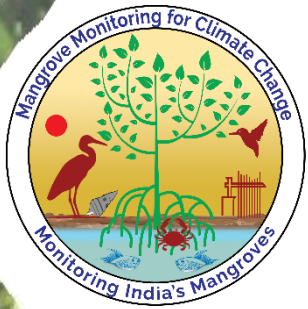





**NCCR**



Report

# India Mangrove Conclave (IMC) 2024

Organised by NCCR and CIFOR-ICRAF

 National Centre for Coastal Research (NCCR)  
NIOT Campus, Pallikaranai  
Chennai – 600100  
16-17 December 2024



### Date and location

The conference held at the National Centre for Coastal Research (NCCR), NIOT-Campus, Pallikaranai, Chennai-600100, Tamil Nadu on 16-17 December, 2024.



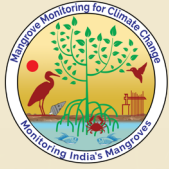
### Contact us

For more information, please visit  
[bit.ly/CIFOR-ICRAF-IMC2024](https://bit.ly/CIFOR-ICRAF-IMC2024)  
Email ID – [imc2024@cifor-icraf.org](mailto:imc2024@cifor-icraf.org)

**Rupesh K. Bhomia**  
CIFOR-ICRAF

**Uma Sankar Panda**  
NCCR





**NCCR**



# India Mangrove Conclave 2024

*Mangrove ecosystems of India: Science, policy and practice for sustainable management*



16-17 December 2024



NCCR, Chennai, India







**Inaugural Session IMC-2024 - 16<sup>th</sup> Dec, 2024**

Guest of Honor – Dr. K. Ravichandran, Director, IIFM & Chief Guest - Dr. Soumya Swaminathan, Chairperson, MSSRF



Participants at IMC-2024, Sagar Sangamam, NCCR-NIOT, Chennai  
16<sup>th</sup> Dec, 2024



## Conclave Overview

The India Mangrove Conclave 2024 was a two-day event scheduled on December 16-17, 2024, at the National Centre for Coastal Research (NCCR) in Chennai, India. The theme of the conclave was "Mangrove Ecosystems of India: Science, policy and practice for sustainable management." The event aimed to bring together researchers, practitioners, and stakeholders to discuss and exchange knowledge on the sustainable management of mangrove ecosystems in India.

**Goals and Objectives:** The primary goal of the conference was to convene experts and stakeholders to identify opportunities for improving mangrove ecosystems sustainably. The objectives were:

- Developing a practical guide for mangrove managers to utilise the latest scientific research and best practices.
- Facilitating discussions and knowledge exchange to encourage strategic research collaborations on mangroves as nature-based climate solutions.
- Reaching a consensus to develop a National Mangrove Centre as a knowledge repository and provide guidance for better mangrove management.

**India Mangrove Conclave** was divided into two main **themes**:

1. **Day 1: Mangrove Ecosystems: Scientific Research and Best Practices**
2. **Day 2: Mangroves for Adaptation, Biodiversity, and Human Well-being**

**Programme Highlights: India Mangrove Conclave 2024** brought together experts (academicians, young researchers, students), policymakers and higher govt officials and stakeholders towards mangrove conservation and restoration efforts in the country.

- Over 300 registrations from >100 institutes across India, IMC explored critical themes such as biodiversity conservation, climate mitigation, community engagement, and innovative restoration techniques.
- All coastal states and regions were covered in the representation of participants.
- A dedicated website was created to host all the information and continue to serve as the repository for all information related to IMC-2024. This site can be accessed at <https://www.cifor-icraf.org/event/mangrove-ecosystems-of-india-science-policy-and-practice-for-sustainable-management/>

### Day 1:

- The conclave started with the inauguration with addresses from key figures such as Dr. M. V. Ramana Murthy, Director, NCCR; Dr. Rupesh Bhomia, CIFOR-ICRAF; Dr. Éliane Ubalijoro, CEO, CIFOR-ICRAF; Dr. K. Ravichandran, Director, IIFM; Dr. Soumya Swaminathan, Chairperson, MSSRF and Dr US panda, NCCR.
- Three plenary talks on mangrove research were presented by Dr. V. Selvam from SPEED, Dr. Shanti Priya Pandey, APCCF from the Andhra Pradesh Forest Department, and Dr. Sudhakar Reddy from NRSC. These

talks provided a deeper understanding of mangrove ecosystems, covering topics such as the status of ecosystems and the use of geospatial technology in mangrove research.

- Panel discussion (Panel Members: Panelists: Dr. Gnanappazham L., Professor, IIST-TVM; Dr. Shanti Priya Pandey I.F.S., APCCF, Andhra Pradesh Forest Dept; Mr. Meerasa S, Mangrove Foundation of India; Dr. Varghese Paul, USAID – India moderated by Mr. Ravi Pratap Singh, Executive Officer, Ecosys Development Foundation, New Delhi) listed out significant issues and challenges in management, success stories, and requirement of intra- and inter collaboration between researchers, practitioners, policymakers and local coastal community.
- Four parallel sessions on Climate Change & Coastal Resilience, Coastal Biogeochemistry, Ecosystem Sustainability, and Restoration & Conservation gave a platform to eminent researchers, experts, and ECRs to showcase their expertise in various aspects of Mangrove research.
- Poster session (15 posters) gave a platform to exhibit the expertise of researchers and had some of the most advanced and technical research taken up in the mangrove ecosystems of India.
- The breakout group activities under three groups (knowledge, practices & policy) with four sub-groups in each by the Socratus group (Adrija Chaudhuri; Mr. Nithin Vemula & Saumya Jain), engaged all the participants actively.
- The breakout group activities engaged all participants across three areas: knowledge, practices, and policy, each with four sub-groups, gave an opportunity to all participants to come up with solutions for complex challenges in coastal settings.

## Day 2:

- Day two started with the recap of Day 1 by Dr. Sanitha K Sivadas.
- The technical keynote by Dr. Kathiresan, Retd. Professor, Annamalai University on mangroves for climate action, biodiversity and sustainability.
- Mr. Jagdish S. Bakan, I.F.S., Wildlife Warden and currently DFO of Hosur, delivered a plenary talk on leveraging institutional setups for collaborative and holistic management at the Gulf of Mannar Marine National Park and Biosphere Reserve.
- The best practices and strategies adopted in the restoration of Gujrath mangroves were explained by Dr. G A Thivakaran, Ecology Consultant, Chola MS Risk Services
- One of the major services of the mangrove ecosystem is tourism. Mr. Nahar Muhammed, IITM, Bhubaneshwar, explained the opportunities and benefits of the mangroves in terms of Tourism.
- A panel discussion on mangroves for adaptation, biodiversity, and human well-being was moderated by Dr. Rupesh Bhomia, a scientist with CIFOR-ICRAF. The panel featured prominent experts from various fields related to mangroves, including Mr. Subhash Chandra, CEO of the National



Authority (CAMPA); Dr. S. T. Balasubramanian, former Vice Chancellor of Chettinad University; Dr. Bijoy Nandan, Dean of CUSAT and former Vice Chancellor of Kannur University; Ms. Anuja Shukla from the World Bank in New Delhi; and Dr. P. Thamizoli, a social anthropologist.

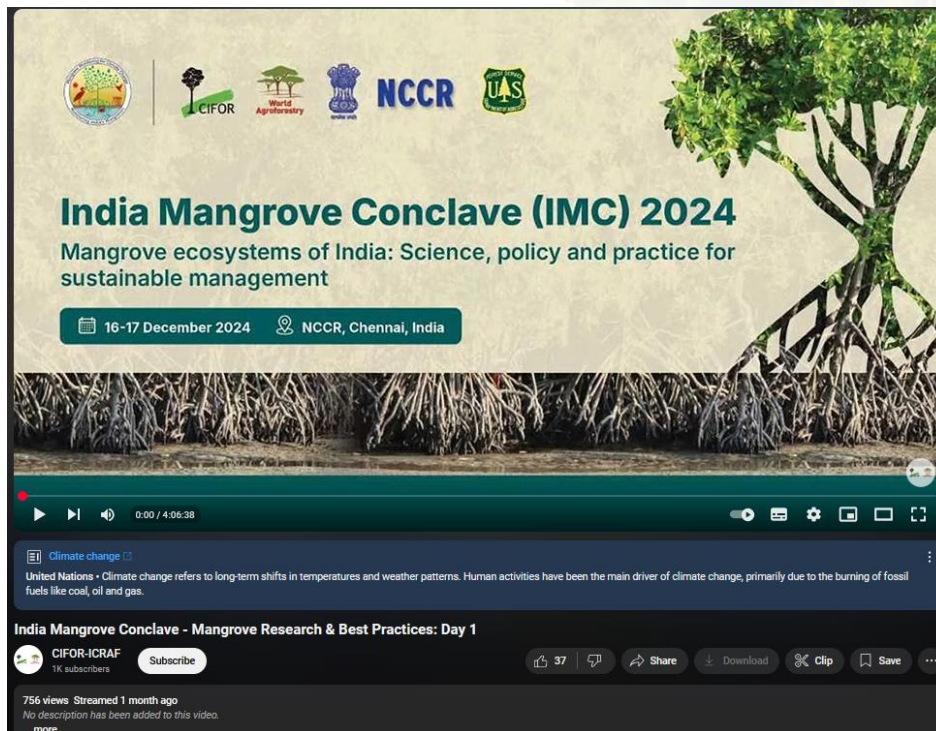
- The Idea exchange and reflection session Dr. Punyasloke Bhadury, IISER, Kolkata; Dr Anirban Guha, IISER-Thiruvananthapuram; Dr. Nehru Prabhakaran, WII, Dehradun; Mr R. Senthil Kumaran, I.F.S. CCF, MNP-Jamnagar; Dr. Uma Sankar Panda, Scientist-F, NCCR; Dr. P. Ragavan, Scientist, MoEF & CC moderated by Dr. Sanitha K. Sivadas, Scientist-E, NCCR. The panellists exchanged views on the gap areas and the future direction of Mangrove research in India.
- Mr. Saumya Jain from Socratus Organization presented the outcomes of the breakout group activities under each theme.
- Dr. Uma Sankar Panda, Scientist-F, NCCR presented the draft structure and way forward for the road map.
- In the closing ceremony, Mr Subhash Chandra, CEO of the National CAMPA, graced the occasion with his thoughts on mangrove ecosystems and the conclave concluded with the inputs from participants.
- Vote of thanks was delivered by Dr Tune Usha, Scientist-G, NCCR, who recounted the accomplishments and learnings from the two-day event, thanking all members and active participants to make this a fruitful gathering.



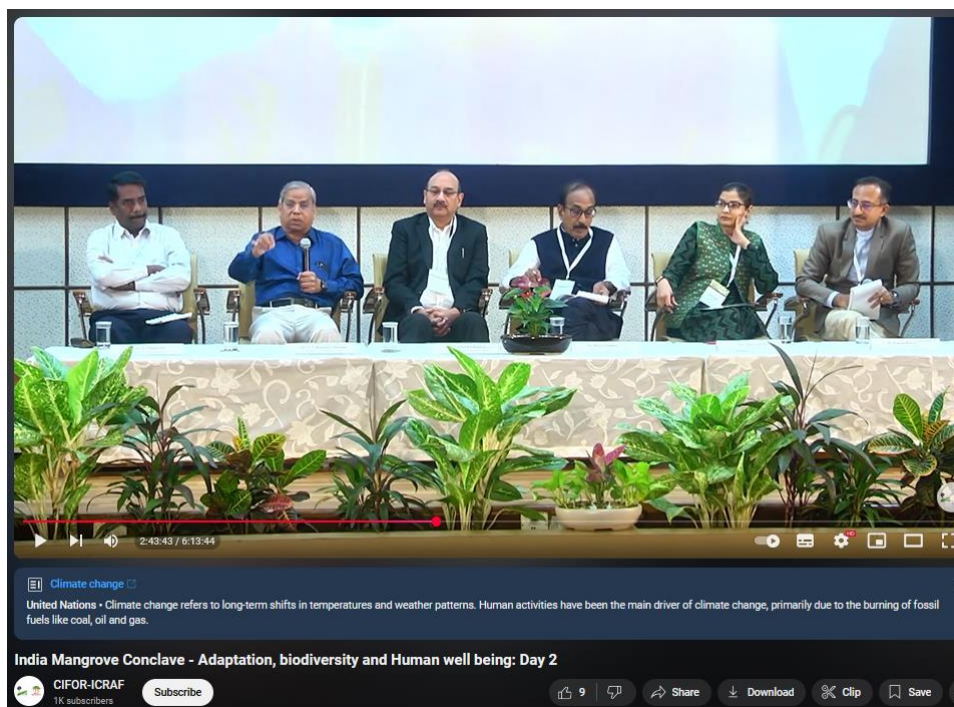
Participants at IMC-2024 closing, Sagar Sangamam, NCCR-NIOT, Chennai  
17<sup>th</sup> Dec, 2024



The IMC -2024 was live streamed on youtube to allow interested members to join and witness the sessions remotely. The recorded sessions are available on youtube for further viewing and dissemination.



India Mangrove Conclave - Mangrove Research & Best Practices:  
Day 1 - <https://www.youtube.com/live/H87teR2ps68>



India Mangrove Conclave - Adaptation, biodiversity and Human well-being:  
Day 2 <https://www.youtube.com/live/kIVctwApFSk>



# IMC-2024 Organizers

## CIFOR-ICRAF

The Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF) (<https://www.cifor-icraf.org/>), is a globally recognized research organization dedicated to addressing complex environmental and development challenges. CIFOR-ICRAF works across Asia, Africa, and Latin America, conducting cutting-edge research to inform policies, practices, and investments that benefit people and the planet. It bridges science and action by collaborating with governments, communities, and international organizations to develop evidence-based solutions that balance environmental conservation with socio-economic development. With an extensive network of field sites and partnerships, CIFOR-ICRAF generates robust data, tools, and insights that guide sustainable practices and policies. The organization also prioritizes capacity building, empowering local communities and stakeholders with knowledge and resources to implement sustainable solutions.

## NCCR

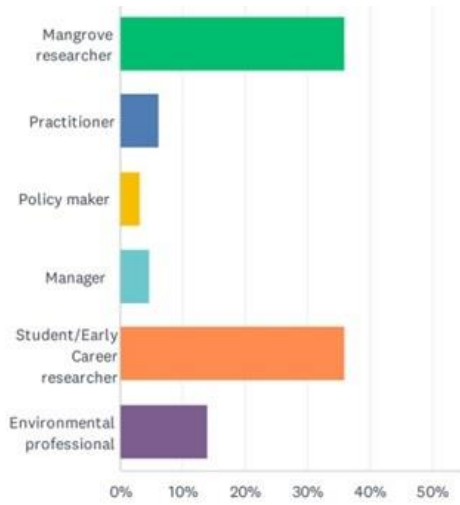
The National Centre for Coastal Research (NCCR) (<https://www.nccr.gov.in>) is an attached office under India's Ministry of Earth Sciences (MoES). Established to advance scientific understanding of coastal processes, NCCR focuses on sustainable coastal management and the conservation of marine ecosystems. Key areas of research include coastal erosion, marine pollution, climate change impacts, and the restoration of critical ecosystems like mangroves and coral reefs. NCCR also monitors India's coastal zones to address challenges such as sea-level rise, storm surges, and coastal flooding, providing valuable data for disaster risk reduction. The centre plays a vital role in developing and implementing scientific tools and models to support policy-making and coastal planning. It collaborates with national and international organizations, fostering interdisciplinary research and capacity-building initiatives.

## USFS

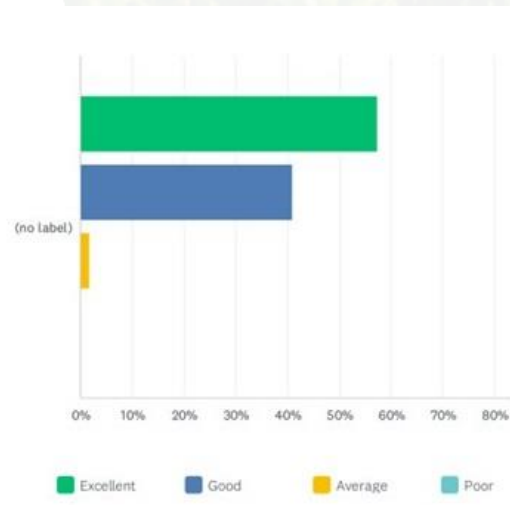
The United States Forest Service (USFS) (<https://www.fs.usda.gov/>) is a US federal agency with a vision for an equitable and climate-smart food and agriculture economy that protects and improves health, nutrition and quality of life; yields healthy land, forests and clean water; and feeds the world. As a leader in agricultural and environmental research, USDA leverages scientific expertise and policy development to promote conservation and sustainable practices.

# Feedback received from IMC participants

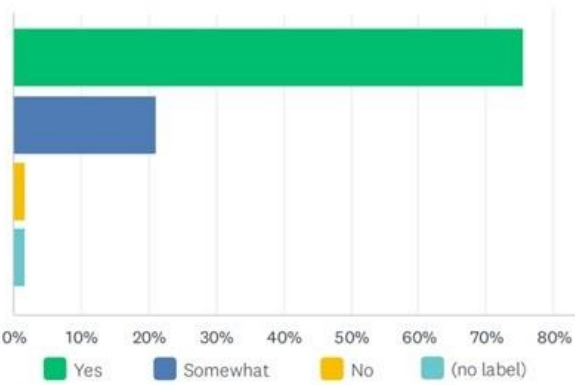
(Survey completed by 60 respondents)



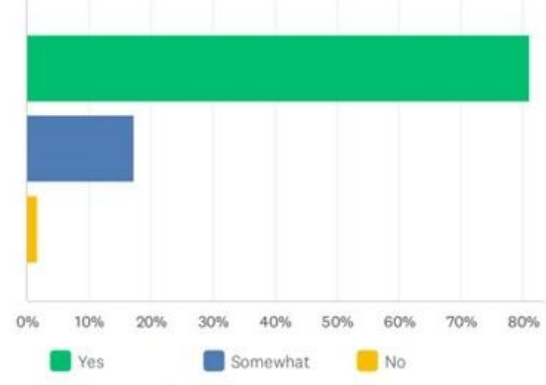
Composition of participants



Overall structure of IMC

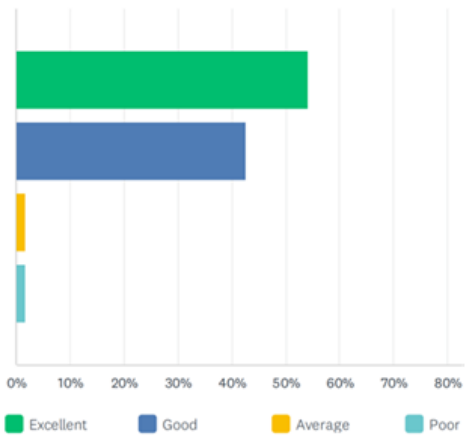


Did IMC-2024 provided a platform for knowledge exchange & collaboration?

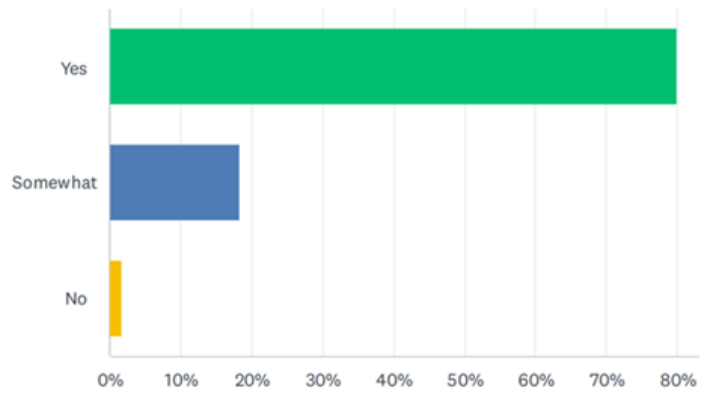


Did IMC-2024 inspired new ideas or direction for you?

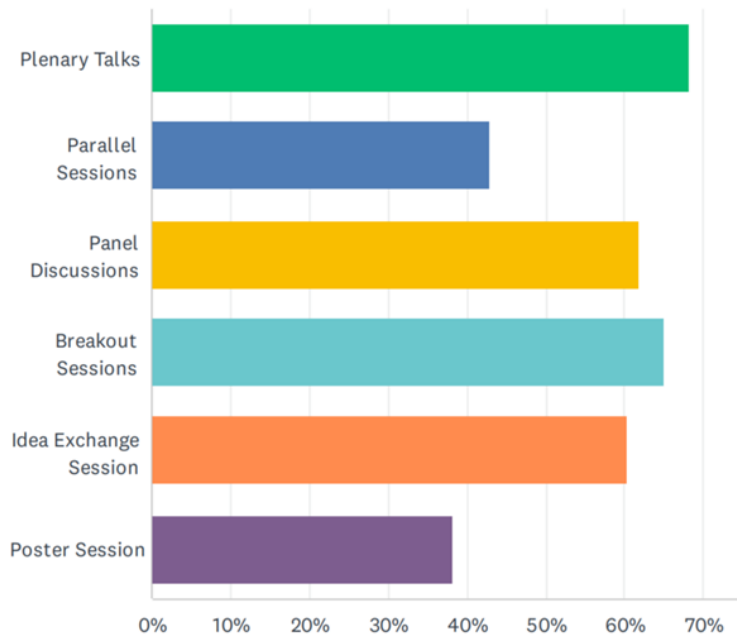




Overall content of IMC



Balanced perspective on Science, Policy and Practice



Most useful sessions at IMC

# Impressions of Early Career Researchers



Dr. Velumani T,  
Bay of Bengal Programme  
(BOBP-IGO)

*I'm delighted to have participated in the inaugural IMC, which was very well organized and insightful. The interactive sessions with diverse stakeholders were particularly impactful. I also built a strong network with professionals from various fields, all committed to mangrove conservation in India. I sincerely hope this well-executed event becomes an annual gathering.*

*Attending IMC 2024 in Chennai was an incredibly enriching experience for me. The event deepened my understanding of mangrove ecosystems and highlighted their role in coastal resilience and human well-being. Vibrant discussions with experts and policymakers provided practical insights into integrating science, community participation, and policy for sustainable management, leaving a lasting impact on all participants.*



Rupali Nayal,  
NEERI, Nagpur



Anjali Ghosh,  
West Bengal State University

*I am deeply grateful to IMC for the opportunity to present my work, even as I'm initiating my PhD on red algae in the Indian Sundarbans. Initially unsure about my presentation, I was overwhelmed by the insights and encouragement from esteemed scientists, which has truly motivated me. This experience highlighted mangrove degradation and sustainable solutions, inspiring me to do my best for environmental research. I feel proud to have been part of IMC 2024 and hope it continues as an annual gathering.*

*Participating in IMC 2024 was transformative for me as an early-career mangrove restoration researcher. I gained valuable insights, shared my work, and learned about new technologies and challenges in mangrove restoration. As a Sundarbans resident, I'm committed to restoring biodiverse mangroves for ecological and community benefits. Grateful to IMC for this platform, I hope it becomes an annual event.*



Chayan Kumar Giri,  
West Bengal State University



# Glimpses of IMC-2024



Day 1: IMC-2024 Inauguration, Plenary talks, Parallel sessions, & break-out group activity.





Day 2: Plenary talks, Idea exchange session, Closing ceremony, Participant feedback, Group photo of Inaugural session and Closing Ceremony.



# Conceptual Roadmap for Sustainable Mangrove Ecosystem Management in India

## Introduction

The India Mangrove Conclave (IMC) 2024 brought together researchers, policymakers, practitioners, and community leaders, nearly 300+ from 204 organisation to address the pressing challenges facing mangrove ecosystems in India. This roadmap outlines actionable strategies and collaborative frameworks for achieving sustainable mangrove ecosystem management, based on the outcomes of the discussions, plenary talks, and group activities during the two-day conclave.



## 1. Scientific Research and Innovation

### 1.1 Enhance Scientific Understanding:

- Conduct comprehensive baseline studies to map the extent, health, and biodiversity of mangrove ecosystems across India.
- Foster interdisciplinary research to explore the biogeochemical cycles, ecosystem services, and socio-ecological dynamics of mangroves.

- **Existing Practices and Policies:** Initiatives like the Mangrove for the Future (MFF) and National Mangrove Genetic Resource Centre (NMGR) aim to study and conserve mangroves. However, limited baseline data and uneven research across regions exist.
- **Actions Required:** Strengthen comprehensive mapping programs, create open-access repositories for data, and enhance collaboration between state and national research bodies.

### 1.2 Leverage Technology:

- Develop and deploy remote sensing and geospatial tools for real-time monitoring of mangrove health.
- Encourage the use of AI and machine learning for predictive modelling and early warning systems for threats such as deforestation, climate change, and pollution.
- **Existing Practices and Policies:** Tools like the Indian Remote Sensing (IRS) satellites and Bhuvan portal monitor mangrove cover, but real-time data integration is lacking.
- **Actions Required:** Develop user-friendly platforms for real-time monitoring and integrate AI/ML capabilities for predictive threat analysis.

### 1.3 Capacity Building in Research:

- Develop and deploy remote sensing and geospatial tools for real-time monitoring of mangrove health.
- Encourage the use of AI and machine learning for predictive modelling and early warning systems for threats such as deforestation, climate change, and pollution.
- **Existing Practices and Policies:** Programs like NCERT's capacity-building workshops are underway but need broader outreach.
- **Actions Required:** Increase funding for research grants and establish fellowships focusing on mangrove ecosystems.

## 2. Restoration and Conservation

### 2.1 Mangrove Restoration Projects:

- Develop and deploy remote sensing and geospatial tools for real-time monitoring of mangrove health.
- Encourage the use of AI and machine learning for predictive modelling and early warning systems for threats such as deforestation, climate change, and pollution.
- **Existing Practices and Policies:** Programs such as CAMPA (Compensatory Afforestation) have supported afforestation efforts. However, non-native species and inadequate monitoring reduce effectiveness.
- **Actions Required:** Enforce site-specific restoration guidelines and ensure monitoring frameworks are community-inclusive.

### 2.2 Ecosystem-Based Adaptation (EBA):

- Develop and deploy remote sensing and geospatial tools for real-time monitoring of mangrove health.



- Encourage the use of AI and machine learning for predictive modelling and early warning systems for threats such as deforestation, climate change, and pollution.
- **Existing Practices and Policies:** EBA strategies are part of India's State Action Plans on Climate Change (SAPCCs), but implementation remains fragmented.
- **Actions Required:** Integrate mangrove EBA into disaster risk management plans and allocate dedicated funding streams.

### 2.3 Traditional Knowledge and Practices:

- Document and incorporate traditional knowledge of local and indigenous communities into mangrove management practices.
- Recognize and incentivize community-led conservation efforts through financial and policy support.
- **Existing Practices and Policies:** Efforts to document traditional practices exist, such as the "People's Biodiversity Registers." Still, they are inconsistently applied.
- **Actions Required:** Create a national database of traditional mangrove management practices and incentivize community stewardship.

## 3. Policy and Governance

### 3.1 National Mangrove Centre:

- Establish a National Mangrove Centre as a knowledge repository and advisory body.
- Create standardized guidelines and protocols for mangrove conservation and management.
- **Existing Practices and Policies:** India lacks a centralized body dedicated to mangroves.
- **Actions Required:** Establish the National Mangrove Centre to act as a coordinating body for research, policy advice, and stakeholder engagement.

### 3.2 Legislative Framework:

- Strengthen legal protections for mangrove ecosystems, ensuring strict enforcement of existing laws.
- Develop policies to mitigate impacts of industrial activities, aquaculture, and tourism on mangroves.
- **Existing Practices and Policies:** Legal protections under CRZ notifications and the Environment Protection Act exist but face weak enforcement.
- **Actions Required:** Strengthen enforcement mechanisms, introduce mangrove-specific penalties for violations, and streamline inter-agency coordination.

### 3.3 Institutional Collaboration:

- Facilitate coordination among governmental agencies, NGOs, academic institutions, and private sector stakeholders.
- Establish state-level task forces for integrated mangrove management.
- **Existing Practices and Policies:** Initiatives like the National Adaptation Fund for Climate Change (NAFCC) promote inter-agency projects but lack long-term focus.
- **Actions Required:** Develop permanent state-level mangrove task forces to ensure consistency and accountability.

## 4. Community Engagement and Livelihoods

### 4.1 Community Involvement:

- Build local capacity through training programs in sustainable mangrove management.
- Foster participatory governance structures to include local communities in decision-making processes.
- **Existing Practices and Policies:** Community participation through schemes like MGNREGA supports mangrove plantation drives, but long-term engagement is limited.
- **Actions Required:** Expand participatory approaches with financial incentives for sustained community involvement.

### 4.2 Livelihood Diversification:

- Promote eco-friendly livelihood options such as mangrove-based eco-tourism, aquaculture, and non-timber forest products.
- Support skill development programs to empower coastal communities economically.
- **Existing Practices and Policies:** Programs like the National Rural Livelihoods Mission (NRLM) include mangrove-based activities but need scalability.
- **Actions Required:** Develop mangrove-linked microenterprises and provide technical training for sustainable livelihoods.

### 4.3 Education and Awareness:

- Launch national and regional campaigns to raise awareness about the ecological and socio-economic importance of mangroves.
- Integrate mangrove conservation into school and university curricula.
- **Existing Practices and Policies:** Awareness campaigns such as the "Mangroves are Lifelines" initiative exist but require broader reach.
- **Actions Required:** Incorporate mangrove conservation modules in educational curricula and use digital platforms for awareness.

## 5. Monitoring and Evaluation

### 5.1 Ecological Indicators:

- Develop a set of key ecological indicators for assessing the health and resilience of mangrove ecosystems.
- Conduct periodic assessments to track progress and adapt management practices as needed.
- **Existing Practices and Policies:** The State of Forest Report includes mangrove health metrics yet lacks region-specific details.
- **Actions Required:** Develop finer-scale indicators and conduct biannual assessments.

### 5.2 Monitoring Frameworks:

- Establish a centralized database for collating and sharing data on mangrove ecosystems.
- Encourage transparency and accountability in reporting conservation outcomes.



- **Existing Practices and Policies:** Fragmented monitoring by multiple agencies leads to data redundancy.
- **Actions Required:** Create a unified database and encourage interoperability among stakeholders.

### 5.3 Impact Evaluation:

- Design and implement metrics to evaluate the socio-economic and ecological impacts of conservation initiatives.
- Use evidence-based insights to guide future policy and project designs.
- **Existing Practices and Policies:** Impact assessments are often ad hoc and donor-driven.
- **Actions Required:** Mandate independent evaluations for major conservation projects and ensure public dissemination of findings.

## 6. Financing and Resource Mobilization

### 6.1 Financial Mechanisms:

- Establish mangrove conservation funds supported by public and private sector contributions.
- Explore international funding opportunities through climate and biodiversity frameworks.
- **Existing Practices and Policies:** CAMPA and external funding mechanisms provide resources but remain insufficient.
- **Actions Required:** Increase allocations under CAMPA for mangrove-specific projects and seek private-public partnerships.

### 6.2 Payment for Ecosystem Services (PES):

- Implement PES schemes to compensate local communities for their conservation efforts.
- Incentivise industries to adopt sustainable practices by linking them to PES frameworks.
- **Existing Practices and Policies:** PES frameworks are limited in scope and pilot stages.
- **Actions Required:** Scale successful pilots and develop PES guidelines specific to mangrove ecosystems.

### 6.3 Corporate Partnerships:

- Encourage corporate social responsibility (CSR) investments in mangrove restoration

- and conservation projects.
- Partner with industries to develop sustainable models for coastal development.
- **Existing Practices and Policies:** CSR activities include mangrove restoration projects but lack standardization.
- **Actions Required:** Develop CSR certification standards to encourage meaningful corporate participation.

## 7. Future Directions and Collaboration

### 7.1 Long-Term Vision:

- Integrate mangrove conservation into India's climate action and biodiversity strategies.
- Develop a 10-year action plan to achieve measurable progress in mangrove restoration and sustainability.
- **Existing Practices and Policies:** National targets for mangrove conservation are included in India's NDCs but lack actionable detail.
- **Actions Required:** Develop specific mangrove conservation milestones aligned with global biodiversity and climate targets.

### 7.2 International Collaboration:

- Foster global partnerships to exchange knowledge and best practices.
- Contribute to international commitments such as the Sustainable Development Goals (SDGs) and the Paris Agreement.
- **Existing Practices and Policies:** India participates in global networks like the Mangrove Alliance for Climate, but collaborations are underutilized.
- **Actions Required:** Establish bilateral partnerships to exchange technical expertise and resources.

### 7.3 Knowledge Sharing Platforms:

- Organize biennial conferences and workshops to review progress and refine strategies.
- Establish online portals for stakeholders to access resources, data, and tools.
- **Existing Practices and Policies:** Platforms like the Indian Mangrove Portal exist but are underfunded.
- **Actions Required:** Enhance funding for existing platforms and create user-friendly, multilingual interfaces



## **Mangroves: A Quick Reference**



Biodiversity	Biodiversity is the variety of life on Earth, including the variety of genes, species, and ecosystems.
Bioshield	Bio-shield is a strip of vegetation, such as trees and shrubs (Mangroves, Coastal forests, Saltmarshes, Dune vegetation, Seagrasses, and Coral reefs) that protects coastal areas from high winds, waves, and other natural hazards.
Brackish water	A broad term used to describe water that is more saline than freshwater but less saline than true marine environments, a transitional area between fresh and marine waters.
Canopy	Canopy cover refers to the proportion of the forest floor covered by the vertical projection of the tree crowns
Carbon Credits	Carbon credits, or carbon offsets, refer to carbon emissions reductions or removals, measured in tonnes of carbon dioxide equivalent (tCO <sub>2</sub> e). Carbon credits can be generated through projects which take in carbon from the atmosphere (e.g. reforestation) or reduce the amount of carbon released into the atmosphere (e.g. renewable energy projects)
Climate change	Climate change refers to long-term shifts in temperatures and weather patterns.
Coastal Blue Carbon	Coastal Blue Carbon; carbon stored in marine and coastal ecosystems, such as mangroves, salt marshes, and seagrasses mostly up to 6 meters under the seabed. It's called "Blue" Carbon because of its proximity to the ocean.
Creek	Natural streams of water are normally smaller than and often tributary to a river.
Cultural Service	The non-material benefits that people can obtain from ecosystems, such as Spiritual enrichment, Intellectual development, Recreation, Aesthetic values, Sense of place or identity, Tourism etc.
Ecology	The study of how organisms interact with their environment, including the relationships between different species and their impact on ecosystems.
Ecosystem service	Direct and indirect ways that ecosystems contribute to human well-being and quality of life.
Estuary	Partially enclosed body of water where fresh water from rivers mixes with salt water from the ocean
Fishbone channel	A plantation method wherein the water from the creek is diverted to gaps in mangroves through fish bone-shaped channels so that the saline barren land becomes fertile to support planted mangrove species.
GDP	Gross Domestic Product; the total monetary or market value of all the finished goods and services produced within a country's borders in a specific time period.

Habitat	A place where an organism or a community of organisms lives, including all living and non-living factors or conditions of the surrounding environment.
Halophytes	Halophyte is the term used specifically for plants that can tolerate significant concentrations of salt and even benefit from the presence of salt.
Hypoxia	A condition where the level of dissolved oxygen in the water within a mangrove ecosystem becomes significantly low.
Inter-tidal Zone	The intertidal zone is the area where the ocean meets the land between high and low tides.
Mangrove	A category of trees and shrubs that live in the coastal intertidal zone.
Mangrove associates	Plants that can survive in salty soils and occur in a variety of coastal habitats, including mangroves, also known as nonexclusive species.
Mangrove Restoration	The process of helping to recover mangrove forest ecosystems that have been damaged or destroyed.
Nature-based Solution	A suite of solutions that involve working with nature, as part of nature, to address societal challenges, and support human well-being and biodiversity locally.
Ocean Accounts	Integrated records of regularly compiled and comparable data concerning ocean environment assets (e.g., extent/condition of mangroves), economic activity (e.g., sale of fish) and social conditions (e.g., coastal employment).
Pneumatophores	Pneumatophores are specialized aerial roots stemming from a subterranean root system, which enable plants to utilize air in waterlogged soil habitats.
Provisional Service	The direct benefits to humans from the ecosystem in terms of material and energy outputs such as food, water, raw materials, genetic resources, and medicinal resources.
Regulatory Service	The ecological processes that improve or make life possible include climate regulation, air quality, water cycle quality, Pollution, and control of floods, soil erosion, and diseases.
Road map	A strategic plan that defines a goal or desired outcome and includes the major steps or milestones needed to reach it.
Shoreline	The physical interface of the land with the water surface.
Tide	Tides are very long-period waves that move through the oceans in response to the forces exerted by the moon and sun.
UN-GOBC	United Nations Global Ocean Decade Programme for Blue Carbon.
Zonation	Mangrove zonation refers to unique ecological clusters within a mangrove





NCCR



# India Mangrove Conclave (IMC) 2024

Mangrove ecosystems of India: Science, policy and practice for sustainable management



16-17 December 2024



NCCR, Chennai, India

## Useful Information for participants

The goal of the conference is to convene researchers, practitioners and stakeholders from India's mangrove ecosystems for knowledge exchange to identify opportunities to conserve and manage these ecosystems sustainably [[Read More](#)]

**Key contact people:** For local logistics and accommodation, please contact Dr Nimalan or Dr Mayamanikdan

## Chennai weather

Chennai is typically pleasant in December, with average high temperatures around 28°C and low around 22°C. However, the weather can be quite variable, with occasional rain showers and higher humidity levels. In general, occasional rain showers are possible.

**Transportation:** Google Maps: Use Google Maps to get real-time directions and traffic updates.

**Google Map Location:** Click [Here](#)

**By Air:** The most convenient way to reach NIOT from the Chennai International Airport is by taxi. Prepaid Taxis are readily available outside the airport terminal.

**By Train:** Train to Chennai Central or Egmore: If you're arriving by train, you can either take a taxi or use public transport to reach NIOT.

**Local Train:** The Chennai Suburban Railway network can be used to reach stations like Velachery or Guindy, from where you can take a taxi or auto-rickshaw.

**By Bus:** Several city buses ply between various parts of Chennai and Pallikaranai. You can check with the local bus authorities or use a bus tracking app (Chalo, Chennai Bus etc.) to find the appropriate bus route.

**App based aggregators:** Cab service providers like Ola, Uber and others offer convenient and efficient transportation in Chennai, connecting riders to a wide network of drivers, ensuring hassle-free travel across the city.

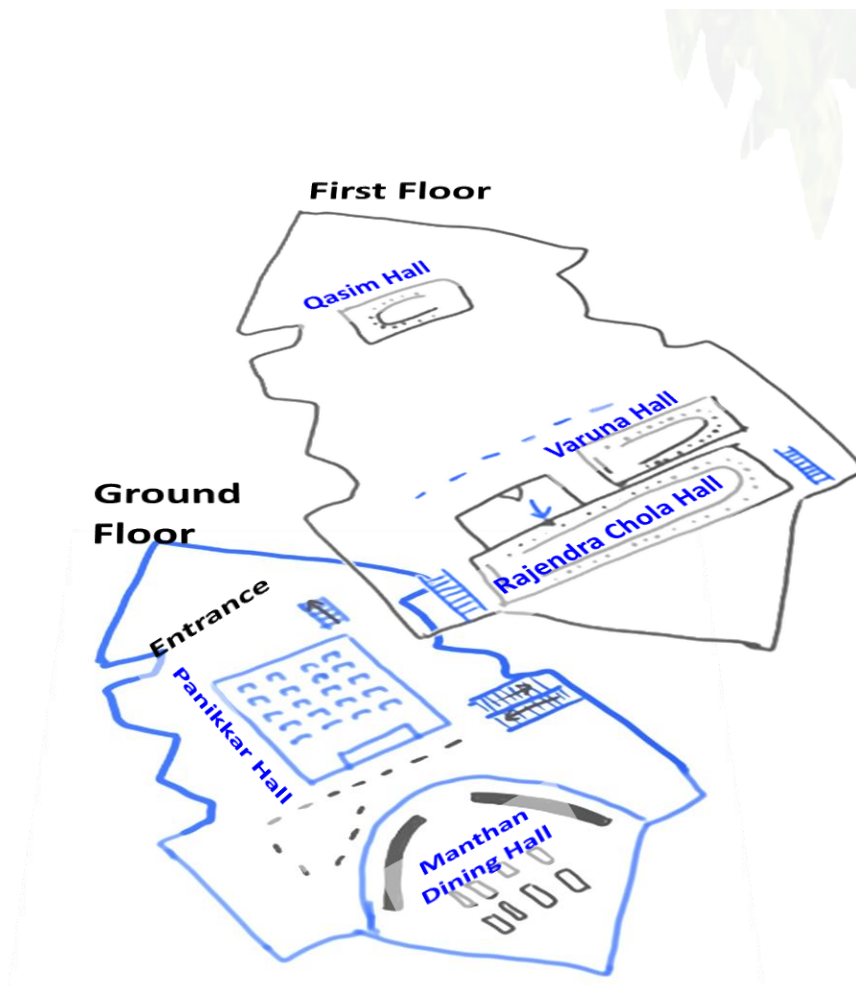
**Auto-rickshaws:** Auto-rickshaws are readily available in Chennai and can be used to reach NIOT from nearby stations or bus stops. However, they might be expensive depending on the distance and location.

**Conclave Location/venue details:**

NIOT is situated in Pallikaranai, Chennai, Tamil Nadu. It's located on the Velachery-Tambaram Main Road, near Kamakshi Memorial Hospital, making it easily accessible from various parts of the city.

We would like to share the following information regarding the conclave venue. The conclave will be held in the **SAGARA SANGAMAM** Building at the NIOT campus.

Panikkar Hall (Plenary Hall) and Manthan Hall (Tea/Lunch) **Ground Floor**  
Rajendra Chola Hall, Varuna Hall, & Qasim Hall (parallel sessions & Break-out session) **First Floor**



*Schematic plan of the venue*



### Places to Visit:

- Marina Beach: The Marina is a primarily sandy beach, with an average width of 300 m (980 ft) and the width at the widest stretch is 437 m (1,434 ft). [Google Maps](#)
- Government Museum Chennai: State collections including Indian art & sculpture, bronzes, anthropology & a children's section. It is located at Pantheon Rd, Egmore, Chennai; is open from 10:30 AM to 6:30 PM on Mondays, Tuesdays, Wednesdays, Thursdays, and Saturdays and Sundays. [Google Maps](#).
- Fort St. George Museum: The first British fortress built in India, established in 1644, with a museum & 17th-century church. It is located at Rajaji Rd, near Legislature and Secretariat, Fort St George, Chennai; is open from 9:00 AM to 5:00 PM on Mondays, Tuesdays, Wednesdays, Thursdays, and Saturdays, and Sundays. [Google Maps](#).
- **Kapaleeshwarar Temple:** A historic Hindu temple dedicated to Lord Shiva, known for its stunning architecture and vibrant festivals. [Google Maps](#).
- VGP Marine Kingdom: Big aquarium with five aquatic zones, an underwater tunnel, a touch-pool exhibit & live feeding shows. [Google Maps](#)
- The Madras Crocodile Bank Trust and Centre for Herpetology (or Croc Bank) is an effort to save India's dwindling crocodilian populations. [Google Maps](#)

### Other important info /FAQ

- Upon arriving at the main Security Gate of the NIOT Campus, please inform them that you are participating in IMC-2024. They will provide directions to the Conclave Venue on the NIOT campus.
- Programmes will start on time. Hence, make it on time.



**NCCR**



## Programme

# India Mangrove Conclave 2024

*Mangrove ecosystems of India: Science, policy and practice for sustainable management*



16-17 December 2024



NCCR, Chennai, India





## Inauguration

16.12.2024, Monday

08:30-09:30	<b>Registration</b>
09:30-09:32	<b>Invocation</b>
09:32-09:35	<b>Lighting of Lamp</b>
09:35-09:40	<b>Welcome address</b> Dr. M. V. Ramana Murthy, <i>Director, National Centre for Coastal Research (NCCR)</i>
09:40-09:45	<b>An Introduction to IMC-2024</b> Dr. Rupesh Bhomia, <i>CIFOR-ICRAF</i>
09:45-09:50	<b>Inaugural address (recorded)</b> Dr. Éliane Ubalijoro, <i>CEO, CIFOR-ICRAF</i>
09:50-09:55	<b>Address</b> Prof. Balaji Ramakrishnan, <i>Director, National Institute of Ocean Technology (NIOT)</i>
09:55-10:05	<b>Address by the Guest of Honor</b> Dr. K. Ravichandran, <i>Director, IIFM</i>
10:05-10:10	<b>Felicitation</b>
10:10-10:20	<b>Chief Guest Address</b> Dr. Soumya Swaminathan, <i>Chairperson, MSSRF, Chennai</i>
10:20-10:25	<b>Vote of Thanks</b> Dr. U.S. Panda, <i>Scientist-F, NCCR</i>
10:25-10:28	<b>National Anthem</b>
	Group Photo
	High Tea



Day 1: 16.12.2024, Monday   Mangrove Ecosystems: Scientific Research and Best Practices	
<b>Plenary Talks</b>	
11.05-11.25	<b>Mangrove research: Advances and gaps in Indian settings</b> Dr. V. Selvam, <i>SPEED</i>
11.25-11.45	<b>Status of mangrove ecosystems: intersectionality of science with management</b> Dr. Shanti Priya Pandey, <i>APCCF, Andhra Pradesh Forest Department</i>
11.45-12.05	<b>Geospatial technology for mangrove monitoring and decision support</b> Dr. Sudhakar Reddy, <i>National Remote Sensing Centre (NRSC)</i>
12.05-12.20	<b>Open Discussion / Q &amp; A</b>
12.20-13.20	<b>Panel Discussion</b> <b>Challenges in management, success stories, cooperation and collaboration</b> Panelists: 1. Dr. Gnanappazham L., <i>Professor, IIST, Thiruvananthapuram</i> 2. Dr. Shanti Priya Pandey I.F.S., <i>APCCF, Andhra Pradesh Forest Dept.</i> 3. Mr. Meerasa S, <i>Mangrove Foundation of India</i> 4. Dr. Varghese Paul, <i>USAID – India</i> Moderator: Mr. Ravi Pratap Singh, <i>Executive Officer, Ecosys Development Foundation, New Delhi</i>
<b>Lunch</b>	
<b>Parallel Session</b>	
14.20-15.20	<b>Climate Change &amp; Coastal Resilience</b> 4 Presentations [10 mins talk & 5 mins discussion] Session Chairs: 1. Dr. P. Raghavan, <i>Sci-C, MoEF &amp; CC</i> 2. Dr. Anirban Guha, <i>Ramalingaswami Faculty Fellow, IISER-Thiruvananthapuram</i>
14.20-15.20	<b>Coastal Biogeochemistry</b> 4 Presentations [10 mins talk & 5 mins discussion] Session Chairs: 1. Dr. Punyasloke Bhadury, <i>IISER-Kolkata</i> 2. Dr. Sahadev Sharma, <i>USFS</i>
14.20-15.20	<b>Ecosystem Sustainability</b> 4 Presentations [10 mins talk & 5 mins discussion] Session Chairs: 1. Dr. Dharmendra Shah, <i>M.S University of Baroda</i> 2. Dr. Rani Varghese, <i>KUFOS, Kochi</i>
14.20-15.20	<b>Restoration &amp; Conservation</b> 4 Presentations [10 mins talk & 5 mins discussion] Session Chairs: 1. Dr. Krishna Ray, <i>Associate Professor, West Bengal State University</i> 2. Dr. Nehru Prabhakaran, <i>Scientist-D, WII, Dehradun</i>
15.20-15.50	<b>Poster Session with Tea</b>
15.50-16.50	<b>Breakout Group Activity</b> Understanding complexities, identifying challenges and opportunities for effective mangrove management and conservation in India Moderators: Saumya Jain, Adrija Chaudhuri and Nithin Vemula, <i>Socratus Foundation</i>
16.50-17.20	<b>Reporting back from Breakout Activity &amp; Sharing summary</b>
17.20-17.30	<b>Concluding Remarks: Day 1</b> Dr. S. R. Marigoudar, <i>Scientist-E, NCCR</i>
<b>Networking Social</b>	

**Day 2: 17.12.2024, Tuesday | Mangroves for Adaptation, Biodiversity and Human Well-being**

09.30-09.35	<b>Recap of Day 1 and opening remarks</b> Dr. Sanitha K. Sivadas, <i>Scientist-E, NCCR</i>
09.35-09.50	<b>Technical keynote</b> <b>Mangrove for climate action, biodiversity and sustainability: Adaptation &amp; nature-based solutions</b> Dr. Kathiresan, <i>Retd. Professor, Annamalai University</i>
<b>Plenary Talks</b>	
09.50-10.10	<b>Leveraging institutional setup for collaborative and holistic management</b> Mr. Jagdish S Bakan I.F.S., <i>Wildlife Warden, Gulf of Mannar Marine National Park and Biosphere Reserve</i>
Tea	
10.30-10.50	<b>Evolving Strategies in Mangrove Restoration in Gujarat: A New Era of Coastal Conservation</b> Dr. G A Thivakaran, <i>Ecology Consultant, Chola MS Risk Services</i>
10.50-11.10	<b>Ecosystem Services and livelihood options through responsible eco-tourism</b> Mr. Nahar Muhammed, <i>IITM, Bhuvaneshwar</i>
11.10-12.10	<b>Panel Discussion</b> <b>Mangroves for adaptation, biodiversity and human well-being</b> Panelists: 1. Mr. Subhash Chandra, <i>CEO, National Authority (CAMPA)</i> 2. Dr. S. T. Balasubramanian, <i>former VC, Chettinad University</i> 3. Dr. Bijoy Nandan, <i>Dean, CUSAT &amp; former VC, Kannur University</i> 4. Ms. Anuja Shukla, <i>World Bank, New Delhi</i> 5. Dr. P. Thamizoli, <i>Social Anthropologist</i> Moderator: Dr. Rupesh Bhomia, <i>Scientist, CIFOR-ICRAF</i>
12.10-12.30	<b>Open Discussion / Q&amp;A</b>
Lunch	
13.30-15.00	<b>Idea Exchange and Reflection session</b> Speakers: 1. Dr. Punyasloke Bhadury, <i>IISER, Kolkata</i> 2. Dr Anirban Guha, <i>IISER-Thiruvananthpuram</i> 3. Dr. Nehru Prabhakaran, <i>WII, Dehradun</i> 4. Dr. Harendra Kharkwal, <i>Scientist-E, MoEF &amp; CC</i> 5. Dr. Uma Sankar Panda, <i>Scientist-F, NCCR</i> 6. Administrators & Officers from Forest Departments Moderator: Dr. Sanitha K. Sivadas, <i>Scientist-E, NCCR</i>
Tea/Coffee	
15.20-16.20	<b>Convening of the Conclave: Unlearning and New Learnings</b> Deliberations for impactful and effective best practices for mangrove management and coastal sustainability in India. Moderators: Saumya Jain, Adrija Chaudhuri and Nithin Vemula, <i>Socratus Foundation</i>
<b>Closing Ceremony</b>	
16.30-16.45	<b>A Conceptual Roadmap – Chief Guest</b> :Mr. Subhash Chandra, <i>CEO, National CAMPA</i>
16.45-16.55	<b>Input from participants</b>
16.55-17.00	<b>Vote of Thanks - Dr. Tune Usha, Scientist G, NCCR</b>



Parallel Sessions   Time: 14:20-15:20				
Theme	No	Title	Presenting Author	Institute
<b>Climate Change &amp; Coastal Resilience</b>	1	Perspectives of establishing a cyclone ecology research in a mangrove estuary of India	Sourav Paul	Estuarine and Coastal Studies Foundation
	2	Methane water-to-air flux and carbon storage potential in restored mangroves: insights for climate resilience and adaptation	Regina Hershey N	Cochin University of Science and Technology
	3	Loss and gains: two decades of post-tsunami mangrove and carbon stock recovery in the Nicobar islands, India	Thirumurugan Vedagiri	Madras Christian College, Chennai/ WII
	4	Stable isotopes of carbon and nitrogen in surface sediments of mangrove creeks and Kakinada bay ecosystem (Andhra Pradesh, India)	Appala Naidu S	National Centre for Coastal Research
<b>Coastal Biogeochemistry</b>	1	Environmental and physiological drivers of evapotranspiration of a tropical mangrove in India	Pramit Deb Burman	Indian Institute of Tropical Meteorology
	2	Patterns of carbonate chemistry from a mangrove dominated coastal ecosystem influenced by environmental perturbations	Nirupama Saini	Indian Institute of Science Education and Research Kolkata
	3	Tracking role of nitrate on sedimentary carbon storage of Indian Sundarbans- an insight from lipid biomarkers	Arindam Roy	Indian Institute of Science Education and Research Kolkata
	4	Dynamics and interaction of dimethyl sulfide (DMS) and methane in Coringa mangrove	Damodara Rao Valavala	National Centre for Coastal Research
<b>Ecosystem Sustainability</b>	1	Isolation and identification of Nitrilase and Laccase producing halophilic bacteria from mangrove ecosystem	Anjali Balakrishnan	Central University of Kerala
	2	Catenella sp., A red alga as an indicator of mangrove ecosystem's vulnerability: A preliminary study from Indian Sundarbans	Anjali Ghosh	West Bengal State University
	3	Understanding sustainability aspects of mangrove ecotourism project Songaon Maharashtra	Manasi Dichwalkar	Forest Research Institute Dehradun
	4	Aquatic food systems for human and planetary health: food security, livelihoods and mangrove conservation in the Indian Sundarbans	Richard Nyiawung	University of Waterloo
<b>Restoration &amp; Conservation</b>	1	Community perception survey on mangrove ecosystems and best practices for sustainable management in Pulicat and Pichavaram	Arunvel M	Institute for Ocean Management, Anna University, Chennai
	2	Native biodiversity restoration in degraded mangrove habitats: experimented in Indian Sundarbans on a pilot scale	Chayan Kumar Giri	West Bengal State University
	3	Communities for mangrove conservation - a case study from Kannur, Kerala	B C Choudhury	Wildlife Trust of India
	4	Relevance of community perceptions in mapping cultural ecosystem services: lessons from bio-cultural landscape of Bhitarkanika wildlife sanctuary, Odisha	Rupali Nayal	CSIR-NEERI

## Introduction

Mangrove ecosystems play an important role in coastal protection, sustainable livelihoods and biodiversity conservation. These unique ecosystems are vulnerable to climate change and it negatively impacts vulnerable coastal communities. Understanding the interconnectedness of these unique socioecological systems would aid in management and protection for sustaining biodiversity that depend on these ecosystems.

A greater understanding of mangrove ecosystem services, carbon sequestration benefits, biodiversity conservation and enhanced resilience is essential for India's coastal sustainability, including the well-being of vulnerable communities. Equally important is the availability of sound scientific information for planning and implementing successful mangrove restoration. Adopting scientific methodologies and monitoring techniques using advanced technical tools can inform and improve management of mangrove ecosystems. Setting up regular mangrove monitoring efforts will allow relevant stakeholders and managers to keep a check on the overall ecological health and to take appropriate action when problems arise.

***The vision for this India Mangrove Conclave (IMC) is to make mangrove science, research and best practices readily available and accessible to managers and other stakeholders to ensure sustainability and resilience of these ecosystems for the benefit of society.***

This conference will convene voices and perspectives from different stakeholders connected to India's mangrove ecosystems. It will provide a platform for exchange of knowledge in discussing challenges and drivers of mangrove loss in India and best practices on mangrove conservation; examining how scientific research can be applied to improve mangrove ecosystem functions and enhance benefits for local communities. By highlighting mangrove research in India, this conference aims to catalyse multi-institutional collaboration to enhance mangrove research and promote practices leading to improved coastal ecosystem sustainability. This gathering will foster linkages between India's scientific research community, practitioners, managers and coastal communities, as well as coastal industry and tourism sectors, including government and non-government entities. The conference will strive to develop an outline for a broad roadmap for integrated and holistic sustainability of Indian mangrove ecosystems based on scientific evidence and best practices.

## Goal and objectives

The conference goal is to convene researchers, practitioners and stakeholders from the country's mangrove ecosystems for a knowledge exchange to identify opportunities in improving these ecosystems sustainably. Sessions will broadly cover topics around livelihoods, biodiversity conservation, climate mitigation, vulnerability and adaptation, and ecological restoration in the context of mangroves. The objectives of these sessions will be to:

- Develop an outline to produce a practical guide that empowers mangrove managers to utilize the latest scientific research and best practices for enhancing coastal resilience and improved management;
- Facilitate discussions and knowledge exchange to encourage novel strategic research collaborations on mangroves as nature-based climate solutions;
- Reach a consensus to develop/constitute a National Mangrove Centre to act as a repository of available knowledge, scientific and practical understanding of the country's various mangrove ecosystems, and for providing needed advice/guidance to tackle issues related to better management of mangroves across the country.

## Conference themes

- **Day 1. Mangrove ecosystems: Scientific research and best practices**
  - Mangrove research advances and gaps in the Indian setting
  - Mangrove extent change and risks to existing mangroves including efforts to address it
  - Innovative in-situ and remote sensing monitoring for decision support
  - Traditional knowledge and community-based conservation
- **Day 2. Mangroves for adaptation, biodiversity and human well-being**
  - Biodiversity and ecosystem services of mangroves
  - Sustainable coastal management and ecosystem-based adaptation
  - Nature-based solutions for coastal resilience
  - Mangrove restoration and potential for climate mitigation and adaptation
  - Leveraging institutional setups for collaborative and holistic management
  - Information and knowledge management for greater effectiveness and impacts

## Programme

The two-day conference will include technical presentations on mangrove research and advancements, as well as selective case studies exhibiting best practices from the field to foster discussions and facilitate conversations for improved mangrove management in the country. Participants (invitees) will be a diverse group representing Government institutions, researchers and civil society organizations, and senior members from the mangrove forest divisions of the country, along with members actively involved in livelihoods, biodiversity conservation and tourism activities in coastal settings.

## Event

- **Day 1.** The first half of the day will include a keynote address and presentations from mangrove researchers and practitioners. The second half will consist of early career researcher presentations (parallel sessions) followed by facilitated panel and group discussions to identify critical priorities/gaps.
- **Day 2.** The first half of the day will have technical sessions highlighting conservation and management practices, and identifying opportunities for increasing capacity and technical expertise. The second half will be facilitated panel and group discussions for developing a roadmap for practitioners to implement best practices in mangrove management.

## Conference Organizers



### CIFOR-ICRAF

The Center for International Forestry Research and World Agroforestry (CIFOR-ICRAF) (<https://www.cifor-icraf.org/>), is a globally recognized research organization dedicated to addressing complex environmental and development challenges. CIFOR-ICRAF works across Asia, Africa, and Latin America, conducting cutting-edge research to inform policies, practices, and investments that benefit people and the planet. It bridges science and action by collaborating with governments, communities, and international organizations to develop evidence-based solutions that balance environmental conservation with socio-economic development. With an extensive network of field sites and partnerships, CIFOR-ICRAF generates robust data, tools, and insights that guide sustainable practices and policies. The organization also prioritizes capacity building, empowering local communities and stakeholders with knowledge and resources to implement sustainable solutions.



### NCCR

The National Centre for Coastal Research (NCCR) (<https://www.nccr.gov.in/>) is an attached office under Ministry of Earth Sciences (MoES), India. Established to advance scientific understanding of coastal processes, NCCR focuses on sustainable coastal management and the conservation of marine ecosystems. Key areas of research include coastal erosion, marine pollution, climate change impacts, and the restoration of critical ecosystems like mangroves and coral reefs. NCCR also monitors India's coastal zones to address challenges such as sea-level rise, storm surges, and coastal flooding, providing valuable data for disaster risk reduction. The center plays a vital role in developing and implementing scientific tools and models to support policy-making and coastal planning. It collaborates with national and international organizations, fostering interdisciplinary research and capacity-building initiatives.



### USFS

The United States Forest Service (USFS) (<https://www.fs.usda.gov/>) is a federal agency with a vision for an equitable and climate-smart food and agriculture economy that protects and improves health, nutrition and quality of life; yields healthy land, forests and clean water; and feeds the world. As a leader in agricultural and environmental research, USDA leverages scientific expertise and policy development to promote conservation and sustainable practices.





 **Date and location**

The conference will be held at the National Centre for Coastal Research (NCCR), NIOT-Campus, Pallikaranai, Chennai-600100, Tamil Nadu on 16-17 December, 2024.

 **Contact us**

For more information, please visit  
[bit.ly/CIFOR-ICRAF-IMC2024](https://bit.ly/CIFOR-ICRAF-IMC2024)  
Email ID – [imc2024@cifor-icraf.org](mailto:imc2024@cifor-icraf.org)

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