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Enabling Stakeholder Participation and Applied Research in Policy Comprehension to Mainstream Climate Resilient Agro-farming Practices in National Climate Agenda (ESPAR)

CRRP2023-06MY-Dey

Final Report

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1. Summary of the Project

The initiative titled 'Enabling Stakeholder Participation and Applied Research in Policy Comprehension to Mainstream Climate Resilient Agro Farming Practices in National Climate Agenda' was carried out by the South Asian Forum for Environment with support from the Asia Pacific Network for Global Change Research. It operated across India, Bangladesh, Pakistan, and Sri Lanka, and strengthened coastal agricultural resilience by linking applied research with policy interpretation and structured stakeholder engagement.

The work examined where national instruments fell short of field realities in climate exposed farming systems. It evaluated how programmes addressed salinity, cyclonic risk, rainfall variability, soil decline, and livelihood security in coastal production landscapes. A multi criteria assessment combined a comparative SWOT lens with decision matrices to judge policy coverage, implementation quality, and institutional coherence across environmental, economic, and social dimensions.

Field assessments were undertaken in the Sundarban in India and Bangladesh, the Sindh delta in Pakistan, and coastal zones of Sri Lanka. These assessments applied the Livelihood Vulnerability Index to capture exposure, sensitivity, and adaptive capacity within community-based production systems. Geospatial work was integral to the field component, which included land use analysis with GIS, resource mapping, and the preparation of country specific spatial products to inform policy planning and gap mitigation.

Stakeholder workshops functioned as the framing process for the country white papers, bringing together scientists, administrators, and planners to validate findings, refine matrices, and agree on actionable directions. In parallel, additional workshops and citizen science sessions served as awareness and outreach activities that improved public understanding, encouraged adoption of adaptive practices, and supported inclusive participation by women and youth.

By its conclusion, the ESPAR project had developed white papers for four countries, each consolidating evidence, stakeholder insights, and policy pathways for embedding climate-resilient agriculture within national development frameworks.

2. Objectives

The project had three principal objectives as following:

i. Identifying synergies and trade-offs between climate-resilient agricultural policy and farming practice in vulnerable coastal landscapes of South Asia using multi-criteria diagnostic research

ii. Field-based empirical research at community-ecosystem interface to evaluate policy-practice gaps in conventional agro-farming to enable Multi-Attribute Decision Advice Matrix (MADAM) towards strategic policy proposition for sustainable intensification of primary sectors

iii. Mainstreaming resilient community farming practices in coastal Socio-Ecological Production Landscapes (SEPLs) through its demonstrative documentation in country-specific white papers in cognizance with recommended operational guidelines.

3. Outputs, Outcomes, and Impacts

Outputs	Outcomes	Impacts
Scientific research paper titled *Institutional Design and Climate Resilience in Agriculture: A Comparative Assessment of the Prevailing Policy Landscape Across South Asia*, prepared and communicated to the APN Science Bulletin	Enhanced scientific understanding of the policy-practice divide in climate-resilient agriculture across the selected countries of South Asia	Strengthened regional evidence base for integrating adaptive agriculture within national policy frameworks
Proceedings of two onsite workshops and eight webinars conducted across the four countries for drafting national white	Strengthened collaboration among scientists, administrators, and community leaders	Established transboundary platforms for shared learning and regional adaptation

papers		
Coffee table book titled *Harvests on the Brink: Climate, Policy, and the Future of Farming in South Asia*, uploaded on the project website	Increased public awareness and engagement on the urgency of climate adaptation in agriculture	Broader social recognition of the need for sustainable practices and inclusive resilience models
Four Livelihood Vulnerability Indices calculated for each selected country with a consolidated regional comparison report	Strengthened technical capacity to assess and compare exposure, sensitivity, and adaptive capacity across nations	Enhanced regional readiness for adaptation planning and evidence-based prioritisation of vulnerable zones
Four geospatial resource maps of coastal agricultural zones of each selected country prepared through multi- temporal satellite imagery	Improved visualisation of land-use dynamics, resource degradation, and conservation opportunities	Future application of geospatial data for zoning, restoration, and adaptive land management in policy and planning
Comprehensive Multi-Criteria Decision-Making analysis report providing a comparative assessment of agricultural sustainability and policy coherence across the four countries	Improved decision-making capacity among policymakers and researchers to prioritise adaptive measures across national contexts	Future institutional uptake of regionally informed, evidence-based approaches for risk management and coastal planning
Proceedings from three online seminars and two workshops on capacity building, awareness, and knowledge dissemination	Increased institutional capacity and stakeholder awareness on integrated coastal resilience	Promoted multi-level cooperation for implementing climate- resilient agriculture
Proceedings from three online citizen-science awareness campaigns	Increased participation of local practitioners in documenting and addressing climate risks	Improved community ownership and knowledge exchange supporting long-term behavioural change
Four country-specific white papers providing policy guidance and strategic recommendations for mainstreaming climate-resilient agriculture	Increased policy coherence and dialogue among participating countries	To inform future policy alignment with SDG 2 and SDG 13 through adoption of resilience-focused measures
Scientific paper titled *Agriculture and Climate: Analysing Existing Policy-research Lacunae in the Sundarban Region of India and Bangladesh* communicated to *World Development Perspectives*	Contributed to global literature on the vital relationship between research and policy-making for vulnerable ecosystems	To position South Asian research within the wider discourse on nature-based solutions and adaptive governance
A video documenting the objectives and activities under the ESPAR project	Enhanced visibility of project achievements and practical examples of adaptation	Greater dissemination of community-centred resilience models to policy-related and academic audiences
Dedicated project website (www.apnespar.com) launched for adaptive learning and knowledge economy	Continuous access to project resources and open- access data for researchers and policymakers	Creation of a sustained digital repository advancing regional knowledge economy
Three media publications and one popular science publication	Increased public awareness on the urgency of climate adaptation in agriculture and dissemination of climate-adaptive agricultural models	Enhanced recognition of the need for sustainable practices and inclusive resilience models

4. Deliverables

i. 1 scientific research paper titled 'Institutional Design and Climate Resilience in Agriculture: A Comparative Assessment of the Prevailing Policy Landscape Across South Asia' was prepared

and communicated to the APN Science Bulletin. It included the policy and planning matrix for each country based on multiple drivers to augment climate preparedness in the primary productivity sector.

ii. The proceedings of workshops (2) and webinars (8, 2 from each country) for drafting white papers were prepared.

iii. 1 coffee table book titled 'Harvests on the Brink: Climate, Policy, & the Future of Farming in South Asia' was prepared and uploaded on the dedicated project website, focusing on policy-practice gaps, and presenting evidence-based recommendations for bridging them.

iv. 4 Livelihood Vulnerable Indices for each country were calculated and a consolidated report was prepared.

v. 4 country-specific geospatial resource (land use and land cover) maps of selected coastal agricultural zones were prepared through multi-temporal satellite imagery to inform future zoning, restoration, and adaptive land management in policy and planning

vi. 1 comprehensive Multi-Criteria Decision-Making Analysis report, evaluating agricultural sustainability and policy coherence across India, Bangladesh, Pakistan, and Sri Lanka to identify priority areas for climate-resilient agricultural transformation, was prepared.

vii. Proceedings from 3 online seminars (1 each in India, Bangladesh, and Sri Lanka) and 2 workshops for capacity-building, awareness, knowledge economy, and dissemination of findings were prepared.

viii. Proceedings from 3 online Citizen-Science awareness campaigns (India, Bangladesh, and Sri Lanka) were prepared.

ix. 4 Country-specific white papers were prepared and uploaded on the dedicated project website to provide evidence-based policy guidance and strategic recommendations for mainstreaming climate-resilient agriculture into national planning frameworks.

x. 1 scientific paper titled 'Agriculture and climate: Analysing Existing Policy-Research Lacunae in the Sundarban Region of India and Bangladesh' was communicated to the jounal 'World Development Perspectives' (https://www.sciencedirect.com/journal/world-development-perspectives) .

xi. 1 video was prepared to document the objectives and activities under the ESPAR initiative.

xii. A dedicated project website (https://www.apnespar.com/index.html) for adaptive learning and knowledge economy was launched.

xiii. 3 media publications and 1 popular science article related to the project were published and communicated respectively.

5. Media Reports, Videos, and Other Digital Content

i. The impact of climate on Sundarban. (2024, August 6). DW. Retrieved from https://www.dw.com/bn/%E0%A6%B8%E0%A7%81%E0%A6%A8%E0%A7%8D%E0%A6%A6%E0%A6%B0%E0%A6%AC%E0%A6%A8%E0%A7%87%E0%A6%B0-%E0%A6%89%E0%A6%AA%E0%A6%B0-%E0%A6%9C%E0%A6%B2%E0%A6%AC%E0%A6%BE%E0%A7%9F%E0%A7%81-%E0%A6%AA%E0%A6%B0%E0%A6%BF%E0%A6%AC%E0%A6%B0%E0%A7%8D%E0%A6%A4%E0%A6%A8%E0%A7%87%E0%A6%B0-%E0%A6%AA%E0%A7%8D%E0%A6%B0%E0%A6%AD%E0%A6%BE%E0%A6%AC/video-69863474?maca=bn-Whatsapp-sharing

ii. Anandabazar Online Desk. (2024, August 16). Several varieties of small fish are disappearing, scientists are blaming pollution. Anandabazar Patrika Online. Retrieved from https://www.anandabazar.com/lifestyle/how-does-global-climate-change-and-pollution-affect-the-sundarbans-dgtl/cid/1538708

iii. Dey Sarkar, G. (2024, August 21). Will the Sundarban survive without community-oriented

policies? What steps must be taken to protect the Sundarban? Ei Samay. 10

iv. Dey, M. (2025). *Harvest on the Edge: Securing South Asia's Food Future through Coastal Agriculture.* Unpublished manuscript. (communicated to **Progyan Communique: The Triannual Newsletter of Progyan Foundation for Research and Innovation - https://progyancommunique.org/)**

6. Pull Quotes

i. "We see the rain come at the wrong time, and the water stays longer on the fields now. When we talk about it together, we understand better what is changing. The training helped us learn how to save crops and record what we observe." - Smt. Purnima Hajor, Farmer, Kultali Block, West Bengal, India

ii. "The floods do not follow the old rhythm anymore. We have to build floating beds and keep ducks and fish together just to survive. Sharing these ideas in the meeting showed us that our ways of coping are also a kind of science." - Md. Ruhul Amin, Farmer, Bangladesh

iii. The dry months are getting longer, and the wells drop lower every year. Learning about traditional irrigation practices like bethma reminded us that simple community methods can still keep our soil and water alive." - Mr. Nimal Perera, Farmer, Kurunegala District, Sri Lanka

7. Acknowledgements

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We further acknowledge the valuable cooperation of government departments, research institutions, and non-governmental organisations in India, Bangladesh, Pakistan, and Sri Lanka for contributing data, expertise, and critical insights through workshops, consultations, and webinars. The participation of community representatives, extension officers, and local practitioners from the selected coastal regions enriched the study with grounded perspectives and regional context.

Finally, we extend our heartfelt thanks to the entire teams of the Progyan Foundation for Research and Innovation (PFRI) for their dedication and sustained effort in collaborating with the South Asian Forum for Environment (SAFE) for coordinating multi-country activities, facilitating stakeholder engagement, and developing the white papers as well as other key project outputs.

8. Outputs

Output 1: Scientific research paper titled 'Institutional Design and Climate Resilience in Agriculture: A Comparative Assessment of the Prevailing Policy Landscape Across South Asia'

Abstract

South Asian agriculture lies at the forefront of climate risk, especially in coastal belts where rising salinity levels, heavy flooding, and frequent storms adversely affect production and stability. The present research assessed how institutional design supported or encumbered climate-resilient agriculture in India, Bangladesh, Pakistan, and Sri Lanka. The authors combined a nuanced systematic review of national policies with experts' perspectives, mapping policy-practice gaps key agricultural dimensions. A weighted SWOT with Likert scoring revealed a common pattern of weakness- unclear targets, low utilisation of climate finance, poor inter-ministerial coordination, slow policy roll-out, and bias against smallholders as well as women. Cross-country differences persisted. While India showed formidable policy architecture but systemic inefficiencies, Bangladesh emphasised on food security with relatively stronger adaptive readiness. Sri Lanka alone stated quantified agricultural mitigation in its NDC, yet faced volatility and capacity constraints. Pakistan was constrained by underfunding and governance deficits. The composite indices indicated higher vulnerability in Sri Lanka and Pakistan, with Bangladesh emerging as the most resilient among the selected countries. In conclusion, a country-specific framework, aiming towards an overall climate-resilience in agriculture, both for livelihood protection, and eventual emission reduction, was recommended to inform future policies.

Keywords: Agricultural emissions, Climate-resilient agriculture, Institutional frameworks, Policy-practice gaps, South Asian agriculture, SWOT analysis

Output 2: Workshop and Webinar Proceedings for White Paper Drafting

Summary

Two onsite workshops - one in India and one in Sri Lanka, and eight online workshops (two per country) were convened to support the development of the national white papers. The sessions in India centred on themes of climate-resilient coastal agriculture, livelihood security, and institutional integration. In Bangladesh, the discussions focused on salinity management, disaster-risk governance, and policy innovation for smallholder adaptation. The webinars in Pakistan examined water and soil management, canal irrigation efficiency, and agrobiodiversity preservation. In Sri Lanka, deliberations addressed policy coherence for coastal farming, women's participation in adaptation, and sustainable use of natural resources.

Participants included researchers, policymakers, extension officers, civil-society representatives, and local practitioners, who jointly contributed to identifying actionable recommendations for embedding climate resilience in agricultural policy and planning across the four participating countries.

Output 3: Coffee table book titled 'Harvests on the Brink: Climate, Policy, & the Future of Farming in South Asia'

Executive Summary

The coastal agricultural landscapes of South Asia face unprecedented challenges from climate change, threatening food security and livelihoods across the region. The ESPAR project addressed this critical issue by examining the prevailing disconnect between agricultural policies and their practical implementation in vulnerable coastal communities.

Climate events like El Nino and extreme weather phenomena cause significant agricultural yield variability in South Asia, with recent studies showing crop yield variability ranging from 12% to 22% across different regions, directly impacting millions of marginal farmers. Without proper adaptation measures, the region could

experience economic losses equivalent to 1.8% of GDP by 2050, escalating to 8.8% by 2100, with some recent projections suggesting potential losses exceeding 24% by the end of the century for parts of South Asia. The project recognized that while governments have developed various climate-resilient agricultural policies, significant gaps exist between policy intentions and ground-level implementation.

Through comprehensive field research across selected coastal landscapes in South Asia, the ESPAR project team systematically mapped these policy-practice disconnects. The initiative employed community-centred approaches, conducting extensive consultations with farmers, local leaders, and policymakers to understand real-world challenges. Special attention was given to the opinion of women farmers, who increasingly shouldered agricultural responsibilities as climate pressures forced male labourers to migrate to cities. The findings were synthesized into practical, evidence-based policy recommendations through country-specific white papers that could bridge the gap between government intentions and farmer needs. Other key outcomes included mapping of climate-vulnerable agricultural areas and comprehensive frameworks for integrating nature-based solutions into farming practices. The project emphasized sustainable approaches that work within existing socio-economic structures while building resilience against climate extremes.

ESPAR's collaborative approach involved researchers, government officials, and farming communities working together to co-create solutions. This participatory methodology ensured that policy recommendations were scientifically sound and practically implementable, ultimately contributing to enhanced food security and climate preparedness across the vulnerable coastal regions of South Asia.

Output 4: Report titled 'Livelihood Vulnerability to Climate Change in Coastal South Asia: A Consolidated Livelihood Vulnerability Index Assessment for Bangladesh, India, Pakistan, and Sri Lanka'

Executive Summary

Climate change poses a profound threat to the densely populated coastal regions of South Asia, where agriculture, aquaculture, and fisheries underpin household economies. This consolidated Livelihood Vulnerability Index (LVI) assessment integrates findings from Bangladesh, India, Pakistan, and Sri Lanka to present a regional perspective on vulnerability across coastal and deltaic systems.

The analysis followed the IPCC framework that defined vulnerability as a function of exposure, sensitivity, and adaptive capacity. Each national study applied the same methodology to ensure comparability. Results demonstrated that Bangladesh and India's Sundarban zones experienced the highest composite vulnerability, with LVI-IPCC scores of 0.92 and 0.90 respectively. The coastal belt of Pakistan recorded 0.79, while the Jaffna Peninsula in Sri Lanka scored 0.76. The consistent pattern across all four cases revealed water as the central axis of risk- scarcity, salinity, and contamination influence food systems, health conditions, and livelihood stability.

In Bangladesh, exposure to recurrent cyclones and saline flooding overwhelmed adaptation capacity. India faced similar pressures in the Sundarban, where embankment failures and saline intrusion threaten paddy cultivation and aquaculture. The coastal regions of Pakistan endured extreme aridity and declining freshwater inflow, producing widespread livelihood stress. In Sri Lanka, over-extraction of groundwater and saltwater intrusion had jeopardised the limestone aquifer upon which domestic and agricultural needs depend.

Common drivers of sensitivity included limited safe drinking water, declining soil fertility, high disease incidence, and inadequate food diversity. Adaptive capacity remained weak where poverty, gender inequities, and low institutional outreach persisted. Strengthening local institutions, expanding access to technology, and diversifying income sources were necessary to reduce vulnerability.

Collectively, the findings highlighted that building resilience in coastal South Asia demanded integrated water management, climate-smart agriculture, mangrove and aquifer restoration, and inclusive livelihood diversification. Addressing gender gaps in education and finance, alongside improving local governance and early warning systems, would be essential for sustainable adaptation.

Output 5: Report titled 'Land use and Land Cover Mapping of India, Bangladesh, Pakistan and Sri Lanka' prepared through multi-temporal satellite imagery to inform future zoning, restoration, and adaptive land management in policy and planning

Executive Summary

This study presents a comprehensive multi-temporal Land Use and Land Cover (LULC) analysis of coastal mangrove regions in India, Bangladesh, Pakistan, and Sri Lanka, spanning three decades from 1994 to 2024. Employing supervised classification techniques with the maximum likelihood algorithm in ERDAS IMAGINE 2014, Landsat satellite imagery was systematically analyzed across four decadal intervals to map six dominant LULC classes: Mangrove, Other Vegetation, Bare Earth and Sand Deposit, Agricultural Land, Salt Pan and Aquafarm, and Waterbodies. The study area delineation was standardized using buffer zone approaches, including the Mangrove Influence Zone (MIZ) and Ecologically Critical Area (ECA), to capture anthropogenic impacts along mangrove fringes. The findings reveal divergent trajectories across countries- India demonstrating recent mangrove recovery (2014-2024) alongside agricultural expansion (24.30% by 2024), Bangladesh experiencing cyclical mangrove fluctuations with substantial aquaculture proliferation (13.98% by 2024) and significant mangrove decline (31.61% by 2024), Pakistan showing sustained mangrove contraction (20.48% by 2024) and bare earth conversion to agriculture (10.75% by 2024), and Sri Lanka exhibiting rapid agricultural intensification (37.60% by 2024) at the expense of mangrove cover (26.05% by 2024). Transformation matrices quantified precise land cover transitions, revealing that bare earth and sand deposits systematically converted to agricultural land and vegetation across all countries, waterbodies remained relatively stable, and mangrove dynamics varied significantly- India gained 1.08% mangrove loss between 2014-2024, Bangladesh lost 5.13%, Pakistan lost 5.52%, and Sri Lanka lost 3.55% during the same period. The spatio-temporal dynamics documented provide essential empirical foundations for modeling policy interventions, identifying gaps in coastal land management frameworks, spatially targeting conservation zones, and regulating land conversion activities with evidence- based zoning regulations. These geospatial datasets transform abstract policy objectives into spatially explicit, measurable actions, enabling adaptive management strategies that respond to ground realities, close implementation gaps between policy formulation and execution, and ensure sustainable coastal development trajectories aligned with both economic aspirations and ecological imperatives across the South Asian coastal belt. The study underscores the urgent need for transboundary collaboration, strengthened enforcement mechanisms, sustained monitoring through multi-temporal satellite imagery, and climate-responsive land-use planning to safeguard South Asia's coastal mangrove ecosystems for future generations while supporting sustainable development pathways for coastal communities

Output 6: Multi-Criteria Decision-Making Analysis report titled 'Assessing Agricultural Policy Coherence for Climate Resilience in South Asia: Insights from Multi-Criteria Decision-Making'

Executive Summary

The Multi-Criteria Decision-Making (MCDM) analysis evaluated agricultural sustainability and policy coherence across India, Bangladesh, Pakistan, and Sri Lanka to identify priority areas for climate-resilient agricultural transformation with a specific focus on coastal systems. This analytical exercise integrated expert judgments informed by field realities of coastal agriculture, contextualising national policy evaluation and generating decision-oriented insights on resilience priorities. The assessment integrated 21 sustainability indicators grouped under environmental, economic, and institutional dimensions, examining the strength, scope and implementation depth of national agricultural frameworks. Composite coverage scores reflected how effectively existing policies addressed adaptive capacity, livelihood security, and ecosystem stability in regions exposed to saline intrusion, cyclonic hazards, and coastal resource degradation.

India demonstrated the most comprehensive institutional coverage, achieving a portfolio strength of 71.6 per

cent. Flagship programmes such as the Gramin Krishi Mausam Sewa, National Innovations on Climate Resilient Agriculture, and Pradhan Mantri Krishi Sinchayee Yojana contributed to strong performance in climate information systems, irrigation efficiency, and adaptive technology dissemination. These functions remain vital in coastal districts of Odisha, Andhra Pradesh, Tamil Nadu, and Gujarat, where saline water intrusion, erratic monsoon patterns, and declining groundwater tables continue to affect productivity. Persistent weaknesses in risk management, credit access, and soil health underscored the need for integrated mechanisms that link productivity enhancement with resilience financing and coastal infrastructure strengthening.

Bangladesh, with a portfolio coverage achievement of 66.8%, exhibited an inclusive policy structure with substantial emphasis on community participation, gender inclusion, and food security, supported by initiatives such as the Delta Plan 2100 and the National Agricultural Policy. High performance in water efficiency and adaptation planning reflected institutional maturity shaped by decades of delta management experience. However, challenges in soil degradation control, input management, and long-term financial protection constrained resilience outcomes, especially across the coastal belt where saline intrusion, tidal flooding, and groundwater contamination have eroded farm viability. Sustained institutional attention to soil-water interface management and adaptive livelihood diversification remains critical for climate-resilient coastal agriculture.

Pakistan presented the most uneven policy performance, achieving 65.3 per cent overall coverage. Strengths were concentrated in knowledge transfer and market access, while critical weaknesses persisted in soil health, credit and finance, and risk management. Despite multi-policy attention, implementation remained hindered by coordination and funding gaps. The country's extensive coastal and deltaic systems along the Indus Basin face compound risks from salinity, drought, and water scarcity, yet operational integration between irrigation management and coastal agricultural planning remained limited. Findings indicated that institutional capacity, rather than policy absence, was the principal constraint to resilience delivery.

Sri Lanka achieved 66.3 per cent portfolio coverage, characterised by strong emphasis on climate resilience and knowledge transfer, but marked by gaps in soil health, financial inclusion, and market integration. Post- crisis recovery frameworks such as the Climate Smart Agriculture Investment Plan and the Coastal Zone and Climate Resilience Management Plan introduced valuable innovations but required consistent funding and institutional reinforcement. Coastal farming systems continued to face salinity stress, cyclone exposure, and declining soil fertility, highlighting the need for joint interventions across water, finance, and livelihood domains.

Across all four countries, the comparative analysis confirmed that while policy architectures were comprehensive, implementation remained fragmented. Three cross-cutting priorities emerged as regionally critical for coastal agricultural sustainability: rehabilitation of soil and water resources to stabilise productivity in saline-affected and erosion-prone areas; institutionalised risk management and financial inclusion mechanisms to protect smallholders from climate and market shocks; strengthened extension and community-based adaptation systems to translate policy intent into field-level practice.

The study concluded that future resilience efforts must move beyond policy design toward coordinated, adequately financed, and locally adaptive systems capable of addressing the compound risks that define South Asian coastal agriculture- salinity intrusion, tidal inundation, cyclonic impact, and livelihood insecurity, while advancing inclusive, climate-resilient growth across the region.

Output 7: Workshop & Webinar Proceedings for Awareness, Knowledge Economy, & Dissemination

Summary

Three capacity-building webinars were organised-one each in India, Bangladesh, and Sri Lanka-to strengthen farmer preparedness and institutional capacity for climate-resilient agriculture. In India, the session focused on farmer resilience in the Sundarban, participatory adaptation, and technology transfer through digital literacy, peer learning, and women's inclusion in adaptation. In Bangladesh, the webinar addressed challenges

in adopting climate-smart agriculture, highlighting integrated farming, water efficiency, seed access, finance, and mentoring models for women-led value addition. In Sri Lanka, the discussion centred on extension services and farmer preparedness under climate variability, emphasising the role of community field schools, timely climate information, and inclusive local institutions.

Two workshops were also convened in India. The onsite national workshop facilitated a multi-stakeholder dialogue on coastal agriculture, addressing market gaps, ecosystem services, rainwater management, and nature-based solutions. The international dissemination workshop, organised in collaboration with the Indian Institute of Technology Madras, created a regional platform for knowledge sharing on policy coherence, agroforestry, regenerative agriculture, carbon finance, and the translation of scientific research into practice.

Together, these events brought together scientists, policymakers, extension officers, farmers, and representatives from civil society, promoting regional cooperation, awareness, and capacity building for advancing climate-resilient agro-farming across South Asia.

Output 8: Proceedings of Citizen-Science Awareness Campaigns

Summary

Three citizen-science awareness programmes were organised under this component, one each in India, Bangladesh, and Sri Lanka, to strengthen local observation, traditional knowledge, and community-based understanding of climate change impacts.

In India, the campaign titled *Learning from the Land* engaged local farmers, panchayat members, and women's groups from the Sundarban. Participants discussed irregular rainfall, tidal shifts, and soil salinity affecting crop and fish yields. The session emphasised community note-keeping, seed saving, composting, and peer learning as practical steps towards participatory monitoring of environmental change.

In Bangladesh, the programme *Living with Water* focused on the Haor wetlands, where participants shared indigenous knowledge of flood indicators, floating-bed cultivation, and duck-fish farming. The event encouraged oral record-keeping, storytelling, and local media for disseminating adaptation knowledge.

In Sri Lanka, the campaign *Every Drop Counts* brought together farmers, researchers, and rainwater experts to explore soil and water resilience. Discussions centred on rooftop rainwater harvesting, well recharge, and traditional irrigation methods. Composting, household gardening, and women-led food security initiatives were also promoted.

Together, these campaigns enhanced community awareness, intergenerational learning, and participatory climate observation, embedding local knowledge within broader frameworks for climate-resilient agriculture and adaptive governance across South Asia.

Output 9a: White paper on climate adaptation and sustainable coastal agriculture in India titled 'Building Coastal Resilience: A Strategic Framework for Climate-Smart Agriculture in India (2025-2040)'

Executive Summary

Coastal agricultural landscapes of India sustain the lives of more than one hundred million individuals, nearly half of whom rely directly on farming, fishing, and related occupations for subsistence. The shoreline extends over 11,000 kilometers, from the fertile plains of Gujarat and Maharashtra in the west to the great river deltas of the Ganga-Brahmaputra, Mahanadi, Godavari, Krishna, and Cauvery in the east. Coastal districts comprise multiple agro-ecological zones, ranging from salt-stressed cotton and groundnut belts of Gujarat to coconut-pepper plantations across Kerala and Karnataka, and from vast kharif rice systems in Odisha and West Bengal to integrated rice-fish models across many regions.

During the last fifty years, climatic patterns along the Indian coast have changed significantly. Average temperatures have climbed by nearly one degree Celsius, sea level has been rising at more than 2.5

millimeters per year, heavy rainfall events occur more often, and cyclones are becoming stronger. These shifts accelerate salinity intrusion, prolonged waterlogging, shoreline erosion, and storm surge risks, reducing crop productivity and threatening national food security. Irregular timing of the monsoon further disrupts cropping schedules, while repeated flooding and salt stress damage soil fertility. Economic losses are already high, with annual agricultural damage from cyclones and floods exceeding one billion United States dollars. Smallholder farmers bear disproportionate costs, losing up to fifteen percent yield in years of severe salinity. Fisheries and aquaculture also face damages surpassing two hundred million dollars annually.

To confront such risks, the government of India has established a wide adaptation framework. The National Action Plan on Climate Change coordinates several thematic missions. Among these, the National Mission for Sustainable Agriculture promotes climate-smart methods such as resilient crop varieties, micro- irrigation, and integrated farming in vulnerable zones. Complementary schemes strengthen soil management, increase assured irrigation, and provide insurance linked to weather indices. Coastal Regulation Zone norms, integrated coastal zone projects, and aquaculture rules help protect critical ecosystems, while state-level action plans adapt measures to specific vulnerabilities. Research and extension networks under the National Initiative on Climate Resilient Agriculture have deployed weather stations, piloted climate-resilient villages, and shared localized advisories through Krishi Vigyan Kendras and digital platforms.

Nevertheless, turning policy into practice faces repeated hurdles. Funding cycles often fail to match agricultural calendars. Data remain fragmented and responsibilities of agencies overlap. Extension resources are limited and community participation is uneven. Farm-level demonstrations show strong potential- salinity-tolerant crops improve yields, rice-fish practices diversify income, subsurface drainage and solar desalination reduce salt stress, and digital advisories support timely decisions. Yet widespread adoption is constrained by insecure tenure, small and fragmented holdings, limited access to finance, and gender-based obstacles.

The financing ecosystem consists of allocations from central and state budgets, concessional credit, green bonds, blended finance mechanisms, and multilateral funds including the Green Climate Fund, the Global Environment Facility, and the World Bank. Still, innovative models such as risk-sharing arrangements, performance-linked grants, and micro-loans run by communities need scaling to reduce private sector risk and guarantee predictable support.

Key directions moving forward include aligning agriculture, water, and environmental policies through coordinated ministries, streamlining access to climate finance, embedding resilience into extension training, institutionalizing multi-stakeholder platforms, and strengthening community-driven adaptation. Core principles-community involvement, adaptive planning for multiple scenarios, fair access to technologies, diversification of livelihoods, and contingency planning in real time-should guide all interventions.

The roadmap is phased: initial years 2025-2028 focus on building institutions; the second stage 2028-2032 expands and integrates proven demonstrations; the final stage 2032-2040 achieves national transformation and leadership. A specialized Adaptation Financing Unit will coordinate diverse resources, allocate based on performance, and provide fiscal transparency using digital dashboards.

By narrowing the divide between policy and practice, encouraging innovation, and enabling coastal communities, the country can safeguard agricultural productivity, protect rural livelihoods, and establish itself as a regional leader in coastal climate resilience by 2040. This strategic framework delivers a clear, evidence-based pathway to navigate the complex challenges of a rapidly changing climate.

Output 9b: White paper on climate adaptation and sustainable coastal agriculture in Bangladesh titled 'Strengthening Futures of Coastal Agriculture: A Climate-Smart Agriculture Strategy for Bangladesh (2025 - 2040)'

Executive Summary

Coastal Bangladesh stands at the forefront of the climate crisis. Rising seas, increased salinity, and more frequent extreme weather are changing agricultural systems. These changes threaten the livelihoods of over thirty-five million people. Agriculture in these nineteen coastal districts is crucial for the national economy, producing

a large share of rice, fish, and vegetables. Yet, it faces significant challenges. Salinity-affected land expanded from 83.3 million hectares in 1973 to 105.6 million hectares in 2009. Projections suggest that this could rise by thirty-nine percent by 2050. Failing to implement strong adaptation measures, agricultural GDP losses could climb to 2.2 to 3 billion US dollars every year by mid-century.

Over the past five years, hazards have become more severe. Tropical cyclones have caused yield losses of more than twenty percent in some regions. Each season, prolonged waterlogging damages thousands of hectares. Heat stress and erratic rainfall could cut rice and wheat yields by nearly half in the worst-case scenarios. Sea level rise and saltwater intrusion are already contaminating both groundwater and surface water. This threatens irrigation and drinking water supplies. By 2050, various hazards are expected to overlap. This will lengthen recovery times and weaken the resilience of farming communities.

Bangladesh has a broad adaptation policy landscape. It includes the Bangladesh Delta Plan 2100, the National Adaptation Programme of Action, and the Bangladesh Climate Change Strategy and Action Plan. These frameworks prioritize climate-smart agriculture. Still, the move from policy to practice is uneven. This is due to bureaucratic delays, poor coordination among institutions, and inconsistent funding to the most vulnerable districts.

Field evidence shows that climate-smart technologies can be very effective when used correctly. For example, salt-tolerant rice varieties like BRRI dhan67 and BINA dhan10 can increase yields by twenty to thirty-five percent in areas with high salt levels. Similarly, integrated rice-fish and rice-duck farming systems can increase household incomes by up to twenty-eight percent. Rainwater harvesting systems can also reduce crop losses during dry seasons by nearly one-fifth. Moreover, mobile-based early warning systems can cut crop damage from cyclones by more than a fifth. Despite these benefits, the adoption rates of these technologies remain moderate, with only about forty percent of farmers in targeted project zones using them. Unfortunately, women and marginalized farmers often do not get to benefit from these gains.

Economic studies show that investing in climate adaptation is urgent and worthwhile, with benefits outweighing costs by a ratio of 2.5 to 6.0. These benefits come from avoiding damage, as well as from creating new ways to make a living, improving food security, and protecting productive land. However, the current funding for adaptation - whether from public, donor, or private sources - is still not enough, and the way funds are used is slowed down by inefficient procedures.

The social side of resilience is just as important. Since women make up a big part of the agricultural workforce along the coast, they face extra challenges because they have limited access to land, money, and decision-making power. Climate-related migration is changing labor markets and putting a strain on social cohesion. Social protection programs are crucial, but they need to better take climate issues into account to protect vulnerable households.

Bangladesh can speed up its progress by learning from both regional and global experiences. The Netherlands' and Vietnam's delta management models, the integrated coastal adaptation strategies of small island states, and regional cooperation platforms like SAARC offer valuable lessons in technology transfer, joint research, and market integration. Case studies from Satkhira, Barisal, and Patuakhali show that when policy support, technology innovation, and community participation come together, large-scale transformation is possible.

The implementation gap remains a major obstacle that needs to be addressed. To speed up delivery, approval processes should be streamlined to match agricultural cycles, inter-agency coordination should be strengthened through clear protocols, capacity building at the community level should be expanded, and performance-based funding models should be tested. It is essential to make community participation, especially the inclusion of women and marginalized groups, a standard part of adaptation planning to ensure everyone benefits fairly.

The path forward requires reforming institutions in a coordinated way, scaling up technology, increasing financing through blended models, and developing capacity. If we take these steps quickly and inclusively, Bangladesh can protect most of its coastal agriculture from climate change by 2040, ensure food for millions, and become a global leader in adapting to coastal climate change. We have a plan; now we need to find the political will, gather the necessary resources, and turn plans into action.

Output 9c: White paper on climate-resilient strategies for coastal agriculture in Pakistan titled 'Securing the Harvest: A Vision for the Coastal Agriculture of Pakistan (2025-2040)'

Executive Summary

The coastline of Pakistan stretches for 990 kilometers along the Arabian Sea, supporting critical farming and fisheries livelihoods for more than 10 million individuals. This zone is under increasing stress from rapid sea-level rise, saltwater encroachment, and stronger cyclonic events. Within the Indus Delta, over 2.2 million acres of once-productive farmland have been abandoned as soil salinity surpassed 15 dS/m. This has forced 1.2 million people to relocate, threatening national food supplies and undermining economic resilience. Agricultural districts situated in Sindh (Thatta, Badin, Sujawal) and Balochistan (Lasbela, Gwadar) experience yield reductions of 40 to 50 percent under moderate salinity, highly variable freshwater flows worsened by upstream diversions, and localized sea-level rise of 1.1 to 2.7 millimeters annually.

The policy structure of Pakistan, based on the National Climate Change Policy of 2012, the Sindh Agriculture Policy for 2018-2030, and the forthcoming Coastal Aquaculture Strategy for 2025-2035, forms a strong platform for adaptation. Significant technological advances demonstrate promise: salt-tolerant rice lines that retain 70 percent yield under 12 dS/m salinity, barley producing 2,000 kilograms per hectare at 15 dS/m, precision irrigation that reduces water demand by up to 40 percent, and integrated rice-fish or shrimp-rice systems that enhance system productivity by 35 percent. These approaches deliver strong financial returns, with benefit-cost ratios ranging from 2:1 to 5:1. Institutions such as the Nuclear Institute for Agriculture and Biology together with provincial research stations are central to developing and distributing these innovations.

Despite strong economic incentives linked to the blue economy, which is valued at 100 billion US dollars, and transport efficiencies from CPEC infrastructure that reduce costs by nearly 30 percent, serious gaps in practice remain. Overlapping institutional responsibilities, very low funding for extension services at only 0.21 percent of agricultural GDP, and limited cooperation between federal, provincial, and local agencies restrict widespread adoption. Financing also falls short, with government adaptation budgets covering less than one-fifth of requirements and private sector contributions staying below 10 million US dollars per year.

A phased action plan for 2025 to 2040 is recommended. This involves establishing a National Coastal Agriculture Authority, expanding tailored interventions across Sindh and Balochistan, mobilizing one billion US dollars in blended financing, and deploying comprehensive monitoring and adaptive management systems. Key priorities are large-scale distribution of salt-tolerant seed, expansion of solar- powered drip irrigation, rehabilitation of karez networks, and creation of agro-processing clusters near Karachi and Gwadar. Strengthening provincial Coastal Agriculture Cells, formalizing inclusive multi- stakeholder governance mechanisms, and embedding gender-sensitive, community-based approaches will be essential to transform the coastal plains into resilient agricultural landscapes and secure livelihoods under the pressures of climate change.

Output 9d: White paper on climate-resilient strategies for coastal agriculture in Sri Lanka titled 'Mainstreaming Climate-Resilient Agricultural Policies into the National Framework in Sri Lanka'

Executive Summary

Sri Lanka's agricultural sector, vital for national food security and rural livelihoods, faces a severe and escalating threat from climate change. Increased frequency of extreme weather events, rising temperatures, and erratic rainfall patterns are already impacting crop yields, livestock productivity, and coastal fisheries, jeopardizing the nation's economic stability. Projections indicate potential yield reductions of 10-30% by 2050 across major crop zones without targeted adaptation measures, threatening food security, rural livelihoods, and economic stability. These impacts will intensify, potentially leading to significant GDP losses and

increased poverty. This white paper presents a comprehensive analysis and strategic framework to mainstream climate resilience into Sri Lanka's national agricultural policies. It synthesizes empirical research, policy reviews, and field-based insights to identify systemic barriers such as policy fragmentation, institutional capacity gaps, inadequate financing, and weak inter-agency coordination, which hinder effective climate-smart agriculture (CSA) adoption. Sri Lanka has developed a comprehensive suite of policies and strategies over the past four decades, including the National Adaptation Plan (2016-2025), the National Agriculture Policy (2021), and the recent Climate-Smart Agriculture Investment Plan (2024). While these policies are ambitious in their objectives, a critical and persistent gap between policy formulation and practical implementation renders them largely ineffective. This gap is not due to a lack of vision but to deep-seated, systemic challenges that consistently undermine progress. Our assessment identifies three core deficits hindering the mainstreaming of climate resilience:

Fragmented Governance and Institutional Weakness: Policies are often developed in silos, with insufficient coordination between key ministries (e.g., Agriculture, Environment, Irrigation) and a lack of integration between national and sub-national authorities. Many frameworks are outdated and do not reflect current climate science, while weak enforcement of existing regulations, such as environmental safeguards, allows for continued degradation.

Inadequate Resources and Capacity: Chronic underfunding, insufficient resource allocation, and a lack of dedicated financial mechanisms are cited as major barriers across nearly every relevant policy. This is compounded by limited technical capacity at both institutional and local levels, along with under-resourced extension services that fail to deliver climate-smart technologies and practices to farmers.

Limited Community Engagement and Adoption: The top-down nature of policy implementation often excludes the very communities it aims to support. Smallholder farmers, women, and marginalized groups have limited involvement in planning processes. Furthermore, high costs, a lack of awareness, complex claim procedures for support systems like insurance, and a lack of trust create significant barriers to the widespread adoption of resilient practices at the farm level. The real-world consequences are severe, manifesting as lost fishing grounds, saltwater intrusion in farmlands, and heightened conflict over resources. To bridge this critical policy-practice gap, this white paper advocates for a strategic shift from policy creation to a focus on a cohesive implementation architecture. The path forward requires a three-pronged approach: strengthening integrated governance through a high-level national steering committee; mobilizing blended finance and building human capacity through a dedicated climate fund and enhanced farmer-centric advisory services; and fostering inclusive, community-led adaptation that empowers local actors and integrates traditional knowledge. By focusing on these core pillars, Sri Lanka can move beyond paper-based strategies and build a truly resilient agricultural future.

Output 10: Abstract of 1 scientific paper titled 'Agriculture and climate: Analysing existing policy lacunae in the Sundarban region of India and Bangladesh'

Abstract

Vulnerable as well as biologically diverse ecosystems usually attract significant attention from policy-makers, who derive heavily from published research on various issues affecting these regions to draft optimal policies. However, observations by researchers from various parts of the world often indicate the existence of considerable gaps between the two. Keeping this background in mind, the authors of the present paper attempted to identify the existing gaps between published research and prevailing policies on climate-resilient agriculture in the Sundarban region spanning across India and Bangladesh, the largest mangrove ecosystem in the world. Since the Sundarban region, which supports the livelihoods of a sizable section of the population in both countries, has become increasingly fragile amidst the ongoing widespread climate- change scenario, this particular research becomes vital. A combination of quantitative methods and analytical reviews of existing literature was employed to fulfill the objective of this research. Two sets of exclusive keywords, six each for and against climate-resilient agriculture were identified for the gap analysis. To further

enhance the study, the inter-relationships between climatic events and policies were also assessed. The results obtained revealed the presence of conspicuous gaps with respect to the pro-climate- resilient agricultural policies in both countries. Furthermore, the existing policies in both countries were found to suffer from implementation related problems like inefficient inter-departmental co-ordination and lack of community involvement. The authors recommended a participatory policy-making approach and focus on long-term environmental sustainability to address these deficiencies.

Keywords: Coastal ecosystems**,** Climate change implications, Climate-resilient agriculture, Participatory policy-making, Policy-research gap, Sundarban mangrove ecosystem**.**

Output 11: Description of the video

Summary

The video titled *From Policy to Practice - The ESPAR Journey*, showcases how research and collaboration turn climate challenges into action. It follows the efforts of the ESPAR project to bridge the gaps between agricultural policy and ground realities across the selected parts of South Asia, connecting scientists, policymakers, and farmers to build climate-resilient farming systems and sustainable livelihoods.

Output 12: A dedicated project website (https://www.apnespar.com/index.html)

Summary

The website is a dedicated project portal that presents the ESPAR initiative through a clear and user-friendly layout. It organises content into concise sections such as About, Current Scenario, Activities, and Impacts, allowing visitors to understand the objectives of the project and its progress easily. Visual elements, accessible navigation, and sections on courses, gallery, and team strengthen its communicative value and outreach. Overall, the website functions as an informative platform designed and highlight the efforts of the project towards climate-resilient agriculture and engage stakeholders even beyond the project duration.

Output 13: Media and popular science publications

Summary

The impact of climate on Sundarban. (2024, August 6). DW. Retrieved from https://www.dw.com/bn/%E0%A6%B8%E0%A7%81%E0%A6%A8%E0%A7%8D%E0%A6%A6%E0%A6%B0%E0%A6%AC%E0%A6%A8%E0%A7%87%E0%A6%B0-%E0%A6%89%E0%A6%AA%E0%A6%B0-%E0%A6%9C%E0%A6%B2%E0%A6%AC%E0%A6%BE%E0%A7%9F%E0%A7%81-%E0%A6%AA%E0%A6%B0%E0%A6%BF%E0%A6%AC%E0%A6%B0%E0%A7%8D%E0%A6%A4%E0%A6%A8%E0%A7%87%E0%A6%B0-%E0%A6%AA%E0%A7%8D%E0%A6%B0%E0%A6%AD%E0%A6%BE%E0%A6%AC/video-69863474?maca=bn-Whatsapp-sharing

In the first publication, Dr. Dipayan Dey, the founder trustee of SAFE , was interviewed during a workshop organized by SAFE in collaboration with PFRI with funding from APN in Kolkata, India on 19th July 2024 for this particular project. He disclosed that the workshop with government officials, environmental experts and farmers from the Indian Sundarban aimed to highlight the role of existing agricultural policies in the lives of the inhabitants of the Indian Sundarban. He added that community involvement in such policy-making was crucial for achieving socio-ecological sustainability there. Furthermore, one of the government officials attending the workshop explained that crops requiring less water ought to be cultivated to achieve climate-resilience in the Indian Sundarban.

Anandabazar Online Desk. (2024, August 16). Several varieties of small fish are disappearing, scientists are blaming pollution. Anandabazar Patrika Online. Retrieved from https://www.anandabazar.com/lifestyle/how-does-global-climate-change-and-pollution-affect-the-sundarbans-dgtl/cid/1538708

The article discussed the outcomes from a workshop organized by SAFE in collaboration with PFRI with funding from APN in Kolkata, India on 19th July 2024 for this particular project. It highlighted the significant environmental degradation occurring in the Indian Sundarban, which was not just a haven for wildlife but home to millions of people who depended on its natural resources and tourism. Climate change, pollution, and human interventions were disrupting this delicate ecosystem incessantly. Forests were being cleared for settlements, and rivers as well as agricultural lands were getting increasingly contaminated. Local fish species, once abundant, were now dwindling due to pollutants from industries, chemicals from farming, and saltwater intrusion from frequent cyclones such as the Aila and the Amphan. This had damaged both the livelihoods and health of local communities, especially women and children, who often suffered from skin infections after catching fish and crabs in polluted waters. The participating government officials and environmental experts suggested holistic solutions, including reviving small-scale fisheries in village ponds and introducing "pocket bheris" (pocket aquaculture farms) for mixed aquaculture with rice paddies, shrimp farming in saline areas, and even poultry, as ducks could boost oxygen levels in water and fertilize fish. Tackling plastic pollution was also considered essential, as tourism left the islands littered with plastic waste. Furthermore, reinforcing river embankments could prevent seawater from flooding farmlands, which, in turn, would improve the productivity of both agriculture and fishing.

Dey Sarkar, G. (2024, August 21). Will the Sundarban survive without community-oriented policies? What steps must be taken to protect the Sundarban? Ei Samay. 10. Retrieved from https://epaper.timesgroup.com/eisamay/archives

In an interview with Mr. Gopi Dey Sarkar, Dr. Dipayan Dey, the founder trustee of SAFE, highlighted the multifaceted issues facing the Sundarban, focusing on both environmental degradation and the livelihood challenges of the local population. He emphasised upon the resilience of the inhabitants of the Indian Sundarban who lived under constant threat from the fragile environment of their habitat. According to him, it was essential to review the responsibility of policy makers in this context. Measures taken by SAFE such as sustainable livelihood enhancement of the inhabitants through climate-resilient agricultural techniques, mangrove and indigenous crop species conservation, popularising solar power to reduce pollution, and improving local education as well as awareness would boost socio-ecological resilience in the Indian Sundarban. He further revealed that a workshop was organized with government officials, environmental experts and farmers from the Indian Sundarban in this regard by SAFE in collaboration with PFRI in Kolkata, India on 19th July 2024. Funded by the APN, this workshop was a part of this particular project.

Harvest on the Edge: Securing South Asia's Food Future through Coastal Agriculture

(Submitted to **Progyan Communique: The Triannual Newsletter of Progyan Foundation for Research and Innovation - ISSN: 3107-5916**)

Along the long coastline of South Asia, from the Indus delta to the Sundarban and the Sri Lankan lagoons, farmers were fighting a slow and silent battle against the sea. Rising tides, creeping salinity, and furious cyclones were redrawing the boundaries of survival for millions who have long depended on coastal agriculture. Yet, amid this climate assault, stories of remarkable resilience were taking root. In the Indian Sundarban, 54 forgotten salt-tolerant rice varieties were being revived, defying brine and storm to yield life where modern hybrids might fail. Women's groups were turning floodwaters into fields through floating farms that grew vegetables and fish atop rafts of straw and bamboo. Across the deltas, mangrove-integrated aquaculture, rice-fish farming, and seaweed cultivation were reimagining livelihoods while healing ecosystems. This article journeyed through these living laboratories of change where science met tradition, and innovation was born from necessity. Supported by satellite mapping, local knowledge, and forward-looking policies like the Delta Plan 2100 of Bangladesh, these efforts revealed a powerful truth- resilience

could be cultivated. South Asian coastal farmers were not passive victims of climate change, they were pioneers of adaptation, showing the world how to farm on the edge and thrive. Their struggle and ingenuity illuminated a hopeful path forward- from the frontlines of crisis to the forefront of a climate-resilient food future.

South Asian Forum for Environment (SAFE)

Multistakeholder Webinar on 'Policy Comprehension to Mainstream Climate Resilient Agro-farming Practices in India, Bangladesh, Pakistan, and Sri Lanka' (India- Online Workshop 1)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 16 July 2024

Time: 2:00 pm - 4:00 pm

Participants:

S. No	Name	Affiliation
1.	Professor Dr. Md. Giashuddin Miah	Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh
2.	Prof. Sanjay Deshmukh	University of Mumbai, India
3.	Dr. Lahiru Udayanga	Wayamba University of Sri Lanka
4.	Dr. Upul Rathnayka	Principal Agriculture Officer Agriculture Department, Sri Lanka
5.	Dr. Muhammad Ali	NesPak, Lahore, Pakistan
6.	Md. Sharif Iqbal	National Agriculture Training Academy (NATA), Gazipur, Ministry of Agriculture, Bangladesh
7.	Md. Shahinul Islam	Department of Agriculture Extension (DAE), Khamarbari, Dhaka, Ministry of Agriculture, Bangladesh
8.	Md. Hafiz Hasan Shohag	Department of Agriculture Extension (DAE), Faridpur Region, Ministry of Agriculture, Bangladesh
9.	Engr. Md. Shahadat Hossain	Onushandhani Creeds Ltd. (O. Creeds), Bangladesh
10.	Dr. Dipnarayan Ganguly	NCSCM, MoEF & CC, GOI, India
11.	Dr. Dhiman Burman	Central Soil Salinity Research Institute, Regional Research Station, Canning, West Bengal, India
12.	Dr. Himangana Gupta	UN University, Japan
13.	Ms. Melina Khanal	Onushandhani Creeds Ltd. (O. Creeds), Kathmandu, Nepal.
14.	Dr. Md Farhadur Rahman	Bangabandhu Sheikh Mujibur Rahman Agricultural University, Gazipur, Bangladesh
15.	Dr. Zubaria Andlib	Department of Economics, FUUAST, Islamabad, Pakistan
16.	Mrs. Kaluthanthiri Patabendi Sepali Darshika De Silva	Ministry of Environment, Sri Lanka
17.	Mr. Iruviman Virajith Kuruppu	Department of Agribusiness Management, Faculty of Agriculture & Plantation Management, Wayamba University of Sri Lanka
18.	Dr. Tanuja Aryananda	Lanka Rainwater Harvesting Forum, Sri Lanka

19.	Ms. Dhanushi Senanayake	Lanka Rainwater Harvesting Forum, Sri Lanka
20.	Engr. Md. Shahadat Hossain	Onushandhani Creeds Ltd. (O. Creeds), Bangladesh
21.	Dr. Dipayan Dey	SAFE, India
22.	Dr. Malancha Dey	SAFE, India
23.	Dr. Chandreyi Sengupta	SAFE, India
24.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
25.	Dr. Soumik Sarkar	PFRI, India
26.	Dr. Asit Kumar Roy	PFRI, India
27.	Ms. Uma Paul	PFRI, India
28.	Ms. Shreya Ghosh	PFRI, India
29.	Ms. Trisha Panda	SAFE, India
30.	Mr. Soham Ghosh	SAFE, India
31.	Mr. Biswajit Mondal	SAFE, India
32.	Ms. Sayoni Chakraborty	SAFE, India

Key Findings

i. Agriculture in South Asia remains highly vulnerable due to outdated practices, fragmented landholdings, and inadequate policy support, with limited alignment between policies and ground realities.
ii. Climate-smart agriculture (CSA) was emphasized across countries, particularly for saline, drought-prone, and flood-prone regions, but adoption remains low due to financing and awareness gaps.
iii. There is an urgent need for crop diversification beyond rice, development of resilient crop varieties, and adoption of precision agriculture suited to resource-poor farmers.
iv. Digital agriculture tools (AI, drones, early warning systems) and agro-meteorological forecasting can reduce risk but require stronger institutional and financial backing.
v. Coastal and mangrove ecosystems were highlighted as critical buffers against climate change. Integrating mangrove genetics with agrarian systems can enhance resilience and biodiversity.
vi. Sri Lanka faces increasing droughts, floods, and climatic shifts, with monsoon variability threatening cultivated areas, especially dry zones. CSA adoption is challenged by funding gaps, poor coordination, and lack of youth interest in farming.
vii. Pakistan's agriculture suffers from stubble burning, weak CSA implementation, poor markets, and inadequate institutional coordination, despite policy frameworks being in place.
viii. India faces major knowledge dissemination gaps- farmers lack access to CSA research data, extension services, and farmer field schools; NGOs could play a stronger role in outreach.
ix. Overlapping policies and fragmented institutions across all four countries reduce efficiency and coherence in agricultural resilience efforts.
x. Gender-sensitive policies are still underdeveloped. Greater participation of women in CSA is essential, alongside measures to protect farmers' assets (wealth, livestock) during disasters.

xi. Long-term CSA adoption is hindered because many interventions are short-term projects rather than embedded in national programmes with sustainable funding.

xii. International perspectives stressed the need for a bottom-up approach, stronger multi-sectoral and inter-ministerial coordination, and ensuring that finance reaches grassroots farmers.

xiii. Climate-smart villages and cluster models were proposed as practical pilots for scaling CSA in India and beyond.

xiv. Regional collaboration, partnerships between researchers, policymakers, and local communities, and knowledge-sharing platforms are critical to bridge policy-practice gaps.

xv. Overall, there is consensus on the needs of South Asia for integrated, climate-smart, and community-driven strategies, supported by financing, technology, and institutional reforms, to mainstream climate-resilient agro-farming practices.

South Asian Forum for Environment (SAFE)

Multistakeholder Workshop on 'Policy Comprehension to Mainstream Climate Resilient Agro-farming Practices in the Indian Sundarban' (India- Onsite Workshop)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 19 July 2024

Time: 9:30 am - 2:30 pm

Venue: Hotel De Sovrani, Bidhannagar, Kolkata, India

Participants:

S. No	Name	Affiliation
1.	Shri Arunangshu Chattoraj	Sundarban Development Board, West Bengal
2.	Mohammad Zahid	Sundarban Development Board, West Bengal
3.	Dr. Timirbaran Mandal	Sundarban Development Board, West Bengal
4.	Smt. Mahua Das	Sundarban Development Board, West Bengal
5.	Shri Sabyasachi Banerjee	Assistant Director of Fisheries, South 24 Parganas, GoWB
6.	Shri Ritesh Kundu	Assistant Director of Agriculture, Gosaba C.D. block, GoWB
7.	Dr. Archan Kanti Das	OAPM Division, ICAR-Central Inland Fisheries Research Institute (CIFRI)
8.	Dr Basudeb Dutta	Block Livestock Development Officer, Kultali C.D. Block
9.	Shri Sourav Paria	Assistant Director of Agriculture, Kultali C.D. Block
10.	Smt. Rita Saha	Central Pollution Control Board
11.	Smt. Jyotsna Haldar	Gram Pradhan, Maipith-Baikunthapur, Kultali C.D. block
12.	Shri Sankar Das	Gram Upopradhan, Maipith Baikunthapur, Kultali C.D. block
13.	Shri Mukta Ram Sardar	Field Researcher, PFRI
14.	Shri Jalad Kumar Gayen	Field Researcher, PFRI
15.	Shri Badal Mondal	Field Researcher, PFRI
16.	Ms. Melina Khanal	Onushandhani Creeds Ltd. (O. Creeds), Kathmandu, Nepal.
17.	Mr. Iruviman Virajith Kuruppu	Department of Agribusiness Management, Faculty of Agriculture & Plantation Management, Wayamba University of Sri Lanka
18.	Dr. Dipayan Dey	SAFE, India
19.	Dr. Malancha Dey	SAFE, India
20.	Dr. Chandreyi Sengupta	SAFE, India
21.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
22.	Dr. Soumik Sarkar	PFRI, India

23.	Dr. Asit Kumar Roy	PFRI, India
24.	Ms. Uma Paul	PFRI, India
25.	Ms. Shreya Ghosh	PFRI, India
26.	Ms. Dittakavi Kalyana Hyma Sudha	IITM, India
27.	Mr. Soham Ghosh	SAFE, India
28.	Mr. Biswajit Mondal	SAFE, India
29.	Shri Gopi Dey Sarkar	Journalist, Ei Samay
30.	Smt. Chaitali Chakraborty	Journalist, Ananda Bazar
31.	Subrata Goswami	Journalist, DW

Key Findings

i. The Indian Sundarban faces severe livelihood vulnerability from shoreline shifts, deforestation, salinity intrusion, climate oscillations (IOD, ENSO), and population pressure.
ii. Agriculture is highly stressed- most surface water is saline, groundwater is overexploited, and only 25–28% of land is multi-cropped though over 80% depend on agriculture.
iii. Land fragmentation (average household size of 6 members) and excess labour availability have made farming increasingly unprofitable.
iv. The interventions of the Sundarban Development Board (SDB) include rainwater harvesting ponds, zero-line cultivation, integrated farming (paddy–fish, duck–fish, poultry–fish), sluice management, crop mechanization (threshers), elephant foot yam distribution, and organic fertilizers.
v. Calls for reviving indigenous crops and landraces, alongside promoting organic farming, vermicompost, and climate-resilient crops like millets, moong, sesame, mustard, and sunflower.
vi. Fisheries and aquaculture are vital- paddy-cum-fish systems, brackish water aquaculture, freshwater ponds, and canal fisheries. The livelihoods of women may be expanded via fish feed making, pickling, poultry, and livestock (Black Bengal goats, turkeys, Garole sheep).
vii. Concerns raised on biodiversity loss from government interventions, tourism, and forest destruction; revival of wild agriculture and soil/biological monitoring recommended.
viii. Climate change has increased pests, diseases, and animal health issues; promotion of climate-resilient livestock breeds and green fodder cultivation is required.
ix. Policies remain relief-oriented rather than resilience-focused; institutional overlaps and lack of long-term planning hinder progress.
x. Awareness-building, training, and farmer producer clusters (FPCs) are necessary to promote sustainable adoption of CSA practices.
xi. Market-led extension and value addition in farm/fish products are crucial to strengthen market chains and improve farmer incomes.
xii. Women empowerment through cooperatives like Sundarini Naturals has shown promise (processing dairy, rice, oil, pulses), but needs scaling up.
xiii. Local governance initiatives (solid waste management, vermicompost creation, separation of biodegradable/non-biodegradable waste) point to grassroots environmental consciousness.
xiv. Overall, there is consensus on the need for convergence between government and NGOs, better policy–practice coherence, and knowledge-based vulnerability ranking to avoid overlaps.

xv. In conclusion, despite rich resources, the Indian Sundarban lacks a balanced policy framework. Therefore, collaborative, climate-smart, and integrated strategies are urgently needed.

South Asian Forum for Environment (SAFE)

Multistakeholder Workshop on 'Policy Comprehension to Mainstream Climate Resilient Agro-farming Practices in Sri Lanka' (Sri Lanka- Onsite Workshop)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 8 August 2024

Time: 9:30 am - 1:30 pm

Venue: Rain Centre, Lanka Rain Water Harvesting Forum, Pelawatta, Sri Lanka

Participants:

S. No	Name	Affiliation
1.	Ms. Chamani Kumarasinghe	Climate ChangeSecretariat, Sri Lanka
2.	Dr. A. G. Chandrapala	Department of Agriculture, Sri Lanka
3.	Dr. Priyanie Amerasinghe	IWMI Sri Lanka (Global headquarters)
4.	Dr Tanuja Ariyananda	Lanka Rainwater Harvesting Forum
5.	Dr. Lahiru Udayanga	Department of Biosystems Engineering Wayamba University of Sri Lanka
6.	Prof. (Ms.) Prashanthi Narangoda	National Center for Advanced Studies in Humanities and Social Sciences, Sri Lanka
7.	Dr. Menuka Udugama	Department of Agribusiness Management, Wayamba University of Sri Lanka
8.	Ms. Nilmini Ranasinghe	Biodiversity Secretariat, MOE, Sri Lanka
9.	Mr. Nimal Gunasena	Former Project Director, Rehabilitation of Degraded Agricultural Lands in the Central Highlands, Sri Lanka
10.	Ms. Nilmini Wickramarachchi	Natural Resources Management, MOE, Sri Lanka
11.	Ms. Shamali Priyanthie	MOE, Sri Lanka
12.	Mr. Ranjith Rajapaksha	Education & Awareness, MOE, Sri Lanka
13.	Ms. Himali De Costa	Land Resources, MOE, Sri Lanka
14.	Ms. Dhanushi Senanayake	South Asia Rainwater Network (SARNET), Sri Lanka
15.	Dr. Zubaria Andlib	Department of Economics, FUUAST, Islamabad, Pakistan
16.	Engr. Md. Shahadat Hossain	Onushandhani Creeds Ltd. (O. Creeds), Bangladesh
17.	Ms. Melina Khanal	Onushandhani Creeds Ltd. (O. Creeds), Bangladesh Kathmandu, Nepal.

18.	Ms. Modeeka Thilakarathna	MOE, Sri Lanka
19.	Ms. Chanchala Jayathilaka	Lanka Rainwater Harvesting Forum
20.	Mr. Rajith Kakillarachi	Lanka Rainwater Harvesting Forum
21.	Ms. Anne Benadict	Lanka Rainwater Harvesting Forum
22.	Ms. Sithara Kumarasinghe	Lanka Rainwater Harvesting Forum
23.	Mr. Rudra Vijendram	Lanka Rainwater Harvesting Forum
24.	Mrs. Kaluthanthiri Patabendi Sepali Darshika De Silva	Ministry of Environment, Sri Lanka
25.	Mr. Iruviman Virajith Kuruppu	Department of Agribusiness Management, Faculty of Agriculture & Plantation Management, Wayamba University of Sri Lanka
26.	Dr. Malancha Dey	SAFE, India
27.	Dr. Chandreyi Sengupta	SAFE, India
28.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
29.	Dr. Soumik Sarkar	PFRI, India
30.	Dr. Asit Kumar Roy	PFRI, India
31.	Mr. Abhay Das	PFRI, India
32.	Ms. Shreya Ghosh	PFRI, India
33.	Mr. Shahabuddin Mughal	Online Participant
34.	Md. Atiqur Rahman Mollick	Onushandhani Creeds LTD. (O. CREEDS), Bangladesh
35.	Dr. Sunil Babu Shrestha	Former VC, National Academy of Science and Technology, Nepal
36.	Mr. Iswar Man Amatya	IOE, Tribhubhan University, Nepal
37.	Mr. Kailash Sharma	Diyalo Technology, Nepal

Key Findings

i. Sri Lankan agriculture is deeply climate-vulnerable- droughts, floods, landslides, salinization, and sea level rise affect different zones (wet zone- flooding, dry zone- drought, coastal zone- erosion).
ii. The country has a rich genetic diversity (indigenous rice, yams, bananas) that needs conservation alongside promotion of traditional knowledge.
iii. Despite several existing policies (e.g., National Adaptation Plan, NDC implementation plan 2021–2030), the biggest gap is ground-level implementation and poor dissemination to farmers.
iv. Water scarcity and mismanagement are identified as central challenges- rainwater harvesting, recharge ponds, percolation pits, and agro-wells are vital solutions.
v. Rainwater harvesting has proven effective (post-Tsunami saline intrusion, roof recharge systems, lined ponds), but awareness, cost, and maintenance remain barriers.

vi. Food security and nutrition policies exist, but Sri Lanka lacks a dedicated food security policy; post-harvest loss management and stronger value chains are needed.

vii. Farmers often resist CSA practices when traditional ones remain more profitable; economic incentives, subsidies, and agri-business promotion are required to encourage adoption.

viii. Youth disengagement from agriculture was flagged as a critical concern- policies must make agriculture attractive and profitable.

ix. Biodiversity Secretariat priorities- managing invasive species, restoring 30% of degraded land, protecting 30% of land area, and conserving mangroves with scientific restoration.

x. Extension services and advisory systems are weak but crucial- farmers need access to agro-met advisories, pest management training, and localized climate information.

xi. A bottom-up, community-driven approach is essential- farmers' innovations, local adaptations, and place-based models must feed into policy.

xii. Digital tools (GIS, drones, AI, crop imaging) can support damage assessments, water management, and targeted interventions, as demonstrated in pilot projects in Bangladesh and elsewhere.

xiii. Regional collaboration across South Asia (India, Nepal, Bangladesh, Pakistan, Sri Lanka) was strongly emphasized for shared learning, watershed management, and crop diversification.

xiv. Nature-based solutions and agroecology (multi-crop models, home garden diversity, soil conservation, organic carrots in Kalpitiya) can offer context-specific pathways.

xv. Clear, feasible, and cross-sectoral climate-resilient agricultural policies in Sri Lanka, supported by financing, monitoring frameworks, community-based organizations, and strong coordination between public and private stakeholders, are the needs of the hour.

Multistakeholder Webinar on 'Policy Gap in Implementing Climate Smart Agriculture in Coastal Areas of Bangladesh (Bangladesh- Online Workshop 1)

Organized by: Bangabandhu Sheikh Mujibur Rahman Agricultural University (BSMRAU), Bangladesh & South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 26 September 2024

Time: 2:30 pm - 4:30 pm

Participants:

S. No	Name	Affiliation
1.	Dr. Md Farhadur Rahman	BSMRAU, Gazipur, Bangladesh
2.	Dr. M. Abdul Karim	Department of Agronomy, BSMRAU Gazipur, Bangladesh
3.	Dr. Md. Kamrul Hasan	Department of Agricultural Extension and Rural Development, PSTU
4.	Mr. Gazi Muhammad Abdullah Mahdi	Agricultural Business Development, Mpower Social Enterprises Ltd.
5.	Atikur Rahman Mollick	O. CREED, Bangladesh
6.	Khalid Hasan Milu	BSMRAU, Bangladesh
7.	Mahfuzul Islam	BSMRAU, Bangladesh
8.	Tarun Khan	BSMRAU, Bangladesh
9.	Dr. Zubaria Andlib	Department of Economics, FUUAST, Islamabad, Pakistan
10.	Dr. Dipayan Dey	SAFE, India
11.	Dr. Malancha Dey	SAFE, India
12.	Dr. Chandreyi Sengupta	SAFE, India
13.	Dr. Anindita Das	PFRI, India
14.	Dr. Soumik Sarkar	PFRI, India

Key Findings

i. The coastal agriculture of Bangladesh is highly vulnerable to salinity, water scarcity, rainfall variability, and sea-level rise, requiring localized adaptation strategies.
ii. Significant research exists at universities, but micro-level differences in coastal farming and farmer perspectives are not adequately addressed.
iii. Farmers often reject premature or immature technologies; local acceptance depends on ecological suitability and demonstrated returns.
iv. Policies are flexible but implementation at ground level is weak, mainly due to poor coordination between government, academia, and farmers.
v. Indigenous knowledge of farmers is valuable and should be integrated into policy and practice.
vi. Research shows salinity impacts vary geographically (e.g., Satkhira more affected than Chittagong); land reclamation takes 10–15 years in saline areas.

vii. Farmers are experimenting with local adaptive technologies but face barriers in accessing insurance and institutional support.
viii. Policies often fail to consider interdisciplinary inputs (hydrology, agronomy, agricultural engineering) and lack open-access databases for wider use.
ix. Farmers respond primarily to economic incentives and food security needs- CSA tools must highlight tangible livelihood benefits.
x. Lack of follow-up after introducing new technologies reduces adoption; digitized databases of available technologies need to be farmer-accessible.
xi. Disease infestations and pest risks are climate-dependent, but forecasting and communication to farmers are weak.
xii. Smart technologies (like digital platforms, AI, drones) exist but are underutilized due to gaps in awareness, accessibility, and trust.
xiii. Float farming was highlighted as a successful indigenous CSA practice (revived in Bangladesh and Indian Sundarban) that should be scaled up.
xiv. Collaboration across South Asian countries is essential, including a shared metadata platform for eco-region data to improve policy and practice alignment.
xv. Overall, there is consensus that bridging the policy–practice gap requires bottom-up participatory planning, stronger institutional convergence, and farmer-inclusive technology adoption.

South Asian Forum for Environment (SAFE)

Multistakeholder Webinar on 'Agricultural Policy-Practice Gap Assessment in the Haor Ecology of Bangladesh (Bangladesh- Online Workshop 2)

Organized by: South Asian Forum for Environment (SAFE), India in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 29 September 2024

Time: 5:30 pm - 7:30 pm

Participants:

S. No	Name	Affiliation
1.	Dr. Mohammad Kamruzzaman	Bangladesh Rice Research Institute Gazipur, Bangladesh
2.	Dr. Afshana Parven Shahid	Noakhali Science and Technology University Bangladesh
3.	Mr. Mohammad Shawkat Ali	Development Technical Consultants Pvt. Ltd. (DTCL) Bangladesh Urban Resilience Project, Bangladesh
4.	Engr. Md. Shahadat Hossain	Onushandhani Creeds Ltd. (O. Creeds) Bangladesh
5.	Mr. Md. Atiqur Rahman Mollick	Onushandhani Creeds LTD. (O. CREEDS) Bangladesh
6.	Dr. Dipayan Dey	SAFE, India
7.	Dr. Malancha Dey	SAFE, India
8.	Dr. Chandreyi Sengupta	SAFE, India
9.	Dr. Soumik Sarkar	PFRI, India
10.	Ms. Uma Paul	PFRI, India
11.	Ms. Shreya Ghosh	PFRI, India

Key Findings

i. The Haor wetlands (2 million ha) are critical for Bangladesh, producing approximately 16.5% of national paddy, yet remain highly vulnerable to flash floods, heat stress, and cold spells.
ii. Boro rice dominates (90% of cultivation); however, reproductive stages (March–April) face extreme risk from heat waves and flash floods, causing crop sterility.
iii. National agriculture policies (2013, 2018) recommend flood-tolerant rice, but current needs require heat-tolerant varieties, showing a mismatch between policy and reality.
iv. Crop models and 15 global climate models reveal sterility in short-duration rice below 18°C and in long-duration rice above 35°C during reproductive phases.
v. Indigenous paddy varieties are more nutritious, resilient, and currently gaining market demand
vi. Agricultural productivity in Haor is much lower than national averages (cropping intensity 104% vs. 195% nationally).
vii. Livelihoods extend beyond crops to fisheries, duck rearing, honey collection, and seasonal tourism, but face ecological imbalance (e.g., snail depletion due to duck feeding).

viii. Development projects and climate change are worsening biodiversity loss, reducing water levels via siltation, and degrading bird habitats.

ix. The participation of women in resource planning and inventory remains limited, but is critical for inclusive adaptation.

x. The Haor Master Plan exists but is under-implemented; policies remain generalized and not region-specific.

xi. Key adaptation strategies include altering crop schedules, strengthening early warning systems, and improving drainage and water management.

xii. There is an urgent need for crop insurance policies, which are largely absent, to buffer farmer risks.

xiii. Coordination failures among agencies and lack of participatory policymaking undermine resilience-building.

xiv. Absence of a national wetland policy (in both Bangladesh and India) hampers integrated Haor management.

xv. Overall, there is consensus that adaptive, collaborative, and region-specific policies are essential, and must be backed by farmer capacity-building, cross-border data sharing (India–Bangladesh), and climate modelling for future planning.

South Asian Forum for Environment (SAFE)

Tidal Transformations: Building Climate-Adaptive Aquaculture Systems in the Indian Sundarbans (India – Online Workshop 2)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 4 November 2024

Time: 2:00 pm – 4:00 pm

Participants:

S. No	Name	Affiliation
1.	Mr. Pulak Priti Patra	Fisheries Extension Officer, Udaynarayanpur C.D. Block, Howrah
2.	Dr. Dipayan Dey	SAFE, India
3.	Dr. Malancha Dey	SAFE, India
4.	Dr. Chandreyi Sengupta	SAFE, India
5.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
6.	Dr. Soumik Sarkar	PFRI, India
7.	Ms. Uma Paul	PFRI, India
8.	Ms. Shreya Ghosh	PFRI, India
9.	Mr. Jalad Kumar Gayen	Local Farmer, India
10.	Mr. Badal Mondal	Local Farmer, India
11.	Mrs. Aprana Halder	Local Farmer, India
12.	Mrs. Jharna Mondol	Local Farmer, India

Key Findings

i. Salinity intrusion and temperature fluctuations are severely disrupting fish reproduction cycles, with native species demonstrating differential tolerance thresholds.
ii. Integrated Mangrove-Aquaculture Systems (IMAS) provide optimal climate resilience while maintaining economic viability through tidal nutrient cycling.
iii. Multi-stakeholder coordination remains fragmented despite successful pilot demonstrations, with policy gaps between forest, fisheries, and coastal management agencies limiting scalable implementation
iv. Climate-adaptive aquaculture systems sustain approximately 70% of traditional farm income while providing enhanced ecosystem services and storm protection benefits.
v. Species diversification toward euryhaline fish species like Scatophagus argus and Penaeus monodon offers resilience against unpredictable salinity fluctuations in deltaic conditions.

South Asian Forum for Environment (SAFE)

Understanding the prevailing policy scenario on canal system-based irrigation in Pakistan (Pakistan- Online Workshop 1)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 7 November 2024

Time: 3:30 pm – 5:30 pm

Participants:

S. No	Name	Affiliation
1.	Dr. Muhammad Ali	NesPak, Lahore, Pakistan
2.	Dr. Safdar A. Sohail	Pakistan Institute of Development Economics, Islamabad, Pakistan
3.	Dr. Dipayan Dey	SAFE, India
4.	Dr. Malancha Dey	SAFE, India
5.	Dr. Chandreyi Sengupta	SAFE, India
6.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
7.	Dr. Soumik Sarkar	PFRI, India
8.	Ms. Uma Paul	PFRI, India
9.	Ms. Shreya Ghosh	PFRI, India

Key Findings

i. Coastal farmers in Pakistan are facing serious water shortages caused by upstream diversions and thefts of 1,200 to 2,800 cusecs from main canals, leading to the abandonment of large areas of farmland.
ii. The canal delivery efficiency from head to root zone remains low at only 35 to 40 percent, resulting in high conveyance losses in coastal districts.
iii. Water Users Associations have stressed the urgent need for dependable drainage infrastructure in Thatta, Badin, and Sujawal to combat waterlogging and salinization intensified by tidal forces.
iv. There are enforcement gaps in the Sindh Water Management Ordinance regarding minimum downstream releases below Kotri Barrage, which are critical for controlling seawater intrusion.
v. Micro irrigation technologies like drip and sprinkler systems are still underutilized in coastal saline agriculture even though they can significantly reduce conveyance losses and improve crop resilience.
vi. Coastal areas lack coordinated emergency protocols to maintain canal flows during cyclones and storm surges, leaving farmers vulnerable during extreme events.
vii. Dual management by Area Water Boards and provincial irrigation departments has created fragmentation that weakens policy coherence in coastal command areas.
viii. Monitoring of water quality at canal heads and tail ends is insufficient for coastal conditions, making it difficult to manage salinity and saltwater intrusion effectively.
ix. Integration of skimming dug wells and managed aquifer recharge has been recommended to supplement canal supplies during dry periods and mitigate salinity in the coastal belt.

x. Regulations on cut and carry methods for fodder and field crops in water-scarce talukas may improve water use efficiency across the canal network.
xi. Subsidies for lining field channels and pump units near the Indus Delta may help reduce seepage losses and improve irrigation efficiency for coastal farmers.
xii. Strengthening the authority of Water Users Associations to manage local water allocation decisions in distributary systems has been identified as a key reform need.
xiii. Linking canal operation and maintenance budgets directly with abiana revenues may help ensure sustainable maintenance of irrigation infrastructure in coastal regions.
xiv. Provincial planners have proposed modernization of coastal canals through salinity-control gates and automation, taking lessons from successful projects in upstream command areas.
xv. Experts have called for a dedicated coastal irrigation task force to align the seawater intrusion control goals of the National Water Policy with ground-level irrigation practices.

South Asian Forum for Environment (SAFE)

Understanding the prevailing policy scenario on the preservation of local agro-biodiversity in coastal Pakistan with special reference to millet cultivation (Pakistan – Online Workshop 2)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 12 November 2024

Time: 4:00 pm – 6:00 pm

Participants:

S. No	Name	Affiliation
1.	Dr. Muhammad Ali	NesPak, Lahore, Pakistan
2.	Dr. Safdar A. Sohail	Pakistan Institute of Development Economics, Islamabad, Pakistan
3.	Engr. Md. Shahadat Hossain	Onushandhani Creeds Ltd. (O. Creeds) Bangladesh
4.	Mr. Md. Atiqur Rahman Mollick	Onushandhani Creeds Ltd. (O. Creeds) Bangladesh
5.	Dr. Dipayan Dey	SAFE, India
6.	Dr. Malancha Dey	SAFE, India
7.	Dr. Chandreyi Sengupta	SAFE, India
8.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
9.	Dr. Soumik Sarkar	PFRI, India
10.	Ms. Uma Paul	PFRI, India
11.	Ms. Shreya Ghosh	Administration and Field Officer, PFRI, India

Key Findings

i. Traditional millet cultivation has declined despite its high suitability for saline soils, creating an urgent need to revive local varieties historically grown in Thatta and Badin.
ii. The national gene bank of Pakistan holds extensive millet collections, but the distribution of coastal-adapted varieties for on-farm use remains limited.
iii. Lack of farmer training on the management of salt-tolerant millet varieties has been identified as a barrier, and field demonstrations are needed in coastal districts.
iv. Grain quality under coastal humidity varies widely, and the absence of standardized post-harvest processing methods leads to high spoilage rates.
v. Indigenous seed exchange networks that once sustained local millet diversity have eroded, reducing community access to coastal-adapted landraces.
vi. The Biodiversity Action Plan of Pakistan does not include specific measures for agro-biodiversity preservation within coastal socio-ecological production landscapes.
vii. There is a shortage of certified millet seeds suited to saline soils, which limits smallholder adoption and overall productivity in coastal areas.

viii. Female farmer groups are largely excluded from decision-making in millet trials, despite their traditional role in seed selection and preservation.

ix. Experts recommended integrating agro-biodiversity goals into coastal zone management policies alongside mangrove restoration and other ecosystem priorities.

x. Agricultural research and development institutions face budget limitations that hinder the creation of new millet varieties adapted to coastal conditions.

xi. Strengthening government support for millet value chains, including storage, processing, and branding, is emphasized to enhance market potential and farmer income.

xii. Mobile-based advisory systems are recommended to deliver climate-smart millet cultivation guidance to remote coastal farming and fishing communities.

xiii. Establishing coastal seed hubs to maintain and distribute traditional millet landraces is proposed to conserve genetic diversity at the village level.

xiv. The absence of fast-track release procedures for stress-tolerant crops has delayed the availability of improved millet varieties for coastal farmers.

xv. The creation of multi-stakeholder platforms that unite farmers, research institutions, and policymakers are proposed to co-develop coastal agro-biodiversity action plans aligned with national biodiversity strategies.

Coastal Inundation in Northern and Southern Sri Lanka: Policy, Activity, and Challenges (Sri Lanka- Online Workshop 1)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 15 November 2024

Time: 4:00 pm – 6:00 pm

Participants:

S. No	Name	Affiliation
1.	Dr. Priyanie Amerasinghe	IWMI, Sri Lanka (Global Headquarters)
2.	Dr Tanuja Ariyananda	Lanka Rainwater Harvesting Forum, Sri Lanka
3.	Ms. Dhanushi Senanayake	South Asia Rainwater Network (SARNET), Sri Lanka
4.	Mr. Md. Atiqur Rahman Mollick	Onushandhani Creeds Ltd. (O. Creeds) Bangladesh
5.	Dr. Dipayan Dey	Founder Trustee, SAFE, India Director, PFRI, India
6.	Dr. Malancha Dey	Senior Scientist, SAFE, India Director, PFRI, India
7.	Dr. Chandreyi Sengupta	Senior Research Officer, PFRI, India
8.	Dr. Bhaskar Deb Bhattacharya	Senior Research Officer, PFRI, India
9.	Dr. Soumik Sarkar	Senior Research Officer, PFRI, India
10.	Ms. Uma Paul	Research Assistant, PFRI, India
11.	Ms. Shreya Ghosh	Administration and Field Officer, PFRI, India

Key Findings

i. The North and South of Sri Lanka exhibit stark differences in implementing the 2024 Coastal Zone Management Plan (CZMP), particularly in funding, ecosystem restoration, and agricultural protection.
ii. The Northern coast, with its flat terrain and broad continental shelf, faces acute threats from erosion, storm surges, and saltwater intrusion, making it far more exposed than the South.
iii. Mangrove restoration, vegetative barriers, and shoreline stabilization are emphasized in both regions, but implementation intensity is higher in the North due to its expansive low-lying areas.
iv. Deployment of salt-tolerant rice varieties is limited in the North due to weak extension services and poor seed access, while the South benefits from better research linkages.
v. Shallow northern lagoons worsen inland salinity during dry spells, whereas steep southern slopes accelerate direct saline intrusion after storms.
vi. High-resolution LiDAR and SRTM-based elevation mapping is being employed to delineate risk zones and design site-specific mitigation plans.

vii. Northern Sri Lanka struggles to attract long-term investment for salinity barriers and drainage infrastructure, hindered by post-war constraints, weak institutional coordination, and lack of technical capacity.

viii. The South and Central regions benefit from donor-funded pilot projects in climate-smart aquaculture and rainwater harvesting, facilitated by stronger institutions and better documentation.

ix. Northern districts such as Mullaitivu have experienced massive paddy loss and displacement of over 5,000 families, with 69% of paddy lands underutilized due to recurring floods.

x. In the South, indirect economic pressures, like tourism expansion and road closures, cause agricultural losses through market disruption and land conversion rather than direct inundation.

xi. The NDCs (2024) prioritize drought-tolerant maize, organic tea cultivation, and water-efficient farming, supported by the Climate-Smart Agriculture Investment Plan and GCF-backed projects.

xii. CSA adoption is strengthened through partnerships between FAO, the Ministry of Environment, and local agencies to align policy, finance, and community-based implementation.

xiii. Coral mining in the Southwest severely accelerates coastal erosion and soil salinization, while sandbag barriers provide only temporary protection and disrupt natural sediment flow.

xiv. Projects like the Mannar bridge alter lagoon hydrology, raising salinity, stagnation, and nutrient loss in adjacent paddy and aquaculture zones.

xv. Flood and drought advisories remain ineffective due to weak communication, lack of localized content, institutional fragmentation, and community mistrust, limiting adaptive actions such as adjusted planting calendars or micro-irrigation adoption.

South Asian Forum for Environment (SAFE)

Role of international organizations in the coastal agriculture of Sri Lanka post political crisis (Sri Lanka- Online Workshop 2)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 27 November 2024

Time: 5:30 pm – 7:30 pm

Participants:

S. No	Name	Affiliation
1.	Dr. Priyanie Amerasinghe	IWMI, Sri Lanka (Global Headquarters)
2.	Dr Tanuja Ariyananda	Lanka Rainwater Harvesting Forum, Sri Lanka
3.	Ms. Dhanushi Senanayake	South Asia Rainwater Network (SARNET), Sri Lanka
4.	Mr. Md. Atiqur Rahman Mollick	Onushandhani Creeds Ltd. (O. Creeds) Bangladesh
5.	Engr. Md. Shahadat Hossain	Onushandhani Creeds Ltd. (O. Creeds) Bangladesh
6.	Dr. Dipayan Dey	Founder Trustee, SAFE, India Director, PFRI, India
7.	Dr. Malancha Dey	Senior Scientist, SAFE, India Director, PFRI, India
8.	Dr. Chandreyi Sengupta	Senior Research Officer, PFRI, India
9.	Dr. Bhaskar Deb Bhattacharya	Senior Research Officer, PFRI, India
10.	Dr. Soumik Sarkar	Senior Research Officer, PFRI, India
11.	Ms. Uma Paul	Research Assistant, PFRI, India
12.	Ms. Shreya Ghosh	Administration and Field Officer, PFRI, India

Key Findings

i. The Food and Agriculture Organization of the United Nations (FAO) played a major role in post-2010 livelihood rehabilitation by restoring boats, fishing gear, and fish landing centers in Northern coastal areas, helping fishing communities resume operations and strengthen food security.
ii. FAO established community-operated mini hatcheries and upgraded aquaculture centers to increase freshwater fish production, diversify diets, and enhance nutritional security in rural areas.
iii. The organization supported the re-cultivation of abandoned paddy lands and distributed quality seeds for paddy and other field crops, reviving agricultural productivity in post-conflict and resettled communities.
iv. FAO's coordination with national government agencies and international donors ensured alignment between immediate rehabilitation activities and long-term goals of sustainable resource management and food security resilience.
v. Lessons from FAO's post-2004 tsunami recovery highlighted the importance of participatory beneficiary consultations, masonry skill training, and self-reconstruction approaches that empowered communities to sustain rebuilding beyond short-term aid.

vi. The establishment of institutional mechanisms such as the Task Force for Rebuilding the Nation (TAFREN) enabled better coordination among government, donors, and implementing agencies - a model applicable to current and future economic recovery programs.

vii. Recovery programs emphasized the need for location-specific and scientifically informed methods, recognizing spatial variability in factors like soil salinity and flood impact instead of applying uniform, one-size-fits-all solutions.

viii. International organizations underscored that the abrupt nationwide ban on chemical fertilizers severely reduced yields, and recommended a gradual, phased conversion to organic farming that allows soil and farmers adequate time to adapt.

ix. Agencies prioritized farmer capacity building through extensive training in organic soil management, pest control, and crop rotation to strengthen knowledge and ensure effective organic transition.

x. To overcome shortages of certified organic fertilizers, international partners are supporting the development of local organic input production units, improved supply chains, and quality control mechanisms.

xi. Donor alignment with Sri Lankan coastal agricultural priorities remains constrained by national budget shortfalls (2024–2025), inadequate counterpart funding, and poor coordination among government departments and local communities.

xii. Programs led by organizations such as the ALMAYUDA Foundation and Rainforest Rescue International (RRI) have targeted war widows and displaced communities, providing seeds, training, and well-restoration assistance to promote subsistence farming and food security.

xiii. Initiatives by We Effect and Sudeesa (formerly known as the Small Fishers Federation of Lanka) fostered women's cooperatives, leadership training, and access to microloans, empowering female-headed households while integrating mangrove and coastal ecosystem conservation.

xiv. FAO's mangrove restoration and coral reef protection projects revealed that successful replication in Southern erosion-prone zones depends on correct site selection, ongoing technical monitoring, and strong community engagement to ensure long-term sustainability.

xv. Innovative financing mechanisms, such as Payments for Ecosystem Services (PES) frameworks, blue bonds for ocean and coastal conservation, biodiversity credit markets, and blended finance partnerships, are proposed to attract private investment, mobilize resources, and sustain coastal agriculture and ecosystem restoration.

South Asian Forum for Environment (SAFE)

Empowering Climate Champions: Building Farmer Resilience through Technology Transfer and Community Action in the Indian Sundarban (India- Online Workshop 1)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 10 February 2025

Time: 3:00 pm – 5:00 pm

Participants:

S. No	Name	Affiliation
1.	Smt. Jyotsna Haldar	Gram Pradhan, Maipith-Baikunthapur, Kultali C.D. block
2.	Shri Sankar Das	Gram Upopradhan, Local Farmer, Maipith Baikunthapur, Kultali C.D. block
3.	Shri Jalad Kumar Gayen	Local Farmer, India
4.	Shri Badal Mondal	Field Farmer, India
5.	Dr. Dipayan Dey	SAFE, India
6.	Dr. Malancha Dey	SAFE, India
7.	Dr. Chandreyi Sengupta	SAFE, India
8.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
9.	Dr. Soumik Sarkar	PFRI, India
10.	Ms. Shreya Ghosh	PFRI, India
11.	Mr. Samir Jana	Local farmer, India
12.	Mrs. Namita Das	Local farmer, India
13.	Mr. Bivas Mondal	Local farmer, India
14.	Mr. Dipak Jana	Local farmer, India
15.	Mrs. Pusphpa Mondol	Local farmer, India
16.	Mrs. Mouli Mondol	Local farmer, India

Key Outcomes

i. Practical approaches for strengthening farmer resilience in the Indian Sundarban are discussed with participation from local leaders, farmers, and experts.
ii. Experiences on coping with salinity intrusion, soil degradation, and changing rainfall patterns are exchanged, highlighting both traditional and scientific methods of adaptation.
iii. Demonstrations of drought and salt-tolerant crop varieties are conducted, and the effectiveness of participatory field trials is emphasized.
iv. The importance of peer learning and local demonstration sites is acknowledged as essential for improving technology adoption.
v. Village-level committees and farmer groups are recognized as key mechanisms for collective decision-making and dissemination of climate-resilient practices.

vi. The significance of gender-inclusive training is underlined, with emphasis placed on women's roles in enhancing household and community resilience.

vii. The requirement for continued digital literacy training is identified to enable effective use of mobile-based weather and market information tools.

viii. The workshop concludes with the consensus that sustained capacity building, community participation, and farmer-to-farmer knowledge exchange are vital for scaling up climate-resilient agriculture in the Sundarban region.

From Knowledge to Practice: Strengthening Farmer Capacity for Climate-Smart Agriculture Adoption in Bangladesh (Bangladesh- Online Workshop 1)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 8 April 2025

Time: 12:00 am – 2:00 pm

Participants:

S. No	Name	Affiliation
1.	Dr. Mohammad Kamruzzaman	Bangladesh Rice Research Institute Gazipur, Bangladesh
2.	Mr. Mohammad Shawkat Ali	Development Technical Consultants Pvt. Ltd. (DTCL) Bangladesh Urban Resilience Project, Bangladesh
3.	Engr. Md. Shahadat Hossain	Onushandhani Creeds Ltd. (O. Creeds) Bangladesh
4.	Mr. Md. Atiqur Rahman Mollick	Onushandhani Creeds LTD. (O. CREEDS) Bangladesh
5.	Dr. Dipayan Dey	SAFE, India
6.	Dr. Malancha Dey	SAFE, India
7.	Dr. Chandreyi Sengupta	SAFE, India
8.	Ms. Shreya Ghosh	PFRI, India
9.	Ms.Nasima Khatun	Local farmer, Bangladesh
10.	Ms. Rokeya Begum	Local farmer, Bangladesh
11.	Mr. Firoz Gazi	Local farmer, Bangladesh
12.	Mr. Alif Rahman	Local farmer, Bangladesh
13.	Mr. Abdur Rahim	Local farmer, Bangladesh
14.	Ms. Fatema Akter	Local farmer, Bangladesh
15.	Mr. Sabbir Hossain	Local farmer, Bangladesh
16.	Mrs. Taslima Khatun	Local farmer, Bangladesh
17.	Ms. Moushumi Parvin	Local farmer, Bangladesh
18.	Mr. Anisur Rahman	Local farmer, Bangladesh

Key Outcomes

i. Key challenges and opportunities in implementing climate-smart agriculture (CSA) in Bangladesh are reviewed through multi-stakeholder participation.
ii. Major barriers to CSA adoption, such as, limited access to resilient seeds, irrigation infrastructure, and financial resources, are identified.
iii. Examples of integrated farming systems, efficient water management, and digital advisory tools are presented by experts.

iv. The success of peer-to-peer learning networks in improving soil management and irrigation practices is acknowledged.
v. The need for enhanced digital literacy among farmers is highlighted.
vi. The growing role of women farmers in agricultural production is recognized, with emphasis on dedicated training for homestead farming, value addition, and income diversification.
vii. The expansion of community-based demonstration plots and mentoring initiatives is recommended to bridge the gap between awareness and practical adoption.
viii. The session concludes with an understanding that collaboration among farmers, extension agencies, and research institutions is essential for sustainable, climate-resilient livelihoods in Bangladesh.

Climate-Wise Farming: Enhancing Extension Services and Farmer Preparedness in the Face of Change in Sri Lanka (Sri Lanka- Online Workshop 1)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 12 May 2025

Time: 12:00 am – 2:00 pm

Participants:

S. No	Name	Affiliation
1.	Dr. Priyanie Amerasinghe	IWMI, Sri Lanka (Global Headquarters)
2.	Dr Tanuja Ariyananda	Lanka Rainwater Harvesting Forum, Sri Lanka
3.	Ms. Dhanushi Senanayake	South Asia Rainwater Network (SARNET), Sri Lanka
4.	Mr. Md. Atiqur Rahman Mollick	Onushandhani Creeds Ltd. (O. Creeds) Bangladesh
5.	Dr. Dipayan Dey	Founder Trustee, SAFE, India Director, PFRI, India
6.	Dr. Malancha Dey	Senior Scientist, SAFE, India Director, PFRI, India
7.	Dr. Chandreyi Sengupta	Senior Research Officer, PFRI, India
8.	Dr. Bhaskar Deb Bhattacharya	Senior Research Officer, PFRI, India
9.	Ms. Shreya Ghosh	Administration and Field Officer, PFRI, India
10.	Amila Silva	Local farmer, Sri Lanka
11.	Mr. Lahiru Dissanayake	Local farmer, Sri Lanka
12.	Mr. Roshan de Silva	Local farmer, Sri Lanka
13.	Mr. Gayan Fernando	Local farmer, Sri Lanka
14.	Mr. Saman Kumara	Local farmer, Sri Lanka
15.	Ms. Fathima Nazeema	Local farmer, Sri Lanka
16.	Ms. Indrani Bandara	Local farmer, Sri Lanka
17.	Ms. Malani Perera	Local farmer, Sri Lanka
18.	Ms. Rizana Farook	Local farmer, Sri Lanka
19.	Ms. Shafika Niyas	Local farmer, Sri Lanka

Key Findings

i. Strategies for improving extension outreach and farmer preparedness under climate variability are reviewed with contributions from scientists, practitioners, and extension officers.
ii. Limitations in infrastructure, transport, and technical manpower are identified as major constraints in reaching smallholder farmers in remote and drought-prone areas.
iii. Participatory learning models linking extension services with community field schools are highlighted as effective mechanisms for farmer skill development.

iv. Evidence from field experiences demonstrates improved knowledge on crop diversification, soil conservation, and water-efficient farming through community-based training.
v. The need for accessible and timely climate information particularly weather forecasts and drought advisories is emphasized.
vi. Gender-responsive capacity-building initiatives are recommended, focusing on cooperative farming, value-addition, and household livelihood diversification.
vii. The strengthening of local institutions and leadership structures is identified as essential for effective adaptation planning and knowledge dissemination.
viii. Consensus is reached that enhanced extension capacity, stronger community networks, and inclusive governance are critical to promote climate-wise farming across Sri Lanka.

Multi-stakeholder Workshop on 'Agro-farming Dialogues on Climate Preparedness and Practices in Coastal Agriculture of South Asia' (India- Onsite Workshop 1)

Organized by: South Asian Forum for Environment (SAFE), India, in association with the Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 6 August 2025

Venue: Hotel De Sovrani, Kolkata, India

Time: 11:30 am – 3:30 pm

Participants:

S. No.	Name	Affiliation
1.	Shri Animesh Mondal	Upadhyaksha, Zilla Parishad, South 24 Parganas, West Bengal
2.	Prof. R. Ravi Krishna	Department of Chemical Engineering, IIT Madras, India
3.	Prof. Sachin S. Gunthe	Department of Civil Engineering, IIT Madras, India
4.	Shri Arunanghshu Chattaraj	Sundarban Development Board, West Bengal
5.	Shri Proshin Ghosh	Climate Change & Adaptation, IGSSS, Kolkata, West Bengal
6.	Dr. T. D. Lama	ICAR-CSSRI, Canning, South 24 Parganas, West Bengal
7.	Dr. Ram Pal	KVK Begusarai, Bihar
8.	Engr. MD Shahadat Hossain	O. Creeds, Bangladesh
9.	Mr. Hasibur Rahman	O. Creeds, Bangladesh
10.	Dr. Malancha Dey	SAFE, India
11.	Dr. Dipayan Dey	SAFE, India
12.	Dr. Chandreyi Sengupta	SAFE, India
13.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
14.	Dr. Turban Kar	PFRI, India
15.	Dr. Aritra Mukherjee	PFRI, India
16.	Ms. Shreya Ghosh	PFRI, India
17.	Ms. Anolita Singho	PFRI, India
18.	Mr. Somnath Samanta	PFRI, India
19.	Mr. Abhijit Sarkar	PFRI, India

Key Findings

i. Organic farming is important for reducing pollution from chemical fertilizers in the Sundarban as increased pollution effects are exerting adverse impacts on groundwater and biodiversity.
ii. Market linkages and infrastructure remain major challenges for agricultural development in the Sundarban.
iii. An estimated 21% of the population is projected to reside along India's 7,500 km coastline by 2070, and 29% of this group may face the risk of inundation; this is likely to prompt large-scale inland migration. Mass migration could result in the erosion of indigenous cultures and languages.
iv. Any changes to existing environmental systems should be implemented gradually; sudden changes can result in significant unintended consequences.
v. Laboratory-generated data and research findings must be effectively implemented in the field to achieve real-world impact.
vi. Climate change impacts are often non-linear; the use of scenario tools such as the SSP-RCP pathways improves predictive capability.

vii. Environmental sustainability should be incorporated into education from the outset.
viii. Provision of alternative, sustainable livelihood options is essential.
ix. The sustainable use of alternative resources must be prioritized, with careful consideration of life cycle analyses for all new technologies. Comprehensive research on biomass conversion processes is required prior to large-scale implementation. Biomass conversion (waste-to-energy) is energy-intensive, still under research, and may disrupt local ecosystems.
x. Sustainable rainwater management practices, such as rainwater harvesting for desalination should be promoted.
xi. All research findings should be made accessible to relevant implementing agencies to ensure effective and sustainable outcomes.
xii. Sensitization and awareness-raising across all sectors are needed.
xiii. Technology solutions must be distributed equitably and fairly.
xiv. Data should be made more openly available and accessible to all stakeholders.
xv. A baseline environmental study is necessary, and the related data should be shared with the local communities residing in these areas. Local communities play a pivotal role in supporting and participating in scientific research. Changemakers and community leaders involved in these processes should be acknowledged and supported.
xvi. Two key points to emphasize are- the approach should be community-based, and there must be effective dissemination of knowledge.
xvii. Nature-based solutions in agriculture, such as floating gardens and cultivation of salinity-resilient crop varieties, and community-based ecotourism ought to be promoted.
xviii. Climate financing needs to be incorporated into policy integration.
xix. Ecosystem services need to be monetized.
xx. Effective linkages between government bodies, organizations, and local communities are crucial for successful interventions.
xxi. Solutions and strategies should be tailored to the specific place and current local conditions.
xxii. It is essential to fully understand the problems specific to particular ecosystems before designing mitigation measures.

Climate-resilient Agriculture- Practice, Policy, and Prospects
An International Review Workshop on Climate-resilience of the Primary Sector in the South Asian Context (Final Dissemination Workshop)

Organized by: Centre for Atmospheric and Climate Sciences (CACS), Indian Institute of Technology, Madras (IITM), South Asian Forum for Environment (SAFE), India, and Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN) and the IndusInd Bank

Date: 8-9 September 2025

Venue: IIT Madras ICSR Seminar Hall 3, India

Time: 9:00 pm – 3:00 pm

Participants:

Day 1

S. No.	Name	Affiliation
1.	Shri Anurag Mishra	Special Secretary, Environment and Forest Department, Secretariat
2.	Prof. R. Ravi Krishna	Department of Chemical Engineering, Indian Institute of Technology Madras, India
3.	Prof. Sachin S. Gunthe	Department of Civil Engineering, Indian Institute of Technology Madras, India
4.	Dr. Priyanie Amerasinghe	International Water Management Institute (IWMI), Colombo, Sri Lanka
5.	Dr. Kaushal K. Garg	Natural Resource Management, International Crops Research Institute for the Semi-Arid Tropics (ICRISAT), Hyderabad, Telangana, India
6.	Dr. Linda Anne Stevenson	APN
7.	Engr. MD Shahadat Hossain	O. Creeds, Bangladesh
8.	Dr. Dipnarayan Ganguly	Futuristic Research Division (FTR), National Centre for Sustainable Coastal Management, MoEF, Chennai, India
9.	Prof. Rajinish Kumar	Department of Chemical Engineering, Indian Institute of Technology Madras, India
10.	Dr. Krishna Malakar	Department of Humanities and Social Sciences, Indian Institute of Technology Madras, India
11.	Dr. Dipayan Dey	SAFE, India
12.	Dr. Malancha Dey	SAFE, India
13.	Mrs. Sujatha P	Indian Institute of Technology Madras
14.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
15.	Dr. Chandreyi Sengupta	SAFE, India

Day 2

Sl No.	Name	Affiliation
1.	Dr. K. Alagusundaram	Tamil Nadu Food Processing & Agri Export Promotion Corporation (TN APEX), Government of Tamil Nadu
2.	Prof. Sachin S. Gunthe	Department of Civil Engineering, Indian Institute of Technology Madras, India
3.	Dr. Yashwanth	Centre for Atmospheric and Climate Sciences (CACS), Department of Civil Engineering, Indian Institute of Technology Madras, India
4.	Mr. Chakradhar	Centre for Atmospheric and Climate Sciences (CACS), Department of Civil Engineering, Indian Institute of Technology Madras, India
5.	Prof. Arshinder Kaur	Department of Management Studies, Indian Institute of Technology Madras, India
6.	Dr. Venkat Raman Srinivasan	Department of Civil Engineering, Indian Institute of Technology Madras, India
7.	Dr. Priyanie Amerasinghe	International Water Management Institute (IWMI), Colombo, Sri Lanka
8.	Dr. Dipayan Dey	SAFE, India
9.	Dr. Malancha Dey	SAFE, India
10.	Mrs. Sujatha P	Indian Institute of Technology Madras
11.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
12.	Dr. Chandreyi Sengupta	SAFE, India

Key Findings-

Day 1

i. Agriculture emerges as a key grassroot concern requiring scientific, technological, and institutional innovations for long-term climate resilience.
ii. The translation of academic research into practical, community-level applications remains a critical gap that needs to be addressed through participatory models.
iii. Climate change reduces major crop yields such as paddy and wheat by up to 20 percent due to heat stress, soil degradation, and pest proliferation.
iv. Integrated soil and water management, biodiversity conservation, and farmer-centred learning systems are identified as core pathways for resilience building.
v. Carbon finance offers potential to incentivize sustainable practices but remains limited by complex verification and reporting frameworks.
vi. Smallholder participation in carbon markets depends on collective mechanisms like cooperatives that can reduce transaction costs.
vii. Land degradation, groundwater depletion, and declining soil organic carbon continue to undermine productivity in several regions.
viii. Rainwater harvesting, farm ponds, and check dams prove effective for water retention and improved cropping intensity in semi-arid zones.
ix. Integrated watershed management enhances groundwater recharge, yield stability, and household income in vulnerable districts.
x. Existing carbon funding mechanisms fail to benefit marginal farmers equitably, calling for redesigned financial inclusion strategies.
xi. Deforestation, unsustainable land use, and poor soil carbon management remain major contributors to greenhouse-gas emissions.

xii. Coastal salinity, wetland loss, and methane emissions from rice fields intensify vulnerability in low-lying agricultural regions.
xiii. Agroforestry and regenerative agriculture strengthen biodiversity, improve soil health, and contribute to carbon sequestration.
xiv. The success of climate technologies depends on inclusive governance, community ownership, and transparent benefit sharing.
xv. Stakeholders agree that resilience cannot rely solely on technology but must integrate social trust, farmer participation, and institutional coherence.

Day 2

i. Strengthening links between climate-resilient agriculture, value chains, and trade systems is essential for scaling sustainable production.
ii. Food insecurity stems more from weak distribution and affordability than from insufficient crop output.
iii. The National Innovation on Climate-Resilient Agriculture (NICRA) program demonstrates measurable gains in mechanization, water efficiency, and farmer adaptation.
iv. Climate models based on Representative Concentration Pathways (RCPs) and Shared Socioeconomic Pathways (SSPs) improve understanding of regional agricultural risks.
v. Earth-system models bridge physical and socio-economic processes, offering robust evidence for policy planning.
vi. Atmospheric CO_2 concentration increases to 422.8 ppm in 2024, reinforcing the urgency of coordinated adaptation strategies.
vii. The field project in Begusarai and Dharashiv confirms that agroforestry, floating cultivation, and local crop revival improve food security and livelihoods.
viii. Persistent challenges include poor water governance, limited access to finance, and low institutional support for smallholders.
ix. High-resolution regional models help forecast floods and droughts, but ensemble modelling is still required for accuracy.
x. Policy and practice gaps widen when farmers lack trust in forecast data and remain excluded from decision-making frameworks.
xi. Education on sustainability and climate adaptation needs to be embedded in school curricula for long-term behavioural change.
xii. Smallholder farmers require affordable technologies, transparent market data, and fair access to pricing mechanisms.
xiii. Over-extraction of groundwater, land fragmentation, and ineffective subsidies worsen agricultural vulnerability.
xiv. Convergence between scientific modelling, economic planning, and community participation is necessary for sustainable policy design.
xv. Regional cooperation and integrated governance across South Asia are essential for securing food systems and achieving long-term climate resilience.

South Asian Forum for Environment (SAFE)

Learning from the Land: Online Citizen-Science Programme on Climate-Resilient Farming in India

Organized by: South Asian Forum for Environment (SAFE) and Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 12 December 2024

Time: 11:00 am -1:00 pm

Participants

S. No.	Name	Affiliation
1.	Smt. Jyotsna Haldar	Gram Pradhan, Kultali Block, West Bengal, India
2.	Shri Sankar Das	Gram Upopradhan, Kultali Block, West Bengal, India
3.	Dr. Dipayan Dey	SAFE, India
4.	Dr. Malancha Dey	SAFE, India
5.	Dr. Chandreyi Sengupta	SAFE, India
6.	Dr. Bhaskar Deb Bhattacharya	PFRI, India
7.	Ms. Shreya Ghosh	PFRI, India
8.	Smt. Momota Mondal	Local farmer, India
9.	Smt. Jhrana Mondal	Local farmer, India
10.	Smt. Anjali Maity	Local farmer, India
11.	Smt. Purnima Hajor	Local farmer, India
12.	Smt. Purnima Halder	Local farmer, India
13.	Smt. Sudipa Mondol	Local farmer, India
14.	Mr. Haren Haldar	Local farmer, India
15.	Mr. Swapan Middya	Local farmer, India

Key Outcomes

i. Participants share observations of irregular rainfall, tidal shifts, and changing crop cycles.
ii. Farmers describe how increasing soil salinity affects rice yields and pond fisheries.
iii. Women groups present simple composting and seed-saving practices.
iv. Experts from SAFE explain salinity and groundwater changes through short video clips and photos.
v. Youth participants agree to maintain seasonal observation notes within local committees.
vi. Participants recognise that community experiences and local observations form part of citizen science.
vii. Panchayat members agree to include discussions on environmental change during meetings.
viii. The group agrees to continue sharing local environmental observations through community interactions.

Living with Water: Citizen-Science Programme on Climate Adaptation in the Haor Region of Bangladesh

Organized by: South Asian Forum for Environment (SAFE) and Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 20 February 2025

Time: 11:00 am - 1:00 pm

Participants

S. No	Name	Affiliation
1.	Engr. Md. Shahadat Hossain	Onushandhani Creeds Ltd. (O. Creeds) Bangladesh
2.	Mr. Md. Atiqur Rahman Mollick	Onushandhani Creeds LTD. (O. CREEDS) Bangladesh
3.	Dr. Dipayan Dey	SAFE, India
4.	Dr. Malancha Dey	SAFE, India
5.	Dr. Chandreyi Sengupta	SAFE, India
6.	Ms. Shreya Ghosh	PFRI, India
7.	Mr. Rokibul Hasan	Local farmer, Bangladesh
8.	Md. Jahid Hossain	Local farmer, Bangladesh
9.	Md. Ruhul Amin	Local farmer, Bangladesh
10.	Md. Mamunur Rashid	Local farmer, Bangladesh
11.	Mr. Abdus Salam Azad Badal	Local farmer, Bangladesh
12.	Mrs. Nahida Ferdousi Chowdhury	Local farmer, Bangladesh
13.	Ms. Moushumi Parvin	Local farmer, Bangladesh
14.	Ms. Fatema Akter	Local farmer, Bangladesh
15.	Ms. Pakhi Rahman	Local farmer, Bangladesh
16.	Mr. Anisur Rahman	Local farmer, Bangladesh

Key Outcomes

i. Farmers describe unpredictable floods and shorter dry intervals that affect Boro rice production.
ii. Participants demonstrate floating-bed and duck-fish farming as adaptive practices.
iii. Elders explain traditional flood indicators such as bird movement, wind direction, and water colour.
iv. Women describe maintaining homestead gardens on raised beds for food security.
v. Experts from SAFE share simple observation techniques suitable for community awareness.
vi. Students propose folk-media activities to spread messages on adaptation and early warning.
vii. Participants understand that oral record-keeping and shared storytelling represent local science.
viii. The group agrees to continue community-based awareness and knowledge sharing on climate impacts.

South Asian Forum for Environment (SAFE)

Every Drop Counts: Dialogue on Water and Soil Resilience with Local Community in Sri Lanka

Organized by: South Asian Forum for Environment (SAFE) and Progyan Foundation for Research and Innovation (PFRI), India

Supported by: The Asia-Pacific Network for Global Change Research (APN)

Date: 20 June 2025

Time: 2:00 am - 4:00 pm

Participants

S. No	Name	Affiliation
1.	Dr. Priyanie Amerasinghe	IWMI, Sri Lanka (Global Headquarters)
2.	Dr Tanuja Ariyananda	Lanka Rainwater Harvesting Forum, Sri Lanka
3.	Ms. Dhanushi Senanayake	South Asia Rainwater Network (SARNET), Sri Lanka
4.	Mr. Md. Atiqur Rahman Mollick	Onushandhani Creeds Ltd. (O. Creeds) Bangladesh
5.	Dr. Dipayan Dey	Founder Trustee, SAFE, India Director, PFRI, India
6.	Dr. Malancha Dey	Senior Scientist, SAFE, India Director, PFRI, India
7.	Dr. Chandreyi Sengupta	Senior Research Officer, PFRI, India
8.	Dr. Bhaskar Deb Bhattacharya	Senior Research Officer, PFRI, India
9.	Ms. Shreya Ghosh	Administration and Field Officer, PFRI, India
10.	Mr. Nimal Perera	Local farmer, Sri Lanka
11.	Mr. Kanthi Fernando	Local farmer, Sri Lanka
12.	Mr. Suresh Kumar	Local farmer, Sri Lanka
13.	Mohammed Rizwan	Local farmer, Sri Lanka
14.	Mr. Selva Bandara	Local farmer, Sri Lanka
15.	Ms. Shafika Niyas	Local farmer, Sri Lanka
16.	Ms. Nazeera Ahamed	Local farmer, Sri Lanka
17.	Ms. Kusum Gunasekara	Local farmer, Sri Lanka
18	Mr. Kannan Selvarajah	Local farmer, Sri Lanka
19.	Mr. Sunil Perera	Local farmer, Sri Lanka
20.	Mr. Sarath Fernando	Local farmer, Sri Lanka

Key Outcomes

i. Participants share experiences of extended dry periods and declining local water availability.
ii. Experts from SAFE explain rooftop rainwater collection and well-recharge methods through visuals.
iii. Women discuss composting and small-garden farming for household food security.
iv. Participants learn that traditional irrigation practices such as bethma support equitable water use.
v. Experts explain simple techniques for monitoring household water use and soil moisture.

vi. The group agrees to sustain community learning and regular awareness on water and soil management.

South Asian Forum for Environment (SAFE)

a. Multistakeholder Workshop on 'Policy Comprehension to Mainstream Climate Resilient Agro-farming Practices in the Indian Sundarban', Kolkata, India

Image 1: Participants of the Workshop

Image 2: Project Overview

Image 3: Discussion on Policy Practice Gap Assessment

b. Multistakeholder Workshop on 'Policy Comprehension to Mainstream Climate Resilient Agro-farming Practices in Sri Lanka', Colombo, Sri Lanka

Image 1: Workshop Objectives

Image 2: Participants of the Workshop

Image 3: Key Note Speech by Dr. Priyanie Amerasinghe (IWMI, Sri Lanka, Global headquarters)

Image 4: Project Overview

Image 5: Discussion on promoting bottom-up, community-driven approaches to integrate local innovations into policy

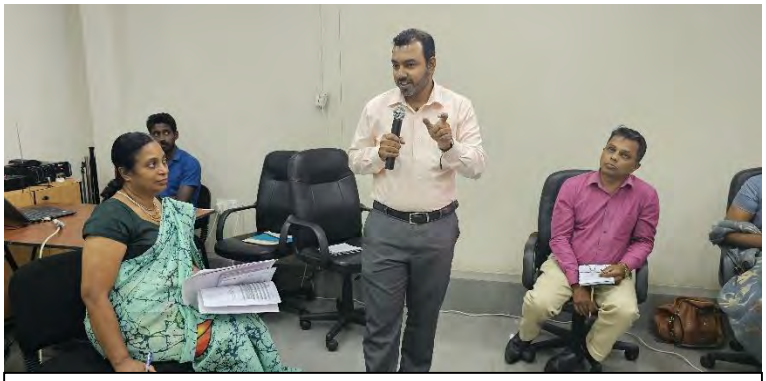

Image 6: Discussion on strengthening extension services and climate advisories for farmers

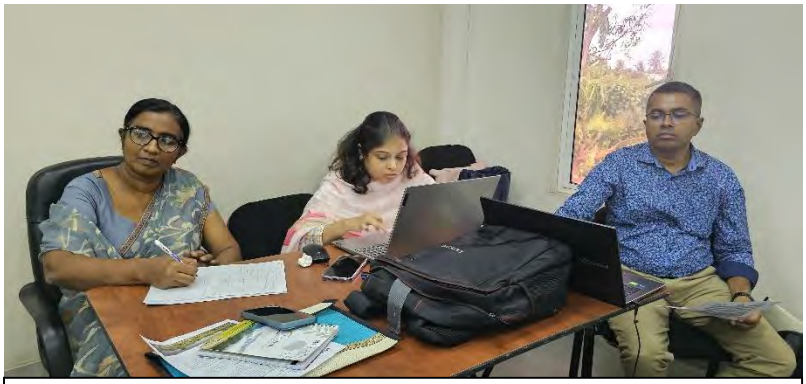

Image 7: Participants capturing insights from the workshop proceedings

Image 8: Discussion on addressing youth disengagement and making agriculture more attractive and profitable

c. Multistakeholder Workshop on 'Agro-farming Dialogues on Climate Preparedness and Practices in Coastal Agriculture of South Asia', Kolkata, India

Image 1: Key Note Speech by Prof. Sachin S. Gunthe, Department of Civil Engineering, IIT Madras, India

Image 2: Project Overview

Image 3: Panel Discussion on Climate-Resilient Farming Practices and Preparedness in South Asia's Coastal Agriculture

Image 4: Participants of the Workshop

d. An International Review Workshop on 'Climate-resilience of the Primary Sector in the South Asian Context', Chennai, India

Image 1: Participants of the Workshop *(Day 1)*

Image 2: Key Note Speech by Dr. Priyanie Amerasinghe (IWMI, Sri Lanka, Global headquarters)

South Asian Forum for Environment (SAFE)

Image 3: Launch of Coffee table Book and Website

Image 4: Panel Discussion on agroforestry and regenerative agriculture enhancing biodiversity and soil health

Image 1: Participants of the Workshop *(Day 2nd)*

Image 2: Key Note Speech by Prof. Sachin S. Gunthe, Department of Civil Engineering, IIT Madras, India

South Asian Forum for Environment (SAFE)

Image 3: Technical presentation on RCP Scenario by Mr. Chakradhar, Centre for Atmospheric and Climate Sciences (CACS), Department of Civil Engineering, Indian Institute of Technology Madras, India

Image 4: Panel Discussion on regional cooperation and governance for resilient South Asian food systems

প্র শ্ন । এ ব ং উ ত্ত র

জনমুখী নীতি ছাড়া সুন্দরবন বাঁচবে?

সুন্দরবনকে বাঁচাতে কী কী করা দরকার?

দীপায়ন দে

প্রোগ্রাম ডিরেক্টর, সাউথ এশিয়ান ফোরাম ফর এনভায়রনমেন্ট

আজকের সুন্দরবনের সমস্যা বহুবিধ। আমরা এখানকার মানুষ, তাঁদের জীবন-জীবিকা, স্বাস্থ্য এবং সেই সঙ্গে এখানকার পরিবেশ— এই সব নিয়ে কাজ করছি। সুন্দরবন জলবায়ু পরিবর্তনের ক্ষেত্রে খুবই দুর্বল একটা জায়গা। অথচ সুন্দরবনের মানুষের মধ্যে একটি অত্যন্ত শক্তিশালী মনোভাব রয়েছে। তাঁরা প্রকৃতির সঙ্গে বা বাঘের সঙ্গে লড়াই করে এখানে বেঁচে থাকেন। এই বাঁচা এবং মরা— এ দুইয়ের মধ্যে দাঁড়িয়ে আমরা সাসটেনেবিলিটির কথা বলি। এখন দেখতে হবে, যারা নীতিমালা তৈরি করেন, তাঁদের উপরে কী দায়িত্ব বর্তায়। সেই নিয়েই সদ্য এই শহরে হয়ে গেল একটি কর্মশালা। সুন্দরবন ক্রমশ সংকুচিত হচ্ছে। ১৯০৪ থেকে ২০২৪-এর মধ্যে প্রায় ৪৪ শতাংশ সুন্দরবন মুছে গেছে। অথচ জনসংখ্যা প্রতি বছর ৬০ লক্ষ করে বাড়ছে। সুন্দরবনে ভীষণ ডায়নামিক এবং চলমান একটা বাস্তুতন্ত্র রয়েছে! কিন্তু সেভাবে কি আমাদের নীতিমালা তৈরি হচ্ছে? আমাদের প্রকল্পগুলি কি পাল্টাচ্ছে? এটা আমাদের কাজের মুখ্য বিষয়।

দ্বিতীয়ত, অভিযোজনকে গুরুত্ব দিয়ে আমরা সুন্দরবনের মানুষের হাতে এমন কিছু প্রযুক্তি তুলে দিচ্ছি, যেটা এখানকার মানুষের দুর্যোগের তাঁদের জীবন ও জীবিকা সুরক্ষিত রাখবে। তার মধ্যে ওয়েদার-স্মার্ট বা জলবায়ু সহনশীল কৃষির কথা বলতে পারি। জীববৈচিত্র নিয়ে সুন্দরবন বায়োডাইভার্সিটি বোর্ডের সঙ্গে একজোটে কাজ করছি। বনবিভাগের সঙ্গেও কাজ করছি এই জীববৈচিত্রকে বাঁচিয়ে রাখতে। তৃতীয়ত, সুন্দরবনে সৌরশক্তিকে আরও অগ্রাধিকার দিয়ে দূষণ কমিয়ে আনাও আমাদের প্রধান উদ্দেশ্য। সুন্দরবনের মানুষের স্বাস্থ্য, শিক্ষার জন্য আমরা একটা স্কুল বানিয়েছি, 'সবুজ পাঠশালা' নামে। সেখানে যা পড়ানো হয়, তা সম্পূর্ণ ভাবে জীবনমুখী শিক্ষা। এখানে কাজের জন্যে কলকাতা থেকে যাঁরা আসেন, তাঁদের জন্য ছোট্ট একটা ধানের সংগ্রহশালা তৈরি করা হয়েছে। এখানে সুন্দরবনের ৫৪ প্রজাতির ধান সংরক্ষিত রয়েছে। ১০ হেক্টরের একটি বাদাবন আছে, যেখানে অন্তত ১৭টি বাদাবনের প্রজাতিকে আমরা দেখাতে পারি। এই ধরনের ছোট ছোট মিউজ়িয়াম নির্মাণ করে আমরা সচেতনতা তৈরি করতে চাইছি। চেষ্টা করছি নোনা জলকে সৌরশক্তির সাহায্যে নুন-মুক্ত করে সবাইকে সরবরাহ করার। এই রকম ছ'টি প্ল্যান্ট সুন্দরবনে রয়েছে। প্রায় ৫০ হাজার মানুষ সেই জল পান করেন। জীবিকার বিকল্প পথ হিসেবে বাক্সে কাঁকড়া চাষ দারুণ সফল হয়েছে।

আমরা ওখানে দু'টি ক্লাইমেট সেন্টার গড়ে তুলেছি। গোসাবা এবং মৈপীঠে। কিন্তু এই অঞ্চল থেকে কার্বন নিঃসরণ তো কমাতেই পারি। চেষ্টা করছি এমন একটি 'রুট' তৈরি করতে যে পথে কার্বন নিঃসরণ কম হবে। এই কার্বন ক্রেডিট বাজারে নিয়ে আসতে পারলে আগামীতে ব্যবসায়ীরা এখানে ব্যবসায় উৎসাহী হবেন। তাতে উপকার এখানকার মানুষের তো বটেই, একইসঙ্গে সমগ্র সুন্দরবনের। এটা আগামীর পরিকল্পনা।

সাক্ষাৎকার: গোপী দে সরকার