Resilient Coasts, Thriving Communities: A Sea of Solutions

18–19 AUGUST 2025
GRAND HYATT, KOCHI, KERALA, INDIA

POST-EVENT SUMMARY REPORT

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ADB

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1 Rationale

India is pursuing an ambitious vision to enhance the climate resilience, sustainability, and opportunities of its coastal environment, cities and communities. India is pursuing an ambitious vision to enhance the climate - resilience, sustainability, and opportunities of its coastal environment, cities, and communities. Spanning 7,525 kilometers, India's coastline is home to approximately 171 million people across 70 coastal districts. This coastal environment holds immense socioeconomic value, supporting fisheries, aquaculture, tourism, renewable energy, trade, and providing resilience to climate change impacts. However, India's coastal areas are threatened by escalating challenges, including uncoordinated and unsustainable development, pollution, coastal hazards, and climate change. The Asian Development Bank (ADB) is a trusted partner of India, with a portfolio of 67 loans totaling $14.15 billion across sectors such as agriculture, water, transport, and energy. ADB is also assisting Kerala, Karnataka, and Maharashtra in adopting innovative, integrated strategies to strengthen coastal resilience and exploring support for Odisha. India has a significant opportunity to demonstrate leadership in developing resilient shorelines and marine ecosystems, and prosperous coastal cities and communities.

2 Forum Objectives

The Government of Kerala and ADB hosted a 2-day forum aimed at achieving five key objectives:

- Enhanced understanding of the value of coastal and marine biodiversity and ecosystems (blue natural capital).
- Shared international and national best practices that can be effectively adapted and scaled in India, including latest scientific research, advanced digital technologies and solutions, and innovative policy and financial instruments.
- Showcased leading international practices to promote holistic, cross-sectoral, and inclusive approaches to coastal resilience.
- Developed and strengthened partnerships among the key stakeholders of the coastal environment.
- Facilitated cross-learning and knowledge-sharing within India to promote more integrated, impactful policy and investment strategies.

3 Key Takeaways From Each Session

Inaugural Session

The Inaugural Session highlighted Kerala's unique coastal challenges and its proactive efforts to integrate resilience into development, drawing lessons from the 2018 floods and ongoing shoreline protection projects. Speakers emphasized the importance of multi-stakeholder partnerships, linking government, communities, and development partners such as ADB, in addressing climate risks and safeguarding livelihoods. The Honorable Minister underlined Kerala's commitment to building a "New Kerala," balancing sustainability, knowledge-driven growth, and infrastructure resilience. ADB reaffirmed its support for Kerala and other coastal states through projects that combine scientific modeling, ecological assessments, hybrid engineering solutions, and strong community engagement to demonstrate how resilient coasts can underpin resilient communities.

	Speaker
Welcome Remarks from Government of Kerela	**Shri Jeevan Babu,** IAS, Special Secretary, Water Resources Department, Government of Kerela

Key Takeaways

1. Kerala's geographic vulnerabilities, with its dense coastal population and exposure to cyclones, sea-level rise, and flooding, require innovative coastal resilience strategies.
2. The 2018 Kerala floods served as a turning point, highlighting the urgency of embedding climate resilience into development planning.
3. State is advancing the "Rebuild Kerala Initiative (RKI)" with strong focus on sustainability, knowledge-based growth, and long-term resilience.
4. Multi-stakeholder partnerships, bringing together government, academia, communities, and international development agencies, are crucial for effective climate action.
5. Kerala aims to become a model for climate-resilient coastal development, balancing ecological protection with social and economic well-being.

	Speaker
Welcome Remarks from ADB	**Mio Oka,** India Country Director, Asian Development Bank

Key Takeaways

1. India's long and diverse coastline, home to 170 million people, faces growing risks from climate change, unplanned development, and habitat loss, requiring swift adaptation measures. Climate change is one of the most critical challenges faced by India's coastal states, with Kerala being highly vulnerable to sea-level rise, erosion, and extreme weather events.

2. Climate impacts could reduce GDP in developing Asia by up to 41% by 2100, making coastal resilience critical not only for climate protection but also for safeguarding livelihoods, food systems, and national prosperity.
3. Strong governance, local participation, and hybrid ecological-infrastructure solutions are emphasized as equally important as hard infrastructure in building coastal resilience.
4. ADB has been a strong partner of India in addressing climate resilience, including in coastal protection, disaster risk management, and sustainable infrastructure development. ADB's commitment to continue supporting Kerala and other states in developing resilient infrastructure and integrating climate adaptation strategies into policy and planning.
5. The forum aims to bring together global and national experts to discuss themes such as biodiversity, sustainable fisheries, marine pollution, resilient infrastructure, and financing tools—aligning strategies towards India's vision of Viksit Bharat 2047.

Quotation/s

- ***"Strengthening coastal resilience is not just about infrastructure, but about empowering communities, integrating knowledge, and ensuring that the most vulnerable are protected against the impacts of climate change."***

	Speaker
Inaugural Address	**Shri P Rajeeve,** Minister for Industries, Law and Coir, Government of Kerala

Key Takeaways

1. Despite contributing little to global emissions, Kerala's coastal regions, including Kochi, face severe risks from rising seas, cyclones, and erosion, making climate resilience a pressing need.
2. Kerala's 590 km coastline spans 9 districts, housing 8.2 lakh people (13% of the state's population) with a very high density of 2,262 persons per sq. km in coastal areas—far higher than the state average—intensifying climate and livelihood challenges.
3. Kerala has undertaken major coastal infrastructure projects like the Chellanam Phase I Project (₹344 crore), protection works in Vypin and Cherthala, as well as the use of tetrapods and geotubes for shoreline protection. Additionally, 1,600 coastal roads and 65 fish markets were built between 2017–2021.
4. An MoU with the National Centre for Coastal Research was signed to prepare shoreline management plans and coastal protection designs aligned with Kerala's 14th Five-Year Plan, focusing on site-specific studies and climate-resilient infrastructure.
5. The state aims to build a "New Kerala"—a knowledge-based, sustainable economy with equitable growth, balancing human development achievements (like literacy and women empowerment) with renewed focus on infrastructure, agriculture, industry, and coastal resilience.

Quotations

- *"Kerala has one of the highest population densities in the country, and this puts immense pressure on our coastal ecosystems."*
- *"Our challenge is to ensure that industrial growth and economic development do not come at the cost of environmental sustainability."*
- *"Coastal resilience cannot be achieved without the active participation of local communities."*
- *"We must embrace technology, research, and innovative solutions to address the threats of climate change and coastal erosion."*
- *"Building resilience requires partnerships — between government, international agencies, academic institutions, and industries."*

	Speaker
Address	**Shri Atul Jain,** Chairman, Central Water Commission, Ministry of Jal Shakti, Government of India

Key Takeaways

1. India's coastal vulnerability is urgent and present: Rising sea levels, storm surges, salinity intrusion, erosion, and extreme weather events are no longer distant risks but "a present reality that demands urgent and coordinated action."
2. The Coastal Management Information System (an integrated digital platform) has been conceptualized to serve as a national repository for shoreline change studies, salinity mapping, and infrastructure planning—enhancing transparency and coordination.
3. Two sets of technical guidelines for resilience have been released Guidelines for preparation of DPRs for coastal management projects under climate change scenarios (integrating adaptation and robust engineering) and on salinity ingress management projects (incorporating sustainable engineering and nature-based solutions like groundwater recharge).
4. A forthcoming national initiative under active consideration to provide dedicated financial support to coastal states/UTs, promoting sustainable, nature-based, and community-oriented solutions.
5. Urging shared responsibility, research, partnerships, and technology adoption so India's coastlines can become a model of resilience, sustainability, and inclusive growth.

Quotations

"The task ahead is monumental, but with shared responsibility and collaboration, we can ensure that India's coastline becomes a model of resilience, sustainability and inclusive growth."



First Session

Keynote Speaker:

The Lifechanging Benefits of Aquatic Foods in the First 1,000 Days of Life

This keynote session highlighted the transformative role of aquatic foods in the **first 1,000 days of life**—from conception through pregnancy, breastfeeding, and up to a child's second birthday. Nutrition during this critical period shapes lifelong health, cognitive development, and resilience. Evidence from Asia and Africa demonstrated the value of small fish, seaweed, and diverse aquatic foods in supporting maternal and child health.

Presentation	Speaker
The Lifechanging Benefits of Aquatic Foods in the First 1,000 Days of Life	**Dr. Shakuntala Haraksingh Thilsted**, Director for Nutrition, Health and Food Security Impact Area Platform, CGIAR, awarded the 2021 World Food Prize

Key Takeaways

1. **Critical Window** – Nutrition in the first 1,000 days (pregnancy to 24 months) has lifelong health and developmental impacts.
2. **Maternal Nutrition** – The health of women during pregnancy directly influences child outcomes.
3. **Small Fish as Superfoods** – Adding small fish to women's diets from conception, and to children's diets during and beyond complementary feeding, provides essential micronutrients.
4. **Diversity of Aquatic Foods** – Fish, seaweed, and other aquatic foods are nutrient-rich "superfoods," supplying essential fatty acids, vitamins, and minerals.
5. **Evidence-Based Benefits** – Studies in Bangladesh, Malawi, and Zambia demonstrated higher iron, calcium, iodine, zinc, and Vitamin B12 intake, improved maternal health, and better child outcomes.

Quotations

- ***"Small fish, big impact: feeding small fish chutney to pregnant and lactating women improved nutrient intake, hemoglobin levels, and empowerment."***
- ***"Community leaders said: 'We don't need to know which women received fish chutney. We see it in the children—they look healthier, cry less, and smile more.'"***
- ***"Seaweed is an essential food in countries like Japan and Korea, especially for young children and school meals—we should expand its use."***
- ***"There is a lifetime of benefits you can get with a diet of aquatic foods."***

Insights from Q&A and Discussions

1. **Nutritional Comparisons.** Small fish contain higher concentrations of vitamins, minerals, and essential fatty acids than large fish. Seaweed provides important nutrients like Vitamin B6 for growth and cognition.
2. **Sustainability Concerns.** Clarified that "small fish" refers to adult small-sized species, not juvenile large fish. Solar drying technologies are used to reduce perishability and create nutrient-dense products.
3. **Policy Integration.** Examples from Odisha, Assam, and Tamil Nadu show how fish powder and dried fish are being piloted in school meals and feeding programs. Scaling requires convergence across departments (fisheries, women and child development, education).
4. **Livelihoods Linkages.** Training women in fish processing and solar drying enhances income, empowerment, and nutrition outcomes.
5. **Multilateral Support.** Agencies such as ADB and the World Bank can play a role in facilitating cross-sectoral convergence and mainstreaming aquatic foods into national nutrition strategies.

Conclusion/Way Forward

Aquatic foods offer a cost-effective, culturally accepted, and nutrition-sensitive approach to maternal and child health. Scaling requires stronger policies, cross-sectoral convergence, sustainable fisheries management, and continued innovation in processing and preservation.

Second Session: Coastal Resilience and Protection Solutions

Increasing the resilience of coastal areas and communities that live there to adapt to and recover from the impacts of extreme natural hazards and climate change is a key focus for planning and policymaking in highly vulnerable countries like India. The knowledge of coastal processes in a changing climate, and the effects on the environments are key to design robust and flexible coastal protection measures and to make sure that adaptation interventions are properly designed and can be maintained in the long term. This session discusses impacts, challenges, and innovative solutions towards the design of coastal protection measures to enhance coastal resilience. The session will feature examples and best-practices both from India and international.

Presentation	Speaker
Scene Setting	**Mary Simla** and **Haseena Abdul Kalam**, Community Representatives

Key Takeaways

1. Large stretches in both Chellanam and Vypin remain unprotected, leading to repeated sea incursions, destruction of houses, displacement, and disruption of daily life. Tetrapod seawalls and breakwaters are urgently needed as permanent solutions.
2. Families face financial, psychological, and physical distress due to recurring losses, unaffordable relocation, inadequate compensation, and loss of livelihood. Public services are getting impacted and lack of infrastructure facilities. Fish farmers, fishermen, and coastal workers are directly impacted, with their occupational base steadily eroding.
3. The Coastal Regulation Zone (CRZ) Notification 2009 severely restricts housing and commercial activities in these narrow coastal strips. Economically weaker sections are unable to benefit from housing schemes (like LIFE) or entrepreneurship programs due to CRZ distance restrictions.
4. Desiltation of Vembanad Lake, raising bunds, beach nourishment, mangrove and casuarina planting, and backwater tourism can provide ecological stability as well as sustainable income sources. A "Chellanam Model Coastal Tourism" was proposed as a long-term revenue strategy.
5. Temporary or piecemeal measures have failed. Communities demand durable infrastructure (tetrapod seawalls), adequate relocation compensation (INR 20 lakh minimum), and distinct policy frameworks tailored to the unique geographic and socio-economic conditions of vulnerable coastal panchayats.

Presentation	Speaker
EcoShape and Coastal Nature-Based Solutions	**Petra Dankers**, Management Team at EcoShape and Leading Professional NbS at Haskoning

Key Takeaways

1. Traditional "grey" infrastructure alone cannot provide sustainable coastal protection in the face of climate change. NBS—such as dunes, wetlands, and mangroves—are not only protective but also adaptive, evolving with natural processes.
2. NBS were positioned as multifunctional—simultaneously protecting coastlines, supporting biodiversity,

and offering social and economic co-benefits like recreation and tourism. Compared to rigid hard structures, they can be more cost-effective in the long run.

3. Practical examples showed how NbS can be successfully embedded into coastal engineering projects when design, science, and community participation align. Demonstrations highlighted measurable success in reducing flood risk and restoring ecosystems.
4. Effective implementation requires cooperation between governments, engineers, ecologists, communities, and the private sector. No single stakeholder can drive NbS alone—it must be a shared responsibility anchored in trust and joint ownership.
5. Unlike static grey solutions, NbS evolve over time. This dynamism makes continuous monitoring and adaptive management critical. Long-term success depends on learning from outcomes, adjusting interventions, and embracing uncertainty as part of the design.
6. Scaling NbS requires not only technical expertise but also capacity building across institutions and communities. The session underlined the importance of sharing data, methodologies, and success stories to mainstream NbS globally.

Quotations

- ***"Nature does not build walls, it builds systems—mangroves, dunes, wetlands—that protect and nurture life while adapting with time."***
- ***"Grey infrastructure is static; nature-based solutions are living, growing, and self-healing."***
- ***"If we design with nature, not against it, our coasts will not just survive but thrive."***
- ***"A seawall only defends; a mangrove forest defends, feeds, and sustains communities."***
- ***"The success of nature-based solutions is not in concrete, but in cooperation—between governments, communities, and ecosystems themselves."***

Presentation	Speaker
Maharashtra Sustainable Coastal Protection and Management	**Dr. Mahesh Chandurkar**, Maharashtra Maritime Board, Government of Maharashtra

Key Takeaways

1. Traditional hard structures like seawalls and groynes provide temporary relief but often worsen erosion elsewhere. Maharashtra is now exploring hybrid and nature-based solutions (NBS) that combine engineering with ecosystem restoration (mangroves, dunes, beach nourishment).
2. Coastal resilience is not just about engineering structures; it is also about protecting livelihoods. Fishing communities and coastal populations must be actively engaged in planning, execution, and monitoring of coastal projects to ensure solutions are socially acceptable and sustainable.
3. The Asian Development Bank (ADB) has supported Maharashtra in planning and funding innovative coastal projects, bringing in international expertise, financing mechanisms, and technical knowledge. This collaboration enables the state to pilot climate-resilient and sustainable coastal interventions.
4. Coastal protection should not be seen in isolation. It must be part of a wider ICZM framework that integrates infrastructure, environment, and livelihoods, ensuring that interventions are both technically sound and socially inclusive.
5. Sustainable coastal protection requires alignment with climate change adaptation policies, long-term maintenance plans, and regulatory support. Without strong institutional frameworks and coordination across agencies, short-term projects may fail to deliver lasting resilience.

Quotation/s

- ***"ADB's role has been very crucial in bringing global best practices and financial support to ensure projects are both technically sound and socially inclusive."***
- ***"Community development is as important as physical protection measures—without local buy-in, even the best projects fail to sustain."***

Presentation	Speaker
Building Integrated Coastal Resilience	**Blair Spendelow**, Senior Coastal and Marine Specialist, ADB

Key Takeaways

1. Traditional seawalls alone are insufficient; integrated approaches combining nature-based solutions with engineered structures offer more sustainable and adaptive coastal protection.
2. Successful coastal resilience requires active involvement of local communities to ensure social acceptance, long-term ownership, and alignment with livelihood needs.
3. Restoring mangroves, wetlands, and other natural buffers not only protects coastlines but also enhances biodiversity, carbon sequestration, and fisheries.
4. Coastal projects must go beyond short-term disaster response and embed resilience thinking into long-term planning, policy, and financing.

5. ADB facilitates integrated coastal projects by bringing technical expertise, global best practices, and innovative financing models to partner countries.

Quotations

- ***"Mangroves and wetlands are not just environmental assets—they are frontline defenses. They reduce storm surges, store carbon, and sustain fisheries."***
- ***"We need to move beyond reactive projects that respond to disasters, and instead embed resilience into planning, policies, and investments"***

Insights from the Panel Discussions and Q&A

1. **Hybrid Solutions** *(Mr. Jeevan Babu, Special Secretary)*
    - » Hybrid solutions integrate **hard, soft, and nature-based approaches**.
    - » Site-specific studies, modeling, and design are required to identify the right mix.
    - » Nature-based solutions are preferred where feasible, as they **reduce costs**, but may not be practical everywhere.
2. **Cost of Infrastructure** *(Mr. Jeevan Babu, Special Secretary)*
    - » Chellanam project: **7.6 km stretch costing ~INR 330 crores**, or INR 45–55 crores per km.
    - » Acknowledged concerns over rising costs (earlier 10 →25 → 40–50 crores/km).
    - » Emphasizing that multiple solutions must be considered, balancing immediate community relief with long-term sustainability.
3. **Sand Sourcing Challenges** *(Dr. Petra Dankers)*
    - » Sand scarcity is a global issue; availability varies regionally (Netherlands and UK abundant, Belgium and many Asian countries facing deficits).
    - » Illegal sand mining accelerates erosion and undermines resilience.
    - » Design of coastal projects must consider **sustainable sand sourcing** and alternatives to extraction.
4. **Scaling Nature-Based Solutions** *(Dr. Petra Dankers)*
    - » Mangrove restoration often fails due to lack of ecological understanding.
    - » If mangroves are absent, it usually reflects unsuitable conditions; restoration must start by addressing these root causes.
    - » Once conditions are restored, natural regrowth is possible, sometimes without planting.
    - » Planting should only be pursued when ecological prerequisites are met.

Conclusion / Way Forward

The discussion highlighted that **no one-size-fits-all solution exists** for coastal resilience. Hybrid models combining **hard, soft, and nature-based approaches** must be tailored to local conditions and community needs. Escalating infrastructure costs underscore the need for **innovative, cost-effective, and sustainable solutions**, including better resource management (e.g., sand) and ecological restoration grounded in sound science.

Interactive Session – Creative Tension Questions

This is an interactive session, expressed through movement, that will move participants to explore, recognize, and challenge each other's insights and perspectives leading them to take a holistic view of the development issues currently presented to them.

Presentation	Speaker
Creative Tension	**Grace Gayoso Pasion**, Senior Knowledge Management Officer, ADB

Background

This interactive session, facilitated by Ms. Grace Gayoso Pasion, invited participants to reflect on **trade-offs in coastal development, conservation, and community resilience** through a creative tension format. Experts from government, research institutions, and civil society shared perspectives on questions around **economic development versus environmental conservation, coastal protection strategies, and relocation of vulnerable coastal communities**. The session encouraged participants to adopt and defend positions, while remaining open to alternative viewpoints to find holistic solutions.

Key Question 1: Should coastal areas prioritize economic development or environmental conservation?

Key Takeaways

1. Without environmental conservation, there can be no foundation for sustainable economic development.
2. Fishermen's livelihoods must remain central but pursued in a sustainable manner.
3. As a developing country, India requires both economic development and environmental conservation.
4. The two priorities are deeply interconnected and must be addressed together.
5. Conservation provides the basis for **proper planning of economic development**.

Key Question 2: Are the best coastal protection solutions hard engineering or nature-based?

Key Takeaways

1. Nature-based solutions take longer to deliver results but are sustainable in the long term.
2. Hard engineering solutions are temporary and hybrid at best, not always long-term fixes.
3. A combination of both is required; hard solutions can be used when nature-based options are not feasible.
4. Every coastal structure is unique; site-specific assessments must precede interventions.
5. Along the Kerala coastline, both hard and soft measures face significant challenges.

Quotation

"Every coastal structure is unique. Before implementing any hard measures or soft measures, we need to identify the things from a regional to sub-regional level. Site-specific understanding is necessary, and we need to prioritize and provide funding for research. Based on this data, we prioritize which is better—hard measures or soft measures. Along the Kerala coastline, most of the time, nature-based solutions are not possible, and hard measures are also creating issues."

— Dr. Fhiroz Shah, Kerala University of Fisheries and Ocean Studies

Key Question 3: Is relocation of highly exposed coastal communities a necessary strategy or an unnecessary disruption?

Key Takeaways

1. Relocation risks triggering litigation and legal disputes.
2. Current notifications restrict relocation, reinforcing the right of coastal communities to remain.
3. Fishing livelihoods depend on proximity to the shore, making relocation highly disruptive.
4. Coastal communities' relationship with nature must be respected.
5. Communities strongly resist relocation due to ties to homes, culture, and livelihoods.

Quotations

- ***"Unlike the land, the ocean is a very dynamic space. You cannot interfere. You can neither interfere, nor can you go with hard solutions, nor can you go with nature-based solutions. The lives of people living in coastal areas are important. Nature relationship index is very important for them." — Dr. Fhiroz Shah***
- ***"This strategy is completely a site-specific question. It all depends on proper understanding of the site. In some places, where your solution is not going to work and there is a necessity for realignment, only in such places do we have to go. It depends on system understanding." — (Speaker, not introduced)***
- ***"Livelihoods of coastal communities depend on proximity to the shore. If you relocate fishing communities 500–600 metres away, they will need transport daily, severely affecting their livelihood. For some non-fishing communities, relocation may be possible, but for fishing communities it becomes a disruption." — (Speaker, not introduced)***

Insights from the Panel Discussions and Q&A

1. The shoreline is the lifeline of coastal communities; relocation cannot be a blanket solution.
2. Any intervention must be carefully site-specific and grounded in proper understanding of local conditions.
3. The strong cultural and economic relationship between coastal communities and nature must guide decision-making.

Third Session - Biodiversity and Ecosystems Management

The presentations focused on how the conservation of coastal and marine ecosystems contribute to sustainable livelihoods and thriving communities. It also highlighted the value of collaboration and partnerships among different stakeholders.

Alexia Michels, ADB Senior Water Resources Specialist who has expertise in water sector planning, infrastructure development and integrated water resources management across Asia and Pacific, said that India's coastline spans unique habitats. These eco systems are lifelines for millions providing food, income, cultural identity and natural buffers from storms and erosion. Climate change, pollution, overuse and habitat loss threaten their survival. Conserving and protecting these eco systems are not just about protecting Nature. It underpins livelihoods, food security and resilience.

The session explored how communities can protect India's coastal and marine biodiversity and safeguard livelihoods and the health of our planet for generations to come.

The speaker voiced concern about global warming and sea level rise and its impact on the social, structural, environmental and economic determinants of health.

Presentation	Speaker
Innovations to Address the Health and Livelihood Challenges of Coastal Communities	**Dr. Soumya Swaminathan**, Chairperson, M.S. Swaminathan Research Foundation and globally recognized pediatrician and public health expert. She joined online.

Key Takeaways

1. A survey done a couple of months back on heat impact on 3,500 women showed that there is a co relation between being poor and suffering more heat impacts on physical, reproductive, menstrual and mental health.
2. Digital tools have also played a very big role especially after the Tsunami when fishermen were very afraid to venture out. An app has been developed for fishermen on all android phones which provides them a bouquet of services in all the Indian coastal languages. It gives information on no fishing zones and alerts on no fishing zones and international border besides information related to livelihood and government schemes, sea safety and first aid. It is used by 120,000 fishermen all over India and this could be used in other countries too. Likewise, the Fisherwomen Connect app empowers fisherwomen and gives them knowledge about post-harvest fisheries, fish business promotion marketing and markets and weather. Many of the women even though they are illiterate and elderly, are finding this very useful.
3. There is a need to empower our local bodies- our Panchayats with tools and resources because decentralized planning and financing of interventions is going to be extremely important. Climate impacts vary so much from district to district that we need local planning.
4. Capacity building of local Panchayats and community health workers is needed to enable them to prepare better for heat waves which are going to get worse in future.

5. Multiple challenges need to be addressed. Looking at health, livelihood, environment together and nutrition is the way to look at this problem.

Questions and Answers with Dr. Soumya Swaminathan

The discussion explored the challenges and opportunities of integrating **aquatic foods, data innovation, and alternative nutrition** into climate resilience and public health strategies. Questions focused on community acceptance, biodiversity monitoring, and the role of alternative nutrition in addressing climate and health crises.

Key Highlights

1. **Community Perceptions of Dried Fish**
    - » While dried fish is highly nutritious, its odor can be a social barrier in urban settings.
    - » Solar drying reduces salt, contamination risks, and odor, producing higher-protein fish powder suitable for children's nutrition programs.
    - » Behavioral acceptance remains a challenge that requires community engagement.
2. **Marine Biodiversity Monitoring**
    - » Lack of baseline data on pollution, sediment runoff, and land use patterns hinders biodiversity law enforcement.
    - » Emerging technologies (drones, hyperspectral imaging, AI) show promise for accurately measuring seagrass and tidal marshes, though ground verification remains essential.
3. **Alternative Nutrition and Climate Crisis**
    - » Traditional sources like seaweed have declined in Indian diets despite being nutrient-rich and climate-resilient.
    - » Southeast Asia provides strong examples of seaweed integration into mainstream diets.
    - » Entrepreneurship and product development in nutritious, natural foods can counter unhealthy, ultra-processed food trends driving non-communicable diseases.

Quotations

- ***"Being a pediatrician and a doctor myself, I am very concerned about how climate change is impacting our physical and mental health."***
- ***"Malnutrition is likely to increase because of the droughts and floods we are witnessing, and this could lead to conflict and migration—we are already seeing that play out globally."***
- ***"Coastal systems and people who live along the coast have some very unique vulnerabilities."***
- ***"Over 75 per cent of Indian districts are extreme hydro-met event hot spots, and 17 out of 20 people in India are vulnerable."***
- ***"Large parts of western, central, and eastern India will see increasing heat."***

Conclusion/Way Forward

Scaling nutritious, sustainable aquatic food solutions requires both technological innovation (e.g., solar drying, AI monitoring) and behavioral change. Climate change intensifies the urgency to diversify diets with healthier alternatives like seaweed and small fish while simultaneously strengthening monitoring systems for marine biodiversity.

Presentation	Speaker
Biodiversity and Ecosystems Management: The Contribution of Migratory Shorebirds to Sustainable Livelihoods and Thriving Communities	**Vinayagan Dharamrajah**, Regional Director (Asia) and Head of Governance, BirdLife International

Key Takeaways

1. Civil society has started to play in the field of migratory bird conservation a sort of sophisticated and enabling role.
2. The conservation community sees merit in joining hands with the local community, development community and international organizations.
3. Civil society organizations can bring local knowledge, national knowledge and scientific knowledge together to deliver conservation for coasts.
4. Restoration must entail consultation with stakeholders
5. Solutions must be thought of through an integrated approach where a single investment delivers on a multitude of objectives.

Quotations

- ***"Protecting your coasts is really important not just for human beings but also for migratory birds."***
- ***"Agriculture, aquaculture, harvesting of wood, eco-tourism—there is a whole bunch of economically important reasons why we protect coastal wetlands but what perhaps has been lost is the linkage between the two."***
- ***"Birds, over millennia, have really specialized in finding the healthiest places to live, breathe and feed—and actually many of those places are really the places that we need for our own economic purposes."***
- ***"The conservation community is beginning to realize that it must work with the development community, local people, local community and international organizations such as the Asian Development Bank to come up with solutions that work not just for birds but also for people."***

Insights from the Panel Discussions and Q&A

The discussion explored **multi-sector governance, protected area management, and the broader socio-economic benefits of bird conservation**. Questions from participants emphasized the need for integrated governance mechanisms, site-specific approaches, and recognition of bird habitats as both ecological assets and economic opportunities.

1. **Cross-Governance Solutions** *(Arun, World Fish)*
   - » Environmental challenges cut across governance domains.
   - » Suggested mechanism: establish an **early-stage multi-stakeholder committee** to address overlapping issues and foster collaboration.
2. **Protected Sites and Jurisdictional Challenges** *(Response to ADB query on bird life support in Kerala)*
   - » Protected sites under national law already have a degree of protection, but interventions must focus on activities around them.
   - » Where sites are not protected, organizations like ADB can support **investments in surrounding areas** to enhance ecological outcomes.

- » In India, Sri Lanka, and Nepal, governments have made progress, but in other Asian contexts, securing even basic site protections remains a challenge.

3. **Tourism Benefits of Bird Conservation** *(Observation by Sanat Ranawana, ADB)*
   - » Conservation of migratory bird habitats in East and Southeast Asia has generated **tourism growth**, particularly birdwatching, which boosts local economies.
   - » Kerala and other states could benefit from similar initiatives by positioning bird habitats as eco-tourism destinations.
4. **Agricultural Benefits** *(Sanat Ranawana, ADB)*
   - » Restoration of degraded mangroves reduced bird-related crop damage in nearby fields, as birds shifted feeding grounds.
   - » Demonstrates that **conservation supports both biodiversity and agriculture**, creating indirect livelihood benefits.
5. **Recognizing Linkages** *(Speaker)*
   - » Conservation often overlooks interconnections with tourism, agriculture, and community well-being.
   - » ADB's engagement in migratory bird flyway initiatives demonstrates how **linkages between conservation and development** can be recognized and leveraged.

Conclusion/Way Forward

Strengthening bird conservation requires **cross-sectoral governance mechanisms, site-specific strategies, and investment in ecological–economic linkages**. Beyond biodiversity value, bird habitat restoration generates **tourism and agricultural co-benefits**, making it a strategic area for development partners and governments alike.

Fourth Session – Sustainable Fisheries and Aquaculture

The session focused on challenges and opportunities in fisheries management, covering both marine and inland aquaculture. Key discussions included the impact of pollution, climate change, and unsustainable fishing practices on fish stocks, as well as strategies to increase farmer incomes through aquaculture diversification. Panelists highlighted the role of women in fisheries, youth participation, and the importance of policy measures to stabilize and support the sector. Data sources, modeling approaches, and gaps between official statistics and research projections were also examined. Overall, the session balanced ecological, economic, and social perspectives in fisheries development and adaptation.

Presentation	Speaker
Boosting Livelihoods and Local Economies through Sustainable Fisheries and Aquaculture	**Dr. Sunil Mohammed**, Former Principal Scientist and Head of Division, Central Marine Fisheries Research Institute (CMFRI), Kochi and Chair, Sustainable Seafood Network of India (SSNI)

Key Takeaways

1. India's average fish consumption is less than 9 kg per person per year, far below the global average of 21 kg, and national policies have historically given limited attention to fisheries.
2. Traditional non-motorized fishing has almost disappeared, replaced by mechanized trawling and motorized crafts, reflecting modernization but also contributing to overcapacity.
3. Many states, including Kerala, have high fishing fleet overcapacity, which, if not managed properly, can threaten sustainable fish stocks and fishermen livelihoods.
4. Unsustainable fishing practices and declining stocks can lead to reduced incomes, job losses, economic instability, and migration, affecting not only fishers but also related industries and women involved in post-harvest activities.
5. Aquaculture and mussel/oyster/fish farming present potential livelihood alternatives, supported by technology, training, and demand-based farming. However, challenges such as carrying capacity, seed quality, and fisher willingness remain.

Quotations

- ***"India is a poorly fish consuming stage nation. When the global average is around 21 kilogram per person per year, we average less than 9."***
- ***"In 2021 studies said there are about 36% of our stocks are overfished, which is not very different from the global average."***
- ***"Unsustainable fishing practices can lead to livelihood problems and livelihood. Once livelihood gets affected, even personal protection structures can affect livelihoods.***

Presentation	Speaker
Boosting (Ensuring) Children's Nutrition and Women's Livelihoods Through Aquatic Foods	**Dr. Nikita Gopal,** Head, EIS Division & Principal Scientist, ICAR-Central Institute of Fisheries Technology

Key Takeaways

1. Women constitute roughly half of the workforce in fisheries and agriculture, playing key roles in pre-harvest (net maintenance), harvesting, post-harvest processing, and trade, significantly contributing to household income and nutrition security.
2. The fish and seafood processed and consumed at home by women directly support household nutrition, ensuring access to nutrient-rich foods, particularly during lean fishing seasons.
3. The shift to mechanized, large-scale fisheries and centralized landing harbors has reduced women's access to fish for processing and trading, disrupting traditional livelihoods and their role in local fish value chains.
4. Policies and projects should center women in decision-making, focusing on equitable outcomes, gender monitoring, convergence of institutions, and empowerment in technology adoption and fisheries management.
5. Robust, granular data and institutional convergence are essential to design interventions that enhance both women's livelihoods and household nutrition, ensuring that technological innovations and policy measures are inclusive and practical.

Quotations

- ***"Women play very critical roles in fish value chains."***
- ***"Shift from targets to more equitable outcomes and processes."***
- ***"Have women at the center of the whole discourse."***
- ***"We need hard data, robust data, granular data."***

Presentation	Speaker
Climate Change and Fisheries	**Dr. Sevrine Sailley**, Senior Ecosystem Modeler, Plymouth Marine Lab

Key Takeaways

1. Climate change is drastically altering fish biomass and distribution, with potential declines of up to 50% in catches in some regions, particularly affecting coastal communities dependent on fisheries.
2. Species-specific and regional impacts matter; small fish crucial for nutrition and local livelihoods are declining, while some areas may see temporary gains, highlighting the need for localized management strategies.
3. Sustainable management and mitigation measures are essential; overfishing combined with climate impacts accelerates fish stock decline, while careful planning can allow recovery.

4. Marine spatial planning must consider multiple interests, including fisheries, aquaculture, tourism, seabirds, marine mammals, and offshore infrastructure, to balance ecosystem health with human needs.
5. Tools and modelling platforms can guide decision-making, enabling stakeholders to visualize climate impacts, plan mitigation, and enhance community resilience by identifying climate change "bright spots" and high-risk areas.

Quotations

- ***"If there's no fish because of climate change, then it's a disorder problem. We can make the communities resilient, but we also have to ensure there are fish to sustain them."***
- ***"Everything is declining as we progress with more effects of climate change, with a rather dramatic collapse by around 2080."***
- ***"Unsustainable fishing accelerates the impact of climate change; overfishing and destructive practices will make recovery slower even with mitigation."***
- ***"Marine planning has to account for multiple, often competing interests—you can't just protect the fish; you also have to consider fishermen, seabirds, marine mammals, and tourism."***
- ***"Bright spots are areas where the impact of climate change is not as strong for certain sectors, and careful management can help sustain activities there."***

Insights from the Panel Discussions and Q&A

The discussion examined the challenges and opportunities in marine fisheries, aquaculture, climate impacts, and gender roles in fisheries. Questions from participants highlighted issues of plastic pollution, low per capita fish consumption in India, sustainability of marine resources, aquaculture growth, gendered participation, and climate change impacts on fisheries. The dialogue underscored the importance of integrated approaches that combine environmental management, sustainable livelihoods, and technological innovation.

Plastic Pollution and Climate Impacts (Dr. Sevrine Sailley)

1. Plastic entering oceans is primarily a land-based waste management problem, not deliberate dumping.
2. Plastic waste enters rivers and seas, with impacts on marine ecosystems and food chains.
3. Climate change factors such as cyclones, storms, ocean acidification, and warming are included in fisheries models, influencing species distributions and biomass.
4. Models use CRO data for baseline fish distribution, then apply environmental drivers to project future changes.
5. Fisheries impacts can be analyzed across small-, medium-, and long-range fishing operations, showing differentiated vulnerabilities.

Consumption and Production Trends (Dr. Sunil Mohammed)

1. India's overall per capita fish consumption is low, but coastal states like Kerala and Tamil Nadu drive demand, with significant imports from other states.
2. In Kerala, marine production dominates (600,000–700,000 tons) compared to inland (~100,000 tons).
3. Nationally, aquaculture is expanding rapidly (12–13% CAGR), while marine and inland fisheries growth has stagnated (~2–3%).

4. Stock assessments show most marine stocks are sustainable, though weak enforcement and unsustainable practices persist.
5. Outmigration of youth reduces fishing pressure, while migrant workers are filling labor gaps in the sector.

Women in Fisheries (Dr. Nikita Gopal)

1. Women's participation is concentrated in post-harvest activities such as marketing, processing, and trading.
2. Nearly all floor-level work in seafood processing plants is managed by women.
3. Direct capture fishing by women is rare, except in seaweed harvesting along the east coast.
4. Outmigration of youth from fisher families is offset by migrant workers from other states, who increasingly dominate processing and labor.
5. Recognition of women's contributions in fisheries value chains remains limited, requiring stronger policy and social support.

Aquaculture and Future Livelihoods (Moderator – Dr. Arun Padiyar)

1. Marine capture fisheries show limited growth (2–3%), while aquaculture remains the main growth driver.
2. Youth disengagement from traditional fishing is widespread, with education leading them into other professions.
3. Migrant workers are filling workforce gaps, ensuring continuity of operations.
4. Open-sea cage culture and submersible cage systems show promise but require large investments, finance, and insurance mechanisms.
5. Traditional fishers are hesitant to adopt aquaculture because returns are delayed compared to daily fishing income.

Conclusion/Way Forward

Fisheries in India face a dual challenge: sustaining marine resources under climate stress while expanding aquaculture for future demand and livelihoods. Plastic pollution, youth disengagement, and weak enforcement threaten long-term sustainability. Yet, opportunities lie in gender empowerment, technological innovations in aquaculture, and recognition of ecosystem impacts such as acidification. An integrated approach combining climate modeling, aquaculture expansion, gender inclusion, and enabling finance/ insurance policies is critical to ensuring resilient coastal livelihoods an**d food security.**

Fifth Session - Resilient Energy Infrastructure, Green Ports

Energy and transport were an integral part of all modern economies, supporting a range of critical services to the communities and the region. With the effect of coastal erosion and climate change, there was increasing pressure on the safety and security of the physical energy and transport infrastructure, with an urgent need to develop resilient designs that could ensure continuity of services to the communities. Technological innovations in the field of renewable energy, ocean energy, and infrastructure design also presented a plethora of solutions that could be deployed in regions and communities affected by coastline changes to protect, save, and enhance livelihoods. Thus, effective policy measures and coordinated action among key actors played a central role in building resilience to climate change.

Presentation	Speaker
Empowering the Edge: Decentralized Energy Solutions for Coastal Resilience	**Narendra Nath Veluri**, CEO, ANERT, Kerala

Key Takeaways

1. Resilient Health Infrastructure: Under a UNICEF program, all hospitals, CHCs, and PHCs in Kerala have been mapped to ensure energy resilience and minimize disruption during power failures.
2. Green Income for Vulnerable Groups: ANERT's Green Income Scheme is solarizing agricultural pumps for small and marginal farmers and BPL families, while a NABARD–ADB joint loan will support solarization of government buildings.
3. Community-Centered Model: Kerala's development approach places communities at the forefront; financing is the critical enabler for scaling resilience solutions.
4. Expanding Solarization: Significant opportunities exist for both off-grid and on-grid solar systems across Kerala's coastal belt.
5. Decarbonizing Fisheries: Pilot projects are testing battery- and hydrogen-powered boats to replace kerosene use in small fishing fleets, though adoption remains at an early stage.

Quotations

- ***"Finance is definitely a key challenge. The second is convincing the government."***
- ***"The other challenge is need for data on use of induction stoves. How do we collect the data since people are spread out and the upkeep of the product. The community has to see benefit that it is getting. Only then they will take responsibility of maintaining this."***

Presentation	Speaker
Climate Resilient Energy Infrastructure for Coastline	**Manisha Mukherjee,** Executive Director, Nangia Andersen India, Pvt. Ltd.

Key Takeaways

1. High Vulnerability Across Kerala: Except for Thrissur and Ernakulam, most districts face severe vulnerability to coastal risks, requiring location-specific resilience strategies.
2. Grid Dependency Risks: With 80% of Kerala's power imported via two grid connections at the state's extremities, any disaster can disconnect the state — underscoring the need for decentralized energy systems.
3. Integrated Community Planning: Energy cannot be treated in isolation; coastal resilience requires community participation in planning, implementation, and monitoring.
4. Energy as a Lifeline: Energy sector cannot be considered in silo and communities need to be involved in the planning, implementation and monitoring process while building energy infrastructure and resilience. Coastal activities will not be powered without energy.
5. Global Lessons: The Fukushima Daiichi nuclear disaster highlights the importance of designing community energy systems that can withstand extreme events.

Quotations

- ***"We cannot think of the energy sector in a silo. We have to think of how the community life is dependent on the energy sector."***
- ***"No vulnerability assessment has been done for the energy sector in Kerala."***
- ***"When it comes to the power infrastructure, climate proofing must be considered at the time of planning and implementation."***
- ***"A robust framework must be developed for resilience financing in Kerala."***
- ***"We often see that for building the power sector resilience, the climate insurance is not being used in most of the countries. Only Philippines has started doing it. Since most of the power sector companies are in the PPP model, we need to work on how we can encourage the PPP model also to take up climate insurance while planning everything."***

Presentation	Speaker
Enhancing Livelihood of Communities Through Renewable Energy	**Martha Wakoli,** Senior Manager, CLASP, an international non-profit organization that supports governments across the world to support energy efficiency of appliances.

Key Takeaways

1. Demographic Imperative: By 2050, one in four people globally will be from Africa — underscoring the need for resilient, inclusive energy planning with broader global lessons.
2. Energy-Livelihood Nexus: Resilient infrastructure must deliver cost-effective energy services while creating jobs and supporting community livelihoods.
3. Decentralization as a Shield: Decentralized systems help minimize energy losses and disruptions during extreme weather conditions.
4. Micro-Infrastructure: Small, efficient solar-powered appliances serve as vital micro-infrastructure for vulnerable coastal households.
5. Sustainability Beyond Aid: Energy initiatives must be designed to run sustainably without long-term dependence on external donations or government subsidies.

Quotations

- ***"The reality is that if a technology solution can work in a remote village in Africa, it can work anywhere."***
- ***"Our countries are a little smaller than India. So, the effect of coastal washaway actually has inland impact, and negative impacts are actually felt at regional level."***
- ***"Energy infrastructure does not always have to be a grant or centralized. A key lesson that could probably be transferred is how to deploy energy infrastructure projects than can run sustainably without building dependence on donations or governments."***

Presentation	Speaker
From Gateway to Greenway: Ports Leading the Energy Transition	**Ankush Saxena,** Associate Partner, KPMG India

Key Takeaways

1. Green Hydrogen Push: India has allocated $2.25 billion for its National Green Hydrogen Mission, accelerating adoption of green hydrogen and ammonia.
2. Carbon-Neutral Ports: Four major Indian ports are now carbon neutral, surpassing the initial target of one.
3. Financing Green Shipping: A $2,500 crore Maritime Development Fund and a 30% shipbuilding subsidy for green vessels will support the transition.
4. Global Leadership in Recycling: India accounts for 33% of global ship recycling and is aligning with the Hong Kong Convention.
5. Transitioning Major Ports: Twelve major ports are in various stages of greening, with Deen Dayal Port setting best-practice benchmarks.
6. Make in India Innovation: The Kochi Water Metro, indigenously built at Cochin Shipyard, showcases India's domestic capabilities.

Quotations

- ***"The ports are called the gateway of trade. Now onwards, we should be calling them greenway of trade."***
- ***"Ninety- nine per cent of the fuel that is used in shipping is fossil fuel. That is a glaring concern. If we look at the global warming concern, it contributes to around three per cent of overall global emissions which is the equivalent of the emissions by Brazil. If shipping becomes a country, it will become the sixth polluting country in the world."***

Presentation	Speaker
Disaster-Resilient Energy and Coastal Planning	**Mr. Sekhar Lukose Kuriakose,** Member Secretary, Kerala State Disaster Management Authority (KSDMA)

Key Takeaways

1. Advanced Warning Systems: KSDMA operates one of India's most integrated cloud-based disaster alert systems, covering nearly half of Kerala's population, successfully tested during Operation Abhayas.
2. Strategic Coastal Projects: Current initiatives include the Integrated Coastal Mitigation Project, the Coastal Erosion Mitigation Project (under the National Mitigation Fund), and a Coastal Vulnerability Relocation Plan.
3. Living Labs for Resilience: Professionals embedded in local governments are supporting "living labs" that help municipalities evolve into resilient administrative units.
4. Climate Alerts for Safety: Heat wave advisories and UV radiometer systems installed along Kerala's coastline provide real-time safety measures for fishing communities.
5. Cultural Sensitivity in Planning: Coastal communities value traditional ways of life and often resist relocation to condominium-style housing — requiring culturally appropriate resilience solutions.

Quotation

- ***"I am looking forward to the shoreline management plan and see how it will fit into resilience building in the long run."***

Insights from the Panel Discussions and Q&A

Financing and Policy Alignment Remain Major Barriers

- Securing adequate funding for renewable energy and coastal resilience projects continues to be a challenge.
- Government buy-in is equally critical, and convincing policymakers requires sustained engagement and evidence of long-term benefits.

Community Ownership is Central to Sustainability

- Technologies such as induction stoves or renewable energy solutions must demonstrate clear, tangible benefits to local communities.
- Without visible advantages, communities are less likely to maintain or adopt such innovations, highlighting the need for participatory approaches and training.

Data Gaps Hinder Scaling of Clean Energy Solutions

- Reliable data on adoption, usage, and maintenance of clean technologies is limited, especially in dispersed rural and coastal settings.
- Innovative monitoring systems and feedback mechanisms are needed to evaluate impact and guide scale-up.

Incremental and Adaptive Approaches Are Essential

- With the frequency and intensity of extreme weather events projected to rise, resilience strategies must focus on step-by-step, adaptive problem-solving rather than one-time solutions.

Ports as Hubs for Community Engagement and Innovation

- Under initiatives like the Sagarmala project, ports are emerging as focal points for training, capacity building, and community participation.
- Technology adoption, such as sensors on boats, can help reduce risks and improve efficiency, reinforcing the role of ports as innovation ecosystems.

Conclusion

The discussions highlighted that resilient coastal infrastructure is not only about technology but also about governance, financing, and community participation. Achieving climate-resilient coastal energy and transport systems requires a whole-of-society approach. By combining decentralized renewable solutions, innovative financing, and community-driven strategies with strong government leadership, coastal states like Kerala can serve as models for balancing economic development, cultural preservation, and environmental resilience.

Sixth Session – Marine Pollution Control and Circular Economy

The session on Marine Pollution Control and Circular Economy focused on innovative and inclusive approaches to addressing marine pollution. Discussions emphasized the need to connect informal and formal waste sectors to minimize plastic leakage into oceans. Integrated strategies for reducing nitrogen pollution from source to sea were also highlighted, alongside regional experiences in embedding natural capital into coastal resilience and circular economy initiatives. Overall, the session underscored the importance of science-based, collaborative, and practical pathways to protect ocean health while supporting sustainable development.

Presentation	Speaker
Collaborative Approaches to Waste Management: Bridging the Informal and Formal Sectors	**Siddharth Hande,** Founder and CEO, Kabadiwalla Connect

Key Takeaways

1. Waste pickers and scrap aggregators form the backbone of recycling in the Global South and must be included in formal waste management systems. Their recognition and inclusion can significantly increase recycling rates while improving livelihoods.
2. Current systems are inefficient and costly. Municipalities often spend heavily on landfilling while missing opportunities for material recovery and recycling. A shift toward resource recovery can reduce expenses and create new economic value.
3. Identifying and connecting small-scale aggregators enables better traceability, efficiency, and inclusion in recycling chains. This also strengthens monitoring and accountability in plastic waste flows.
4. Mobile-based platforms and digital tools can link informal and formal sectors, improve safety, and ensure fairer systems. Adoption of such solutions can accelerate scaling and policy support for waste management.
5. Integrated waste management reduces marine pollution, enhances coastal resilience, and contributes to sustainable development. It fosters a balance between economic growth, social inclusion, and environmental protection.

Quotations

- ***"The big picture is not only about plastic. It's also about inclusivity and social justice."***
- ***"Most of the global south depends on waste pickers, aggregators, and scrap dealers to recycle plastics."***
- ***"The challenge is how do we connect them (waste pickers), and how do we integrate them in a safer, fairer way."***

Presentation	Speaker
Reducing Nitrogen Pollution from Source to Sea	**Professor Mark Sutton,** Environmental Physicist and Director of the GCRF South Asian Nitrogen Hub, UK Centre for Ecology and Hydrology

Key Takeaways

1. Nitrogen pollution is a critical but often overlooked challenge. Excess nitrogen from agriculture, sewage, and industry is damaging ecosystems, contributing to climate change, and affecting human health.
2. A source-to-sea approach is essential. Tackling nitrogen pollution requires integrated management across land, freshwater, and marine systems, since nitrogen moves through all these pathways before reaching the ocean.
3. Agriculture plays a major role in nitrogen leakage. Improving fertilizer efficiency and adopting sustainable farming practices can significantly reduce nitrogen runoff into rivers and coastal waters.
4. Nitrogen pollution is a transboundary issue, and addressing it demands collaboration between countries, sectors, and disciplines under global frameworks.
5. From technological innovations to policy reforms, a mix of measures can help reduce nitrogen losses, but they must be scaled up and embedded within circular economy principles.

Quotations

- ***"From the source on the farm to the sea in the coastal zone, nitrogen is moving through every system, and every step offers us an opportunity for intervention."***
- ***"Agriculture is both the biggest user and the biggest polluter, but with smarter practices, we can produce more food with less nitrogen loss."***
- ***"Nitrogen Pollution is a global problem that no country can solve alone. International cooperation is the only way to address it effectively."***

Presentation	Speaker
Regional Experience on Integrating Natural Capital for Coastal Resilience and Circular Economy	**Zhe Yuan,** Natural Resources Economist, ADB

Key Takeaways

1. ADB applies a natural capital operational approach (ADB strategy 2030 and EAP 2024-2030) across the entire project cycle (upstream, mainstream, and downstream), ensuring that coastal resilience is addressed through planning, policy dialogue, project design, and evaluation. This structured framework helps embed ecosystem value in long-term resilience strategies.
2. ADB is preparing a $500 million program in the Philippines to strengthen marine and coastal resource management through institutional reforms, spatial planning, natural capital accounting, and circular economy policies. The program aims to reduce GDP losses projected from marine degradation while improving sustainability.
3. Without reforms, marine and coastal degradation could cause GDP losses of up to 30% by 2040, but with the program, productivity gains and avoided transition costs could generate long-term economic benefits. This highlights the clear cost-effectiveness of integrating natural capital in national planning.
4. China is expanding eco-compensation frameworks, originally applied to forests and watersheds, into marine and coastal ecosystems. Pilot projects in provinces like Fujian focus on mangroves and link natural capital accounting with financing tools such as insurance, demonstrating innovative models for scaling up marine conservation.
5. While progress is being made, key gaps remain: (a) better valuation methods for marine ecosystems, (b) improved monitoring and verification systems, and (c) specialized frameworks to connect natural capital accounting with innovative finance. These are critical to scaling sustainable investments for coastal resilience.

Quotations

- ***"We are also looking at valuing ecosystems and ensuring that natural capital is fully integrated into planning and budgeting."***
- ***"Without doing the program, up to 30.6% of the GDP may be lost by 2040 – so there is a necessity to do the program."***
- ***"China is expanding its eco-compensation framework from land, which has been successful in forestry and watershed management, to marine areas.***

Insights from the Panel Discussion and Q&A

The Q&A session brought together perspectives on nutrient management, natural capital accounting, and plastic waste solutions. Questions emphasized the need for standardized approaches, cost-effective nutrient recovery, recognition of informal recycling systems, and practical applications of waste in infrastructure.

- **Standardizing Nitrogen Use Efficiency (Prof. Mark Sutton)**
  - Multiple nitrogen efficiency metrics exist, serving different audiences.
  - The International Nitrogen Management System is preparing global guidance on standardized reporting.
  - India's neem-coated fertilizer is an example of decisive national action improving efficiency.
  - Farm-level advice must remain context-specific and locally led.
- **Nutrient Standards and Recovery from Sewage (Prof. Mark Sutton)**
  - India's strict nutrient removal standards (10 ppm nitrogen, 1 ppm phosphorus) impose high costs (~$10 billion for sewage treatment).
  - Beyond removal, future strategies should focus on nutrient recovery — turning waste into fertilizer.
  - Current large-scale technologies are not yet ready but represent a critical innovation pathway.
- **Natural Capital Accounting (Zhe Yuan**)
  - Piloted in the Philippines and China using the UN's SEEA framework.
  - Entities for accounting are location- and sector-specific: mangroves and fisheries for coastal states, for example.
  - Collaboration with national agencies is essential to align methods with country systems.
- **Role of Informal Sector in Plastic Waste (Siddharth Hande)**
  - Informal workers in Chennai collect ~20,000 tons of plastic waste, mainly thicker plastics.
  - Without their contribution, the formal waste management system would collapse under the burden.
  - Policy efforts should incentivize collection of low-value plastics as well.
- **Community-Led Action on Plastics (Siddharth Hande)**
  - Waste segregation at household and community levels can create a bottom-up movement to prevent plastic leakage.
  - Scrap shops and informal actors are key to building a meaningful circular economy in the Global South.
- **Plastic Waste in Roads and Infrastructure (Siddharth Hande)**
  - Technologies already exist to use low-value plastics in road construction and other applications (e.g., oil recovery).
  - The challenge is channeling waste properly and formally recognizing circular jobs in the informal recycling sector.

Quotation

- ***"There's more than one kind of nitrogen efficiency... we are shortly going to be launching a global guidance document on standardization and harmonization." – Prof. Mark Sutton***

Conclusion / Way Forward

Moving from removal to recovery, from informal to formally recognized circular systems, and from fragmented metrics to standardized reporting are critical next steps. Strengthening data systems, scaling nutrient recovery technologies, and empowering community-led segregation will enable governments and development partners to align environmental goals with economic opportunities.

Seventh Session – Newspaper Activity

Participants worked in small groups to create a one-page "newspaper" capturing the conference's key highlights and messages. Using headlines, quotes, visuals, and personal context, they turned complex discussions into clear, shareable stories. The activity encouraged reflection, connection, and creative communication of outcomes.

This highly engaging session transformed the conference room into a bustling newsroom. Participants, working in groups of four or individually, were asked to play the role of journalists and produce a one-page newspaper on coastal resilience within 30 minutes. Using templates, illustrations, and creative layouts, participants distilled two days of conference deliberations into compelling headlines, stories, and graphics.

The exercise emphasized that while participants were already convinced of the need for change, the next step was to communicate effectively—through storytelling, campaigns, and outreach—to influence wider stakeholders, secure financing, and inspire collective action.

At the close, participants proudly pinned up their creative outputs, which Keisuke committed to sharing with ADB headquarters in Manila.

Key Takeaways

1. **Creative Reflection Tool** – The newspaper exercise helped participants synthesize two days of discussions into clear, newsworthy messages.
2. **Communication as Change Driver** – Highlighted the importance of effective storytelling in securing support, funding, and broader buy-in for coastal resilience.
3. **Collaborative Engagement** – Brought together participants of diverse ages and organizations, fostering teamwork and cross-sector dialogue.
4. **Visual and Creative Expression** – Encouraged the use of color, sketches, and catchy titles to frame technical discussions in an accessible way.
5. **Memorable Outputs** – The session produced multiple creative titles such as Tides and Times, The Ocean Times, Shoreline Times, Resilient Coast, and Our Coast, reflecting diverse perspectives and priorities.

Quotations

- ***"We basically wanted to have a very catchy title and we called it Tides And Times... The whole process was to actually put together the two days of learning... Overall, it was a very interesting exercise." – Ashana Wani, Research Officer, Maharashtra Institution for Transformation (MITRA)***
- ***"This was a very fun way to think and pause and look at all that we had listened to in the last two days and put it into a creative form. It was a very exciting experience." – Maitreyi Arwari, Fellow, Ashoka Climate Corps, Environmental Defense Fund, and Intern at MITRA***

Conclusion/Way Forward

The newspaper activity showcased how creative communication can distill complex technical debates into accessible, engaging narratives. As resilience planning increasingly requires cross-sector collaboration and public buy-in, such approaches are critical for shaping public perception, mobilizing resources, and sustaining momentum. Future workshops could integrate similar interactive exercises to strengthen knowledge sharing and build a culture of storytelling for impact.

Eighth Session – Tools and Models for Coastal Resilience Planning

The session on Tools and Models for Coastal Resilience Planning focused on the growing challenges faced by coastal regions due to climate change impacts such as erosion, flooding, and extreme events. It emphasized the use of scientific data, modeling tools, and decision-support systems to guide effective coastal planning and management. The discussions highlighted the importance of developing flexible, ecosystem-sensitive approaches that balance infrastructure needs with community resilience. The session also underlined the role of integrated information systems in supporting sustainable and adaptive coastal development.

Presentation	Speaker
Climate Change Impacts on Coastal Areas-Tools and Models for Coastal Resilience Planning	**Dr. Tune Usha,** Scientist, National Centre for Coastal Research (NCCR), Ministry of Earth Sciences, Government of India

Key Takeaways

1. Rising sea levels and increasing frequency of cyclones are putting coastal communities at higher risk. Puducherry was presented as a case where unchecked coastal erosion led to significant loss of beaches and damage to livelihoods, highlighting the urgency of climate-resilient planning.
2. Scientific modeling and long-term data on tides, currents, and sediment transport were emphasized as critical inputs. In Puducherry, absence of baseline data during initial interventions (such as seawalls) aggravated erosion in adjacent areas, underlining the need for robust scientific evidence before executing coastal protection measures.
3. Hard engineering structures alone (like groynes and seawalls) provide only temporary relief. In Puducherry, it was shown that combining hard measures with soft solutions—such as beach nourishment and restoring natural sand movement—helped in reviving parts of the coastline and restoring public access to beaches.
4. Beyond physical protection, interventions must also address the socio-economic vulnerabilities of fishing communities and coastal settlements. In Puducherry, the restoration of beaches not only improved coastal protection but also revived local tourism and enhanced community well-being, showing the wider socio-economic benefits of integrated planning.
5. Coastal conditions evolve constantly, and rigid one-time solutions are insufficient. The Puducherry experience demonstrated that adaptive approaches—regular monitoring, course correction, and blending traditional knowledge with modern science—are key to achieving long-term resilience.

Quotation

- "***Climate change is a happening reality. All of us in this room know it... the temperature is going to increase, the droughts are going to increase, there is going to be an increase in extreme events, the number of tropical cyclones will increase and things like that***"

Presentation	Speaker
Coastal Management Information System (CMIS) for Planners and Designers	**Mr. D.P. Mathuria,** Chief Engineer, Central Water Commission, Government of India

Key Takeaways

1. **Coastal issues in India involve multiple actors** — Ministry of Earth Sciences, Ministry of Environment & Forests, Central Water Commission, and maritime states. The Coastal Protection and Development Advisory Committee (CPDAC) was highlighted as a key platform where 13 maritime states, union territories, and scientific institutions collaborate to guide national coastal policies.
2. Through improved surveying and high-resolution methods, India's official coastline has been **revised to about 11,000 km** (up from 7,500 km). Many states like Puducherry and Kerala face severe erosion — with 30–40% of their shoreline under threat — making erosion and salinity intrusion two top national challenges for coastal planning.
3. **Coastal Management Information System (CMIS),** initiated in the 12th Five-Year Plan (2016), was designed to collect and consolidate long-term coastal process data. This includes shoreline changes, waves, tides, currents, salinity, sediment transport, and bathymetry. Such data forms the foundation for Detailed Project Reports (DPRs) on erosion, salinity intrusion, and coastal protection works.
4. **Data for Science-Based Coastal Planning** from over 20 long-term observation stations across Gujarat, Maharashtra, Goa, Kerala, Tamil Nadu, Odisha, and Andaman-Nicobar provides critical inputs for numerical models, shoreline management plans, and site-specific protection works. Importantly, riverine data (from 1,400+ stations near coastal outfalls) is also integrated to assess freshwater flows that balance salinity, nourish beaches, and sustain coastal ecosystems like mangroves and wetlands.
5. While data exists with multiple agencies, dissemination is still a challenge due to security restrictions. A National Dissemination Policy is under development to make data accessible through the Water Resources Information System (WRIS). The long-term goal is a unified, user-friendly portal for coastal planners, researchers, and policymakers to access harmonized coastal datasets.

Quotations

- ***"The Coastal Management Information System (CMIS) is not just a data repository; it is a decision-support tool for planners and designers."***
- ***"We are integrating shoreline change maps, tidal gauge data, wave models, and land-use layers so that coastal interventions are based on scientific evidence."***

Insights from Panel Discussion and Q&A

The discussion highlighted the importance of integrated shoreline management, coordinated data sharing, and robust design approaches in coastal infrastructure planning. Questions emphasized challenges around data dissemination, sediment transport, overlapping institutional mandates, and the need for reliable early warning systems to protect communities.

Data Availability and Dissemination (Mr. D.P. Mathuria)

- Multiple agencies, including the Coast Guard and NCCR, collect coastal and hydrological data.
- Data is being archived under the Water Resources Information System (WRIS).
- Dissemination policies are under development, balancing accessibility with security restrictions mandated by the Ministry of Defence.
- The aim is to eventually integrate and share data across agencies and planners, subject to safeguards.

Shoreline and Sediment Management (Dr. Tune Usha)

- Past coastal design in silos caused unintended erosion (e.g., Puducherry–Tamil Nadu).
- New shoreline management approaches treat the coast as a single system to provide holistic solutions.
- Sediment transport and budgeting are now integral to designs, reducing cross-boundary conflicts.

National Geospatial and Data Sharing Networks (Dr. Tune Usha)

- Stronger geospatial data networks are needed to support research and planning.
- Policies are evolving to enable sharing of shape/KML files, provided users can apply them effectively.
- Researchers and planners can formally request access, and data can be shared when available.

Safety and Design Challenges (Dr. Tune Usha and Moderator)

- The Muthalapuri river mouth, known as the "mouth of death," has seen many boat capsizes due to sand deposition and faulty design.
- Improved modeling and precautionary measures are being implemented to prevent future accidents.
- Such cases underscore the importance of predictive models and cross-agency coordination in coastal design.

Need for Coordinated Institutional Support (Dr. Tune Usha)

- Historically, different agencies developed solutions independently, leading to conflicting outcomes.
- A shift is underway toward multi-agency, system-wide studies where solutions are integrated across states (e.g., Tamil Nadu, Kerala).
- Future designs must be holistic to avoid one intervention creating problems elsewhere.

Early Warning Systems (Dr. Tune Usha)

- Operational flood warning systems are active in three cities, providing ward-level alerts 2–3 days in advance.
- Outputs are shared with disaster management authorities for evacuation planning.
- These systems strengthen local government preparedness against climate hazards.

Holistic vs. Multi-Agency Approaches (Mr. D.P. Mathuria)

- Multiple agencies working in parallel is not a contradiction — the key is aggregation and dissemination through central platforms like WRIS.
- Community science and stakeholder collaboration are vital for ensuring information is effectively used.

Role of IISC (Mr. D.P. Mathuria)

- Data collected has multiple applications, including flood forecasting, interstate water disputes, and coastal process modeling.
- IISC platforms support data utilization across agencies, including the Indian Meteorological Department (IMD).

Quotations

- ***"Our intention is to assimilate data from all sources and archive it in the Water Resources Information System. Dissemination policies are being developed in consultation with the Ministry of Defense." – D.P. Mathuria***
- ***"The problem between Puducherry and Tamil Nadu was a result of addressing issues in silos. Shoreline management now treats the coast as a system to provide holistic solutions." – Dr. Tune Usha***
- ***"The Muthalapuri mouth is known as the 'mouth of death.' Ideally, models should have predicted sand deposition and taken abundant precautions." – Dr. Tune Usha***
- ***"There is no contradiction in having more agencies working. The key is aggregation and dissemination through nodal platforms like WRIS." – D.P. Mathuria***

Conclusion/Way Forward

Coastal resilience requires moving from siloed designs toward integrated shoreline management supported by reliable data and multi-agency collaboration. Strengthening geospatial networks, developing clear dissemination policies, and embedding sediment transport analysis into all designs are key priorities. Early warning systems, combined with predictive modeling, will help safeguard vulnerable communities, while platforms like WRIS can ensure that data is systematically shared and applied across institutions.

Ninth Session – Innovative Financing for Coastal and Marine Ecosystems

Sustainable and resilient financing was essential to safeguard coastal and marine ecosystems while enabling inclusive economic growth. This session explored innovative financing mechanisms, such as blue bonds, blended finance, carbon credits, and payment for ecosystem services, that were increasingly used for natural capital conservation and investments in India and globally. Highlighting practical models from India and beyond, it showcased how ecological restoration could generate livelihoods and sustainable revenue. The session brought together key stakeholders to discuss policy, partnerships, and risk-sharing strategies to mobilize long-term finance at scale.

Moderated by Meera Nair, Independent Board Director, DBS Bank of India, this session convened policymakers, financiers, and practitioners to explore financial mechanisms that safeguard marine and coastal ecosystems while ensuring inclusive economic growth. The discussion emphasized how ecological restoration has generated jobs, community benefits, and sustainable revenues. It also showcased innovative financing models, such as blue bonds, blended finance, carbon credits, and payments for ecosystem services, increasingly applied in India and globally to support conservation and community development.

Presentation	Speaker
Blue Economy Pathways – Strengthening Blue Finance in India	**Anuja Shukla,** Environmental Specialist, World Bank

Key Takeaways

1. The World Bank is launching the SHORE Program (Strengthening Coastal Resilience and Economy), with Phase 1 starting in Karnataka and Tamil Nadu in the next two to three months. The program will expand to other coastal states as readiness grows.
2. SHORE emphasizes coastal resilience and blue economy integration, with multiple components supporting ecosystem protection, sustainable livelihoods, and climate adaptation.
3. Efforts are under way to adopt integrated coastal zone management approaches, ensuring ecological and socio-economic priorities are addressed together.
4. The World Bank is engaged in broader initiatives, including ocean centres, port-cleaning projects, blue carbon assessments, and blue finance pilots, to strengthen the evidence base for policy and investment.
5. Studies and knowledge products (e.g., ocean accounting, finance frameworks, blue carbon valuation) are informing SHORE's design and supporting India's transition to a sustainable blue economy.

Quotation

- ***"Being a knowledge bank, we are trying to get all the best practices from our experiences globally in blue economy and coastal resilience. We are working with different ministries and stakeholders to come up with knowledge products, one of which is blue finance." – Anuja Shukla***

Conclusion/Way Forward

The SHORE program and related blue finance initiatives highlight the potential of resilient, knowledge-driven investment models to safeguard coastal ecosystems while supporting inclusive economic growth. Scaling ocean accounting and blue finance across states will strengthen India's ability to integrate conservation into policy, attract capital, and build a robust blue economy.

Presentation	Speaker
Strengthening Blue Finance in India	**Venkat Sreedhara**, Financial Sector Specialist, World Bank

Key Takeaways

1. The World Bank is exploring support for blue economy projects, including coral reef restoration, sustainable fisheries, aquaculture infrastructure, and marine pollution reduction.
2. With limited fiscal resources, private and blended finance are critical. Key instruments include equity investments, bank credits, bonds, and sustainability-linked bonds that tie financial returns to environmental outcomes.
3. Over the past four to five years, India's financial sector has advanced in climate finance, with emerging momentum in blue finance.
4. Notable pilots include the Fisheries and Aquaculture Infrastructure Development Fund (FIDF), launched in 2018, which provides low-cost, subsidized financing for fisheries and aquaculture projects.
5. Strengthening blue finance in India will require:
    - Better data availability and impact metrics
    - Adoption of innovative financial instruments
    - Stronger dialogue on risk-sharing mechanisms (including insurance)
    - Capacity-building for commercial lenders to evaluate and appraise blue economy loans.

Quotations

- ***"There are statistics which show that the blue financing requirement is only met to the tune of 0.1% in South Asia, which is almost nothing. So, why is blue finance not flowing? One big issue I would like to point out is the issue of taxonomy. India is working on a national climate finance taxonomy. There is lack of capacity of financial institutions as most banks don't know how to appraise blue economy loans. There is also lack of standard impact metrics." – Venkat Sreedhara***

Conclusion/Way Forward

Closing the gap in blue finance requires clear taxonomies, robust metrics, and institutional capacity to channel funds effectively. With pilots such as FIDF demonstrating feasibility, scaling private and blended finance could unlock the transformative potential of India's blue economy.

Presentation	Speaker
Innovative Financing for Coastal and Marine Ecosystems	**Ganesh Pillai,** Private Sector Operations Department, Asian Development Bank (ADB)

Ganesh Pillai emphasized the critical role of the **private sector** in financing the blue economy, noting that public funding alone cannot meet the scale of capital required for climate transition. He showcased ADB's experiences in aquaculture, plastics, fertilizers, and tourism, highlighting how private investments when aligned with sustainability can drive both commercial returns and environmental impact.

Key Takeaways

1. Private sector engagement is essential: Public resources are insufficient to support the scale of investments needed for resilient and sustainable coastal economies.
2. Fisheries transition in Kerala offers significant opportunities moving from conventional practices to more efficient, commercially viable models could attract financial capital.
3. ADB's investments in specialty fertilizers (as opposed to bulk fertilizers) improve efficiency and reduce environmental impacts, representing a model for sustainable agricultural inputs.
4. Through ADB's financial institution program, lending to the Bank of Maldives supports local SME tourism operators with the added objective of promoting sustainable tourism practices.
5. Addressing ocean pollution from automobile tyres requires leveraging existing facilities, including those in Kochi, for responsible recycling and waste management.
6. ADB's investment in Thai Union (Thailand) included "additionalities" beyond financial capital, such as improving the sustainability of shrimp farming practices.

Quotation

- ***"ADB had an ambitious programme from 2019 to 2024 in which about close to five billion U.S. dollars was earmarked for blue investments in the private sector. This was categorisedcategorized in areas like ecosystem, natural resources management, sustainable coastal and marine development and pollution control."***

Presentation	Speaker
Sustainable Coastal and Marine Development: Examples from Thailand and Cambodia	**Lan Le,** Environmental Economist, ADB

Lan Le joined the session online and discussed how the Asian Development Bank supports local bodies to build capacity, mobilize funds, and provide insurance to vulnerable communities. She highlighted the importance of ecosystem valuation and innovative financing to strengthen sustainable coastal development and economic resilience. A notable example was a project in Cambodia deploying fish-protective structures where fish stocks had significantly declined.

Key Takeaways

1. Proper assessment of ecosystems is essential when designing any project.
2. Investing in nature is not optional; it is an economic necessity.
3. Public investment alone is insufficient for ecosystem restoration or coastal protection, necessitating mobilization of diverse financing resources.
4. Sustainable coastal development and economic resilience are closely linked.
5. Practical interventions, such as fish-protective structures in Cambodia, demonstrate innovative solutions to ecological and economic challenges.

Quotation

- ***"For India, with more than 7,000 kilometres of coastline, fishing and tourism are also very vital. The experience from Thailand and Cambodia is directly relevant. Innovative finance is the bridge that turns environment protection into sustainable and responsible economic ground."***

Presentation	Speaker
Government Perspective on Financing Coastal and Marine Ecosystems	**Saurabh Vijay,** Principal Secretary, Finance Department, Government of Maharashtra

Key Takeaways

1. Assessing and supporting efforts to make coasts resilient is crucial.
2. Funding is not a constraint; delays occur due to lack of proper implementation. District Planning Committees and Panchayat Raj institutions receive sufficient funds under the Finance Commission.
3. The Government of Maharashtra aims to integrate coastal resilience and ecosystem financing into the Viksit Maharashtra 2047 Vision Document.
4. Thirteen government departments are directly linked to these issues, and convergence among them is key to advancing initiatives.
5. A government-led approach is essential to secure adequate financing for coastal and marine ecosystem projects.

Quotation

- *"We will be able to find money. That is not an issue. The only thing we really lack is well-researched planning. We need to find answers to implementable challenges."*

Insights from Panel Discussion and Q&A

- Global best practices are being adapted to India's context to create innovative financing models for coastal and marine ecosystems.
- Knowledge-sharing and stakeholder collaboration are central to scaling solutions and ensuring long-term sustainability of blue finance initiatives.
- Ocean Accounts provide a framework to capture the monetary value of ocean assets, supporting evidence-based policy and finance.
- A pilot has already been completed in Tamil Nadu, with plans to scale up the framework in Kerala and other coastal states.
- Ocean accounting could serve as a foundation for integrating natural capital into national and state-level decision-making.
- Accounting for natural resources is critical as they serve as the first line of defense for coastal communities. Quantifying these assets enables innovative financial products such as insurance.
- ADB has pioneered coral reef insurance, a specialized product designed to safeguard vulnerable ecosystems. Unlike standard insurance instruments, such innovations require the leadership of DFIs (development finance institutions) such as ADB and the World Bank.
- The ADB Frontier Fund was highlighted as a mechanism focused on channeling investments into lesser-developed economies, where commercial finance is often limited.
- Thailand, Cambodia, and India face similar risks from climate change impacts on marine ecosystems, such as coastal erosion. Lessons on financing livelihoods, sustainable seafood farming, eco-tourism, and value-added enterprises in Cambodia and Thailand are relevant to India and other Asia-Pacific countries.
- Sea grass restoration in Thailand is critical; inland survival trials are successful, but marine trials are challenging. Experts are testing alternative techniques.
- The sovereign lending project includes an incubator fund to support startups in sustainable marine fisheries and seaweed cultivation.

Visual Recap Session

Presentation	Speaker
Visual Recap	**Keisuke Taketani,** Consultant, ADB

Whilst visual recapping the day 1, the session highlighted the pressing challenges facing coastal communities, such as extreme weather, climate change, sea-level rise, declining fisheries, plastic waste, erosion, and migration pressures, while stressing the importance of moving beyond problem identification to forward-looking, integrated solutions. Emphasis was placed on nature-based solutions like mangroves and reefs, supported by policy, intergovernmental collaboration, and community engagement, as came out during discussions on day 1. Participants were encouraged to reflect on their position in this journey whether addressing immediate issues or shaping long-term strategies, and to consider how to bring in broader stakeholders, including government officials, financiers and community, to collectively advance towards sustainable, systemic resilience.

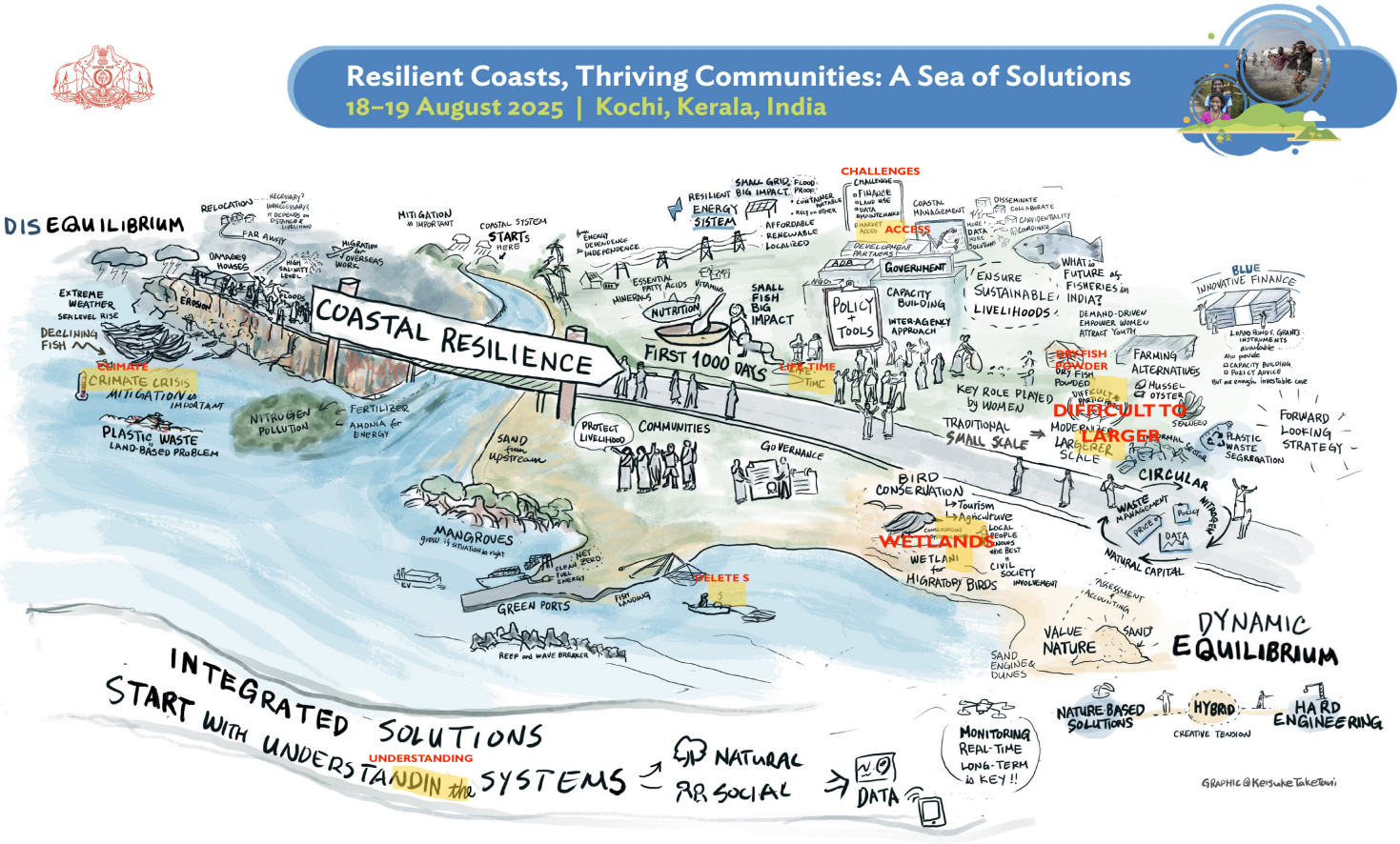
Key Takeaways

1. Coastal communities face a convergence of threats: climate change, extreme weather, sea-level rise, erosion, salinity, declining fisheries, waste management, and migration pressures. These issues must be understood as part of an interconnected system rather than isolated problems.
2. While immediate issues demand attention, sustainable progress requires a forward-looking approach that prioritizes integrated strategies over piecemeal interventions.
3. Ecosystem restoration through mangroves, reefs, and other nature-based methods offers both protective and livelihood benefits, making them central to resilience planning.
4. Effective resilience begins with understanding how ecosystems and human systems interact from mountains to coasts ensuring that interventions address root causes rather than just visible symptoms.
5. Success depends on multi-level coordination: strong policies, intergovernmental collaboration, and active community governance are all necessary to implement meaningful solutions.
6. Beyond technical experts, it is vital to bring in absent but critical stakeholders government officials, financial institutions, and partners to scale solutions and secure long-term impact.
7. Participants were encouraged to reflect on their role in the resilience journey, identifying whether they are addressing short-term issues or contributing to broader transformation, and to commit to bridging the gap between today's challenges and tomorrow's solutions.

Quotation

- ***"My question to you is: where are you in this journey? Are you addressing current issues, which is very important, or are you trying to go into the forward-looking strategy?"***

Visual Recap



Closing Session

The two-day conclave organized by ADB and the Government of Kerala brought together national and international experts, government departments, NGOs, and research institutions to deliberate on coastal resilience. Across nine sessions, themes spanned food security, finance, fishing, tools and models for coastal planning, waste management, biodiversity conservation, and community livelihoods. Key insights highlighted the importance of small nutrient-rich fish for nutrition and women's income, hybrid solutions integrating engineered and nature-based defenses, and the role of migratory birds and turtle nesting sites in eco-tourism and ecosystem health. The closing session emphasized the need for integrated shoreline management plans, inter-departmental collaboration, community engagement, and evidence-based decisions to ensure resilient coasts. The conclave concluded with gratitude to participants and a call to transform the nine rich sessions into "9,000 good actions" that safeguard livelihoods, strengthen communities, and sustain coastal ecosystems for future generations.

Key Takeaways

1. Examples like the Kerala Water Metro (electric boats) highlight how sustainable transport and port operations can support coastal resilience.
2. Themes of nutrient management, waste management, and natural capital valuation show that nature-based solutions must be aligned with policies, pricing, and data-driven approaches.
3. Multiple financial instruments and policy support exist, but there is a shortage of investable, bankable cases; stronger project pipelines are essential to mobilize available funds.
4. The journey towards resilient coasts requires collective action from partners, stakeholders, and new collaborations must be identified and activated beyond the conference to build momentum for the next generation.

Presentation	Speaker
Closing Remarks from Government of Kerala	**Shri Jeevan Babu,** IAS, Special Secretary, Water Resources Department, Government of Kerela

Key Takeaways

1. Coastal protection should not rely only on hard infrastructure like seawalls; hybrid solutions combining engineered works with nature-based defenses (reefs, dunes, mangroves) are more sustainable.
2. Small nutrient-rich fishes must be prioritized in coastal planning for nutrition security, women's livelihoods, and local markets, with special provisions like first-sale privileges for women.
3. Eco-tourism linked to biodiversity (migratory birds, turtle nesting sites, breeding grounds) can generate hidden income while preserving ecosystems.
4. A comprehensive and integrated shoreline management plan is essential, bringing together multiple departments, agencies, scientific institutions, and communities instead of working in silos.
5. Communities must be central to decision-making, with solutions tailored to local topography, livelihoods, and resilience needs, ensuring coasts remain safe, thriving, and future-ready.

Quotations

- "***Seawalls are not the only answer; we must explore hybrid solutions which integrate engineered works with nature-based defenses."***
- ***"If we over-harvest today, tomorrow our children or grandchildren will be casting empty nets."***
- ***"Any future harbour or landing center must reserve space and cold chain capacity for small nutrient-rich fishes, and the first-sale privilege should be extended to our womenfolk."***
- ***"By 2040 or 2045, our coasts across India should be in a better shape than today—that should be our collective vision."***

Presentation	Speaker
Closing Remarks from ADB	**Sanath Ranawana,** Director AFNRD, ADB

Key Takeaways

1. The conclave was an eye-opener for many participants, helping them appreciate the breadth and integrated nature of coastal zone management beyond their initial perspectives.
2. The sessions highlighted that coastal zones are not only about infrastructure but are also vital for cognitive development, economic growth, cultural heritage, and social well-being.
3. The event provides importance of applying a human face to all coastal solutions, treating the coast as a holistic system that must be resilient and thriving.
4. The hospitality and cultural traditions of Kerala enriched the experience, demonstrating the value of local culture in such global discussions.
5. Emphasized need for collaboration among governments, communities, and development partners to build resilient coasts, while expressing deep gratitude to participants, ADB colleagues, and the Government of Kerala for their contributions.

4 Wave Tank Exhibit

A wave flume with a wave generator was manufactured and deployed on site to demonstrate the effects of different coastal barrier constructions in reducing wave overtopping. The physical model provided a tangible way to observe how various structures performed, each achieving the same objective – reducing coastal flooding – but in very different ways. This allowed participants to directly compare the performance of different interventions and to consider their wider implications for shoreline change and amenity values.

5 Annexes

1. Agenda
2. Presentations
3. Selected Photos

Resilient Coasts, Thriving Communities: A Sea of Solutions

18–19 AUGUST 2025
GRAND HYATT, KOCHI, KERALA, INDIA

POST-EVENT SUMMARY REPORT