



November 2024

04 Key Lessons for informing Policy Decisions

Scaling Climate Adaptive Capacities among Small and Marginal Farming Communities in the Sundarbans

Scale of the Problem



USD 14 Billion¹

Damages caused by Amphan, a super cyclone which had its landfall in the Indian Sundarbans in May 2020



3 centimetres²

Rise in the sea level in Sundarbans on an average per year over the last two decades



110 sq.km³

Reduction of Mangrove Forests within the reserve forest in Sundarbans due to erosion between 2000 and 2020

About DRCS

www.drsc.org

Over the last 4 decades, Development Research Communication and Services Centre (DRCS), as a non-profit development organization has been focusing on improving food, nutrition, and livelihood security for rural communities in resource-poor and climate-vulnerable settings through design and execution of innovative programs, undertaking action-research, and forging effective stakeholder engagements.

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Executive Summary

Over 3,000 small and marginal farming families from Patharpratima and Namkhana blocks from the Sundarbans are leading a silent revolution against climate change. In the last three years, these families have strengthened the coastal embankments by restoring mangrove forests, practiced resilient farming using local seeds, supplemented their food security through integrated nutrition gardens, and undertook climate adaptive actions through women-led mutual cooperation groups.

These endeavours generated learnings and recommendations, which DRCS wanted to document as a policy brief and share with the broader community working on similar climate action programs in the Sundarbans. DRCS strongly urges policymakers to consider the four evidence-based lessons in this document while designing climate interventions and policies for Sundarbans.

How climate change affects landless rural communities in India and what should we do about it?

The mangrove forests on the coastal islands of the Sundarbans serve as the first line of defense against frequent, high-velocity tropical cyclones, embracing much of the impact to protect West Bengal, particularly the adjacent districts of Kolkata, South 24 Parganas, and North 24 Parganas. However, over the last two decades, there has been a steady decline in mangrove forest area due to natural soil erosion and deforestation, weakening embankments and rising sea levels. Saline water intrusion further stunts the growth of many mangrove species.

As a result, small and marginal farming communities in the Sundarbans have become more vulnerable to tropical cyclones. During these cyclones saline seawater inundates agricultural land, destroying crops and reducing soil productivity. Cyclones and floods also damage homes and livestock of these marginalized communities. Lacking the skills to recover from these shocks, many farmers migrate in search of livelihoods, with some permanently displaced. For instance, in May 2020, when super-cyclone Amphan struck, more than 2.4 million¹ people were displaced in India, mostly in West Bengal and Odisha.

The Government of West Bengal supports mangrove planting through programs like MGNREGS and MISHTI, but the lack of a community-led approach in planting, nurturing, and protecting these



forests makes the efforts less effective.

In this context, it is crucial to address the fundamental causes of climate-induced vulnerabilities for small and marginal farming communities in the Sundarbans and empower them with sustainable, replicable local adaptive capacities.

Since 2021, DRCS has been implementing a similar program across 24 villages in 02 blocks of the Sundarbans. This document synthesizes four key evidence-based lessons from the program to inform relevant policy decisions.

The Programme in Numbers



3000 Families
Impacted through the Program



24 Villages
Across which the program was executed



265 Women MCGs
Developed through the program

How to map out a climate vulnerability causal chain and effectively design interventions addressing the underlying and basic factors?

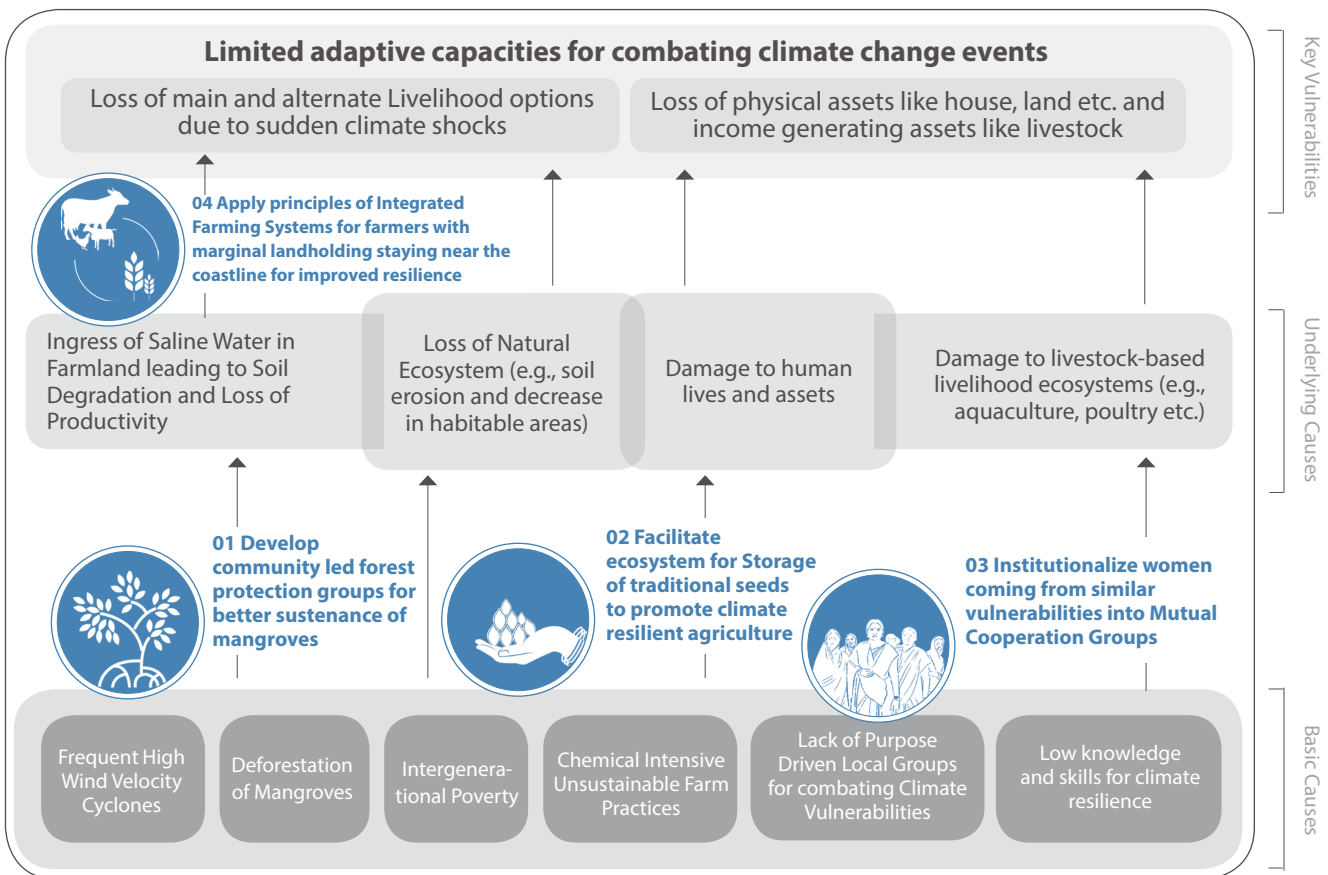
To design the program, DRCSC delved into the intricate causal chain to identify the critical underlying and basic factors snowballing into two predominant climate-induced vulnerabilities affecting rural landless communities: Loss of livelihood options due to sudden climate shocks and Loss of physical and income generating assets.

This causal chain mapping has helped the program in devising tailored interventions to address the significant vulnerability-causing factors like deforestation of mangroves, chemical

intensive unsustainable farm practices, lack of purpose driven local groups for combating climate vulnerabilities, and soil degradation and loss of farm productivity due to ingress of saline seawater.

The vulnerability causal chain as outlined in Exhibit 01, also highlights four key lessons that DRCSC strongly advises policymakers to incorporate into their future policy designs. This document has expanded these four key lessons and appropriate recommendations in the next sections.

Exhibit 01: DRCSC identified the overlapping vulnerabilities of the small and marginal farming communities, its contributing factors, and designed interventions to increase resilience of the program’s target households



02 Program Intervention Blocks in South 24 Parganas District of West Bengal



- > Patharpratima
- > Namkhana

About the Program: Adaptation to climate change and resilience building on the Sundarbans Islands through afforestation and promotion of sustainable livelihoods

The program targeted 3,000 marginalized households, predominantly residing near the coastline and highly vulnerable to frequent cyclones. These families possess marginal landholdings 0.2 to 0.4 hectares for crop production and up to 0.01 hectares for household gardens or allied activities such as livestock rearing. Most of the target families use small nets and fish traps for fishing off the coast, in small freshwater canals, and during the monsoon in the flooded rice fields.

The program strengthened community-based groups aimed at enhancing climate resilience, empowered households through climate-adaptive livelihoods, and improved coastal protection through community-led mangrove forests and social forestry initiatives. DRCSC implemented the program across 24 villages in 02 blocks of the South 24-Parganas district, spanning 4 Gram Panchayats.



47 Mangrove Protection Groups

Developed during the Program

The program planted mangroves across a total of 47 Ha. with a density of 9,000 Mangroves per hectare and introduced four varieties of mangroves (Goran, Garjon, Baine, Keora) based on agro-ecological need of the terrain selected.



192 Group Seed Banks

Formed under the program, all of which are led by local rural women



21 to 22

Seasonal seed varieties are available from the seed banks



INR 1.9 Mn

Consolidated Turnover from all 192 Group Seed Banks and 8 Community Seed Banks

Lesson 1: Develop a community led approach for planting, nurturing and protecting mangroves for improved sustenance

During the program design DRCS identified that although existing Government programs support strengthening embankments through mangrove plantations, the initiatives remain less effective due to limited engagement and decision-making of the community in the key elements of developing such forests - site selection for plantation, choice of mangrove varieties, physical labour for plantation which fosters a sense of ownership, and planning around protection of the newly planted saplings. In the program,

DRCS formed 47 mangrove protection groups and actively engaged them throughout the entire process of restoration of mangrove patches. This helped the program leverage the traditional knowledge of the community in planning, designing and development of the mangrove forests and instills a sense of ownership for protecting them from deforestation. The mangrove protection groups were responsible for restoring a patch of 47 Ha. of land and protecting an additional 93.74 Ha. of forest area.

Recommendation: When developing mangrove forests, use **Participatory Rural Appraisals (PRA) to map vulnerable zones** requiring restoration and protection. It is crucial to select **mangrove varieties native to the region and plant them based on their optimal growing conditions**, whether at the High Tide Line (HTL) or Low Tide Line (LTL).

Lesson 2: Revive the use of traditional seeds by facilitating a seed bank ecosystem and promote climate resilient farming

Declining use of indigenous seeds and increased dependence on hybrid seeds available in the market put farmers at economic and ecological risk. Not only seeds available in the market are expensive, but they are vulnerable to climate change events too. While farmers are aware of the risks, they seldom have the access to native varieties of seeds. In this context, DRCS saw an opportunity to impact the community through increasing their access to traditional seeds by forming local community led seed systems by

empowering rural women. In the program, DRCS developed about 192 village level seed banks which cluster into 8 community level seed banks. During climate crisis, these village seed banks become instrumental in providing access to a range of traditional seeds – 15 to 20 varieties of vegetables, pulses and paddy. The community level seed banks are empowered through the program to commercially market the seeds to potential buyers like the Government, FPOs, NGOs etc.

Recommendation: Establish an **alternate seed system led by farmers with its own quality assurance and marketing standards**. This system has the potential to enhance local climate adaptation and mitigate the economic and ecological risks common with private seed systems.

Recommendation: **Support development of commercially viable business models** for traditional seed banks to sustain their efforts by facilitating **effective market linkages** with potential buyers across Government, NGOs, FPOs, private sector organizations etc.



9 to 10 Months

Duration in a year adopter families in the program can access nutrition-rich food through integrated nutrition garden



39 Micro-enterprises

Developed through the program across 265 Mutual Cooperation Groups (MCGs)

3,141 women from small and marginal farming families were institutionalized into 265 MCGs - which by the end of the program accumulated a total savings of INR 3 million. Each group had access to at least three governmental schemes.

Lesson 3: Apply the principles of Integrated Farming Systems to improve the livelihoods and food security of marginal farmers staying in vulnerable coastal regions

DRCS, in the program, specifically targeted farmers with marginal landholdings 0.2 to 0.4 hectares for crop production and up to 0.01 hectares for household gardens or allied activities such as livestock rearing. The program applied the principles of Integrated Farming Systems (IFS) to develop Integrated Nutrition Gardens. Through training, farmers began optimizing the limited space around their homes to grow nutritious food for 9 to 10 months each year. To maximize space, families

selected plants that thrive at different horizontal levels, reshaping existing areas accordingly. Additionally, the program encouraged families to build a 'living fence' around their gardens, stocked with culinary and medicinal herbs, as well as erosion control plants. Households with ponds were trained to create 'floating gardens,' a form of hydroponics where crops are cultivated on rafts floating in the pond.

Recommendation: Engage families with marginal landholding staying in vulnerable coastal regions to identify the opportunities for land shaping and **optimization of existing resources and assets** to practice the principles of integrated farming systems.

Lesson 4: Institutionalize women coming from similar vulnerabilities into Mutual Cooperation Groups and build increased agency to combat climate change impacts

Women in the Sundarbans face disproportionately higher climate vulnerabilities. Cyclones and their effects exacerbate their drudgery, and when male family members migrate in search of alternate livelihoods, women are left behind with increased financial uncertainties. DRCS identified this key underlying cause and designed interventions by organizing women

from similar marginalized conditions facing overlapping vulnerabilities into Mutual Cooperation Groups (MCGs). The MCGs facilitated access to capital for starting micro-businesses, government schemes, and capacity building, thereby enhancing women's resilience to climate vulnerabilities.

Recommendation: Through a **Participatory Rural Appraisal (PRA)**, identify **climate vulnerability levels of local women and form groups** with members from similar overlapping vulnerabilities. This **will foster empathy and a sense of cooperation**, which can be leveraged effectively for climate adaptive interventions like micro-businesses, access to rights, and capacity building.

List of Abbreviations

DRCS	Development Research Communication and Services Centre
FPO	Farmer Producer Organization
Ha	Hectares
INR	Indian Rupee
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MISHTI	Mangrove Initiative for Shoreline Habitats & Tangible Incomes
NGO	Non-governmental Organization
PRA	Participatory Rural Appraisal
USD	United States Dollar

References

1. World Meteorological Organization, "State of the Global Climate 2020", 2021, [Link](#)
2. Deutsche Welle (DW), Sundarbans' climate refugees face an uncertain future, [Link](#)
3. Remote Sensing, Assessment and Attribution of Mangrove Forest Changes in the Indian Sundarbans from 2000 to 2020, 2021, [Link](#)

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