Biodiversity and Climate Action:

A Case for Adaptation-Centred Prioritization in Kerala

Dr C. George Thomas

Former Chairman, Kerala State Biodiversity Board &
Dean, College of Agriculture, Thrissur

Triple Planetary Crisis

- Climate change
- Biodiversity Loss
- Pollution

Climate Action- Four pillars

1. Mitigation (reduction in greenhouse gases)
2. Adaptation (reduction in negative impacts of CC)
3. Resilience (capacity to respond to and recover from climate events)
4. Addressing loss and damage (Compensation)

Means: (1). Climate finance; (2). Technology development and transfer; (3). Capacity building

Mitigation vs Adaptation

- Climate policy debates often revolve around the relative importance of mitigation and adaptation (inclusive of resilience)to climate impacts.

- In the case of Kerala, a climatically fragile and disaster-prone state, adaptation warrants comparatively greater and immediate emphasis than mitigation.

- This position is grounded in Kerala's high exposure to climate risks, its relatively modest emissions profile, fiscal constraints, and development priorities.

Climate vulnerability and exposure

- Kerala is vulnerable to climate extremes because of its unique physiography—bounded by the Arabian Sea on the west and the Western Ghats on the east

- Extreme rainfall events, catastrophic floods (e.g., 2018 and 2019), recurrent landslides (e.g., Wayanad and Idukki), coastal erosion, and increasing heat stress.

- Adaptation measures, such as flood-resilient infrastructure, landslide early-warning systems, coastal protection, and climate-resilient agriculture, are essential to safeguard human lives and economic assets.

Emission profile and Mitigation potential

- Kerala's greenhouse gas emissions are relatively modest compared to India's major industrial states (Per capita emission Kerala, 0.33 t CO_2 e; India- 2.46 t CO_2 e; World 6.8 t CO_2e)
- The state's economy is predominantly service-oriented, with limited heavy manufacturing industries. Consequently, even aggressive state-level mitigation would have only marginal influence on global emission trajectories.
- While mitigation is globally imperative to limit warming to 1.5°C or 2°C , Kerala's contribution to global emissions is small relative to the scale of vulnerability it faces.
- Wherever emissions are limited but exposure is high, resilience-building generates more immediate and locally tangible benefits than emission reductions alone.

Economic considerations

- Kerala's fiscal landscape further reinforces the need for adaptation-centric policy. Recurrent extreme events have imposed substantial economic losses, straining public finances and development gains.
- Preventive adaptation measures—such as watershed restoration, slope stabilization, urban drainage redesign, and climate-resilient agriculture—function as risk-management strategies that reduce long-term fiscal burdens.
- From a development economics perspective, adaptation investments yield direct returns by minimizing disaster-related damages and livelihood disruptions.

Equity and climate Justice

- Kerala's most climate-vulnerable populations include smallholder farmers, fishing communities, tribal groups, and residents of coastal areas.
- By strengthening livelihood resilience, enhancing early-warning systems, and promoting ecosystem-based adaptation, the state can protect marginalized communities from disproportionate harm.
- Mitigation, although necessary, may not directly address localized vulnerabilities. Therefore, adaptation serves as a vehicle for climate justice in regions where exposure and sensitivity to climate hazards are high.

CBDR-RCNC in Paris Agreement

- All countries are responsible for addressing global warming and climate change but not equally; article 2(2) mentions about CBDR-RCNC (Common But Differentiated Responsibilities and Respective Capabilities in light of National Circumstances)

- CBDR-RCNC allows flexible implementation of climate commitments (NDCs, LT-LEDS) in Paris Agreement, acknowledging that a poor, low-emitting nation needs support, while a rich, high-emitting nation has greater responsibility to lead.

Role of mitigation with co-benefits

- Kerala's long-term development trajectory should integrate low-carbon strategies that generate co-benefits.
- Renewable energy expansion, electrification of public transport, energy-efficient buildings, and contribute to emission reductions while simultaneously enhancing resilience and public health.
- Ecosystem restoration, for example, agroforestry and mangroves, functions as both a carbon sink and a buffer against floods and landslides.
- Hence, mitigation in Kerala should be pursued in a synergistic manner—embedded within adaptation frameworks and guided by economic efficiency and social equity considerations.

Issues in Conservation of Biodiversity

Kunming-Montreal Global Biodiversity Framework 2022

Updating of NBSAP and SBSAP

Threats to biodiversity in Kerala

- Habitat fragmentation
- land-use changes
- invasive species
- Human- animal conflict
- climate change, and
- unsustainable resource use

1. Habitat protection and ecological restoration

a) Strengthening protected areas

- Consolidation and effective management of wildlife sanctuaries, national parks, and conservation reserves.
- Scientific management plans based on ecosystem health indicators.

b) Restoration of degraded forests

- Assisted natural regeneration using native species.
- Removal of invasive alien species such as *Senna spectabilis, Mikania micrantha*, and *Lantana camara*
- Landscape-level restoration of fragmented forest patches.

c) Protection of wildlife corridors

- Identification and legal safeguarding of elephant and other wildlife corridors.
- Regulation of infrastructure (roads, transmission lines) in ecologically sensitive zones.

2. Wetland, Coastal, and Riverine Ecosystems

- Mapping and protection of wetlands under Wetlands (Conservation and Management) Rules 2017
- Restoration of backwaters and mangroves (e.g., community-led mangrove afforestation)
- Strict regulation of sand mining and riverbank encroachment.
- Integrated coastal zone management to protect estuarine biodiversity

3. Mainstreaming biodiversity in development planning

- Strengthening Biodiversity Management Committees (BMCs) and People's Biodiversity Registers (PBRs)
- Strengthening local self-government institutions in biodiversity documentation and conservation.
- Updation of PBRs
- Using PBR data in local development decisions.

4. Sustainable agriculture and agrobiodiversity conservation

- Conservation of landraces and local varieties and indigenous livestock breeds.
- Support to custodian farmers conserving landraces.
- On-farm conservation of genetic resources
- Integrated nutrient and pest management
- Climate smart agriculture

5. Control of invasive aliens species

- State-level action plans for invasive flora and fauna.
- Mechanical and biological control measures
- Community participation in invasive species removal drives

6. Climate Action and biodiversity

- Nature based solutions - Ecosystem-based adaptation strategies (agroforestry, mangrove buffers, watershed restoration)
- Enhancing carbon sequestration through afforestation with native species
- Integrating biodiversity concerns into the State Action Plan on Climate Change.

7. Urban Biodiversity

- Protection of urban wetlands and sacred groves
- Urban biodiversity parks and green corridors
- Managing urban heat island effects
- Biodiversity-sensitive urban planning and tree protection policies.

8. Strengthening environmental governance

- Strict enforcement of Environmental Impact Assessment (EIA) norms
- Monitoring quarrying, deforestation, and land conversion
- Transparency and public participation in environmental decision-making
- Strengthening the Kerala State Biodiversity Board and research institutions.

9. Community-based conservation

- Eco-development committees and joint forest management models.
- Incentive-based conservation for forest fringe communities.
- Recognition of traditional ecological knowledge, particularly among indigenous communities.

10. Education and research

- Strengthening taxonomic research and digital biodiversity databases

- Biodiversity literacy programmes in schools and colleges.

Conclusion

- In Kerala, climate adaptation merits comparatively greater and immediate priority due to the state's acute vulnerability, limited emissions footprint, fiscal constraints, and equity considerations.
- Conservation of biodiversity cannot be isolated from development planning; instead, biodiversity must be mainstreamed into agriculture, infrastructure, climate policy, and local governance.
- A balance between ecological integrity and human well-being is central to ensuring Kerala's long-term environmental sustainability.