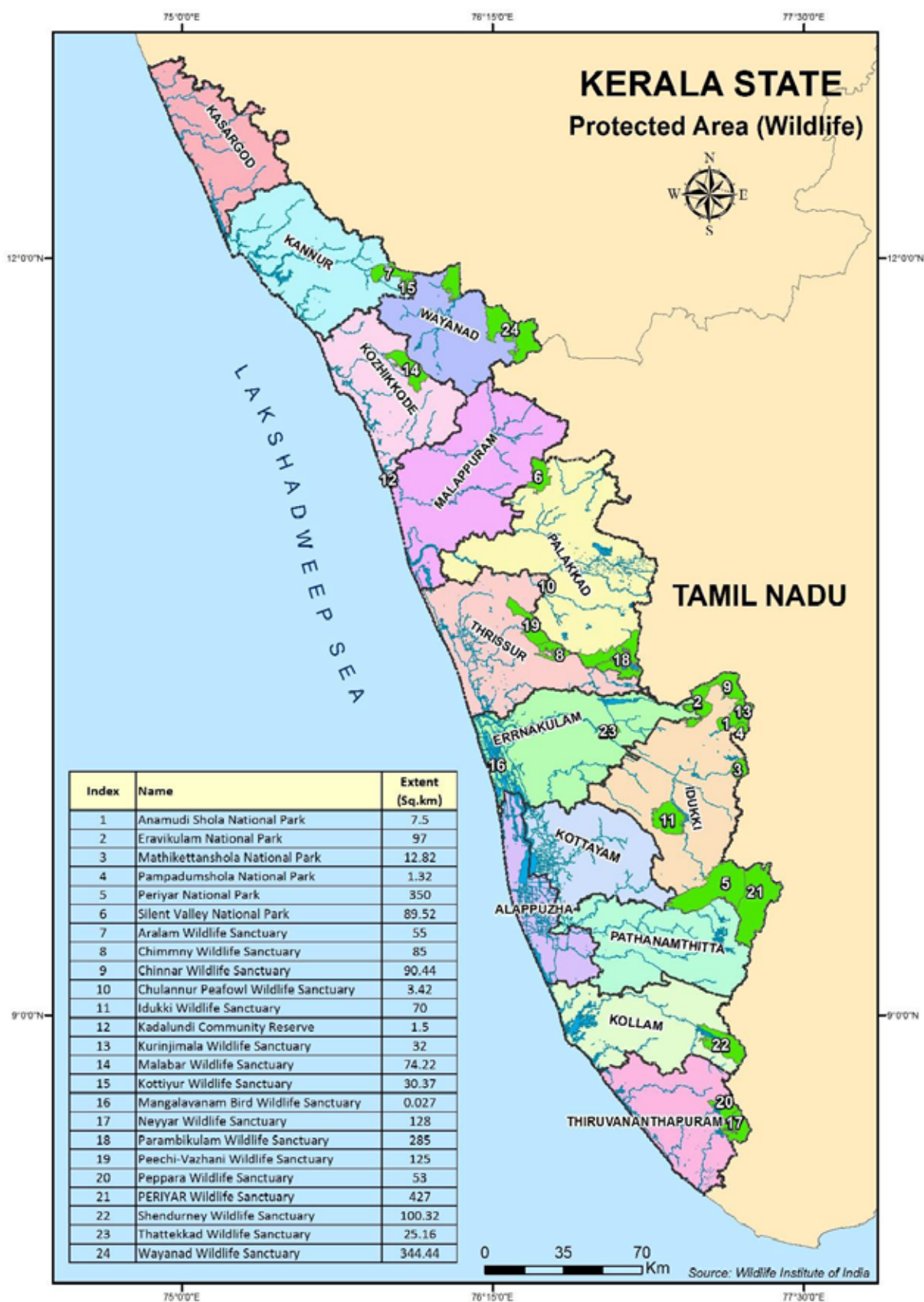
Map 4 : Kerala State Landscape Ecological Zone



Map 5 : Kerala State Planation Surfaces



Map 6 : Kerala State Protected Area (Wildlife)



KERALA STATE WETLAND MAP

75°22'0"E 76°56'0"E

KARNATAKA

TAMILNADU

LAKSHADWEEP SEA

0 40 80 kms

N

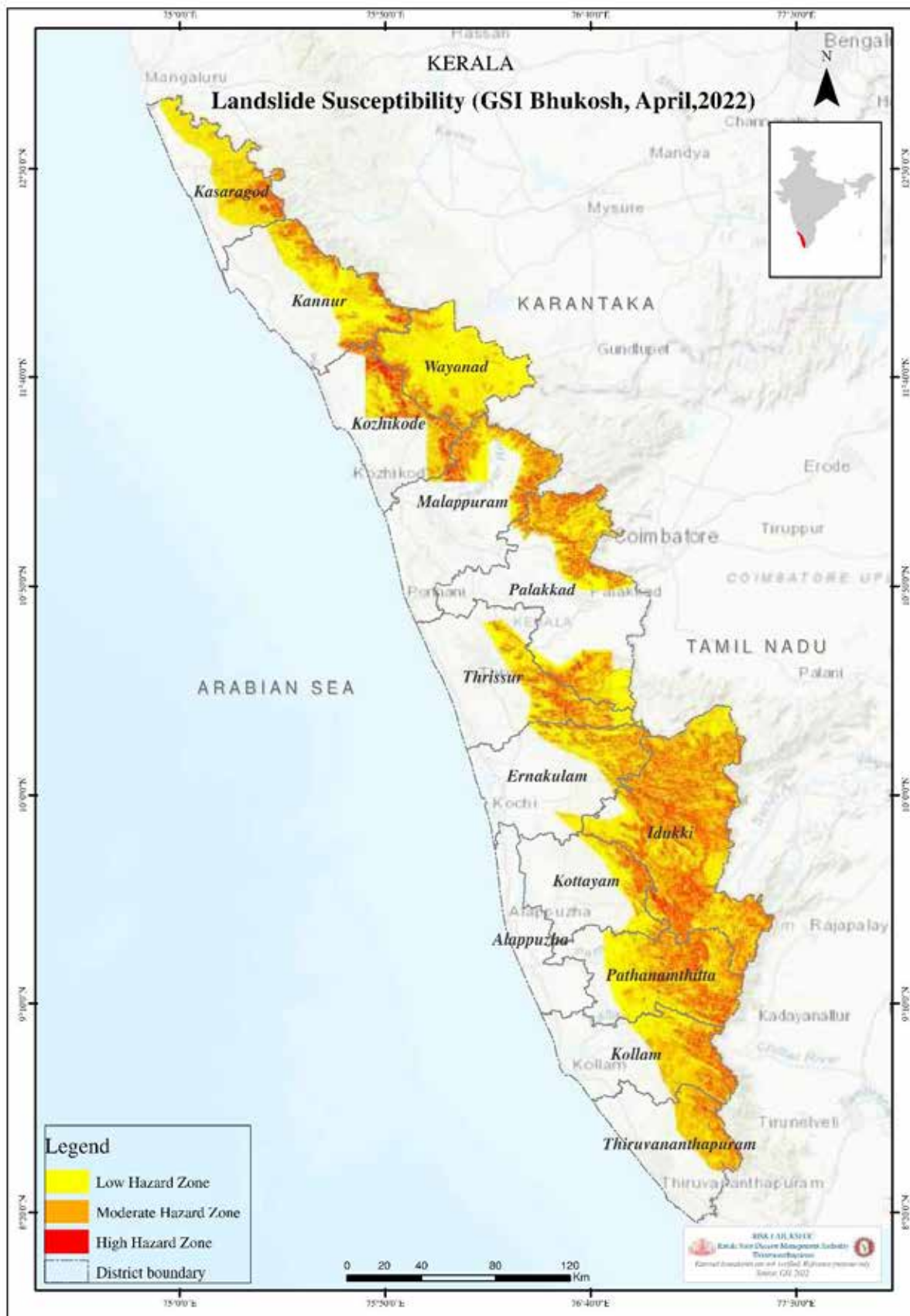
Kasaragod Kannur Kalpetta Kozhikode Malappuram Palakkad Thrissur Kakkannad Ponnani Kottayam Alappuzha Kollam Thiruvananthapuram

Legend

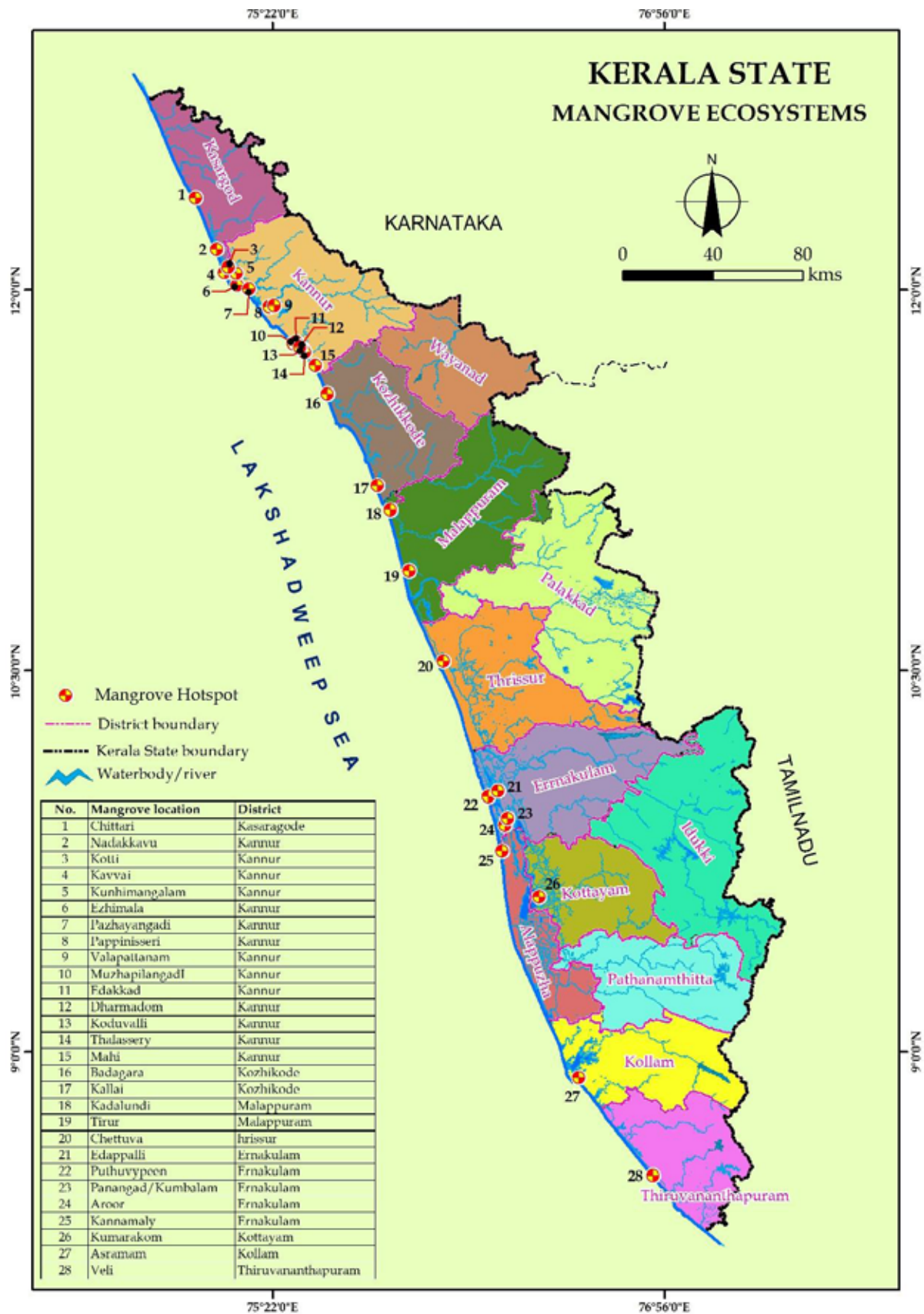
- River/Canal/Pond/Lake/Reservoir etc
- Marshyland
- Paddy
- State headquarter
- District headquarter
- Kerala administrative boundary
- Kerala State boundary

75°22'0"E 76°56'0"E

Map 8 : Kerala Landslide Susceptibility (GSI Bhukosh, April, 2022)



Map 9 : Kerala State Mangrove Ecosystems



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