



## 08 Lessons Learned

Inputs for policy considerations in developing resilience against climate risks for small scale farmers in semi-arid regions

### Key Messages

- » Climate change risks are multipronged affecting food, water, and livelihood securities for vulnerable communities, and hence it takes a multistakeholder approach to tackle the problem
- » When communities are encouraged to work in groups and take ownership, they become active implementers of the program from passive beneficiaries – paving the path to sustainability.
- » Programs aiming to build climate adaptive capacities should combine local knowledge of the community with climate smart technologies and sustainable farming practices

### Introduction

Low and erratic rainfall coupled with high temperature in semi-arid regions hinder small scale farmers in India from having sustainable livelihood practices. These regions receive at least 30%<sup>4</sup> lesser rainfall than the national average and are prone to frequent droughts. The scale at which these agro-climatic conditions affect the farmers are massive. Around 68% of the cropped area in India is vulnerable to drought and these water scarce conditions severely affect farm productivity, food security, and income opportunities for the farmers.

Since 2015, DRCSC has been developing climate adaptive capacities for 5000 climate threatened families in two of the driest districts in the state of West Bengal – Purulia and Bankura. Funded by the Adaptation Fund Board and supported by NABARD, this program over the past five years has encouraged collective stewardship of soil, water, and green cover, driven the adoption of integrated farming practices, and strengthened food and livelihood systems for the marginalized tribal communities.

The eight key lessons highlighted in this document, hence, surface from rigorous piloting, iterations, and gradual scaling up across 40 villages in semi-arid regions of Purulia and Bankura districts in West Bengal between 2015 and 2021. The lessons have a strong evidence base, and this resource guide offers practical solutions for climate change practitioners, policymakers, government, and private organizations who want to implement similar climate change adaptation programs in drylands, drought-prone areas, and semi-arid regions of India. Among the host of innovations, lessons learned and good practices which have come out of the program, this report highlights eight of them which together have maximized the effectiveness and impact of the climate change adaptation program. The document aims to raise interest in the program, and inspire organizations to invest, partner and collaborate to scale the impact.

### Scale of the Problem in India



**>80%**<sup>1</sup>

Population in India lives in districts highly vulnerable to extreme hydro-met disasters



**68%**<sup>2</sup>

of cropped area in India is vulnerable to drought



**33%**<sup>3</sup>  
(193 out of 573)

Districts in India have high or very high vulnerability to climate change

## 08 Key Lessons

Emerging from DRCSC's Climate Change Adaption Program in Purulia and Bankura

### Harness the advantages of Climate Smart Technologies



**1** Leverage local knowledge of the community supported by GIS technology to create more dependable access to water all year round by harvesting erratic rainfall and using it optimally



**2** Commission hyperlocal weather stations (for an area of ~10 sq.km.) and enhance the decision-making abilities of the community with more frequent and dependable crop-weather advisories

### To promote resilient livelihoods and improved biodiversity through nature based solutions



**3** Support vulnerable communities transition towards climate resilient farming and improve their food and nutrition security



**4** Develop agroforests with multi-use, multi-functional and multi-species trees to improve biodiversity and provide increased access to food, fuel, and fodder



**5** Revive the use of traditional grain banks through Women SHGs to supplement food security and improve resilience

### Built on the bedrock of strong program guiding principles



**6** Adopt a multi-stakeholder approach to harness collaborative effort for program design and implementation



**7** Form purpose driven groups, keeping women at the centre, to tackle overlapping vulnerabilities due to climate change



**8** Design interventions such that they evoke a sense of community ownership around the program and embed sustainability at design

Refine the outcomes of local knowledge with climate smart technologies to enable vulnerable communities prepare and respond to climate change more effectively



## Lesson 1

**Leverage local knowledge of the community supported by GIS technology to create more dependable access to water all year round by harvesting erratic rainfall and using it optimally**

**80 to 90%<sup>5</sup>**

Farm Ponds developed and community ponds renovated under this program has turned out to be perennial with 10 to 12 months of water available annually for farming

### Why ?

Farmers intuitively understand which are the more suitable locations for developing water harvesting structures in the community, but seldom has the confidence to act on it as they lack clear understanding around the risks and rewards. When this local knowledge is considered for building farm ponds (*happas*) or renovating community ponds, it improves their effectiveness as perennial water harvesting structures. In this program, DRCSC collects insights from the local community members before initiating the construction work for *happas* and community ponds and triangulates them with the analysis from GIS mapping. GIS technology precisely maps landforms, contours, water tables, and direction of rainwater runoffs to identify locations for potential perennial water harvesting structures.



The community of Pabrapahari village in Purulia has developed 33 *happas* and renovated 02 community ponds under DRCSC's program – all perennial. Apart from increased farm productivity, at least 60 families now practice fish farming which has resulted in improved food security and diversified livelihood.



**35%**<sup>6</sup>

Reduction in input cost experienced by beneficiary farmers who apply local weather advisory services into their agricultural practices

The Gramin Krishi Mausam Sewa Scheme supports setting up Agro-automatic Weather Stations at District Agromet Units located in the Krishi Vigyan Kendras under Indian Council of Agricultural Research network. However, the weather prediction precision level is up to block level while DRCSC's program predicts and share weather forecast lower than Gram Panchayat level. To explain this – DRCSC's intervention block, Kashipur has an area of 450 sq.km., with 13 Gram Panchayats each having area of 35 to 40 sq.km. In this program, DRCSC uses hyperlocal automated weather stations, tracks, and disseminates weather forecast for 10sq.km.

## Actions for Consideration

- Facilitate a participatory land use resource mapping involving both men and women of all ages from the community to collect local knowledge and insights on natural resources
- Create long term partnerships to plan, implement, continuously monitor, and assess impacts of GIS technology on more dependable water harvesting structures
- Borrow traditional wisdom of the community to shortlist potential locations for developing more dependable community ponds, and corroborate using GIS technology
- Encourage sharing of community labour to invoke a sense of ownership around developing perennial community ponds as village level assets

## Lesson 2

**Commission hyperlocal weather stations (for an area of ~10 sq.km.) and enhance the decision-making abilities of the community with more frequent and dependable crop-weather advisories**

### Why ?

Most mainstream weather services in India provide a forecast of district-level weather. However, weather can change every 5 sq.km., and communities depending on weather information for taking decisions around farming, and other livelihood practices may often find these broad weather predictions less reliable in addressing their needs. Precise weather information can reduce climate linked risks for farmers – prevents damages to harvested crops, improves return on labour, and reduces cost of cultivation. In this program, DRCSC delivers hyperlocal weather information and related crop advisory services every 5 days, tailored for communities residing in that specific 10 sq.km. The intervention has improved decision making in agriculture and made communities resilient towards climate uncertainties.

## Actions for Consideration

- Create an enabling ecosystem leveraging partnerships with climate experts, agriculture universities, community members, and a network of automated weather stations and manual data collection centres.
- Develop local leaders from the community to introduce, train and drive regular usage of weather information
- Use local language and a common meeting point in the village to disseminate weather information so that it improves the effectiveness
- Support local rural enterprises with frequent and dependable weather information, and improve income opportunities

Promote resilient livelihoods and improve biodiversity through nature based solutions



## Lesson 3

**Support vulnerable communities transition towards climate resilient farming and improve their food and nutrition security**

### Why ?

Over the last five decades, majority of Indian farmers have gradually shifted from traditional agricultural methods using low-cost natural inputs to expensive chemical intensive farming. Combined with monocropping with a single variety of crop this farming practice has subjected poor small scale farming communities to more risks than rewards, especially in climate threatened regions. The food and livelihood challenges surfacing from these practices have pushed the small scale farmers to work as migrant workers and agro labourers, especially during lean seasons and women, in particular, experience a disproportionate increase in burden. DRCSC's climate resilient farming model combines traditional farming practices with modern agriculture technologies to improve farm productivity, reduce cost of cultivation and ensure subsistence all year round.

### Actions for Consideration

- Use native crops and livestock which are more adaptive to extreme and uncertain - local climate conditions
- Promote diversified farming systems with cereals, pulses, vegetables, oilseeds to improve subsistence even during adverse climate conditions
- Build capacities for farmers to prepare bio-fertilizers, bio-pesticides, seeds with locally available ingredients, and reduce cost of cultivation
- Promote nutrition gardens to grow vegetables with diverse gestation periods so that there is a constant flow of nutrition rich food all year round

## Lesson 4

**Develop agroforests with multi-use, multi-functional and multi-species trees to improve biodiversity and provide increased access to food, fuel, and fodder**

### Why ?

It is important to introduce, promote and scale plantation of trees in a specific region by understanding the social and environmental impacts of the species in the context of local agro-climatic conditions. However, mainstreamed tree plantation practices are not always curated keeping in mind the needs, concerns, and priorities of the community. For example, planting Sonajhuri (*Acacia auriculiformis*) and Eucalyptus trees are quite popular in the Purulia and Bankura districts of West Bengal, but their adversities outweigh their benefits. Eucalyptus is known to deplete groundwater, have dominance over other species and degrade soil fertility. In this program, DRCSC addresses these longstanding challenges by identifying unutilized stretches of land and developing agroforests with multiple variants of native trees suitable for the local conditions. These biodiversity hotspots have increased the green cover and developed potential long-term income streams for the community.



I can now practice farming for three seasons in a year even under water scarce conditions, as compared to only one (Kharif) before adopting the program. Additionally, I am now experiencing more than 1.5 times productivity in paddy cultivation.

**PADMABATI MANDI,**  
Farmer  
Chingri Village, Bankura



**143 Hectares**<sup>7</sup>

of unutilized land converted into agroforests in the program with different varieties of multifunctional native trees which can provide food, fodder, and fuel round the year

## Actions for Consideration

- Identify unutilised stretches of land with the help of local community members which have potential to get transformed into agroforests
- Include climate-adaptive trees in the agroforest design which can sustainably provide food, fuel, and fodder
- Train and engage local community members in forest development activities, and follow a continuous monitoring for quality control
- Provide access to inputs like saplings, vermicompost, muck and bio-fertilizers needed for plantation



## Lesson 5

### Revive the use of traditional grain banks through Women SHGs to supplement food security and improve resilience

#### Why ?

To secure food during lean seasons, poor farmers in climate impacted regions are often forced under circumstances to become migrant workers or work as agro labourers. The burden of drudgery disproportionately affects women as they act as caregivers at home, manage their own farm-related activities, and additionally work as labourers. Guided by social norms, they are even the first in line to reduce their food consumption in the family. Furthermore, local paddy lenders can demand high interest which elevates the misery among the small-scale farmers. The paddy sourced from these lenders might often be inferior in quality deterring the food consumption experience amidst the already distressed conditions. Subsidized grains from government programs can reduce the challenge to some extent, but they cannot fully meet the consumption needs. DRCSC in this program, developed grain banks through women SHGs in villages with high food vulnerabilities to close these food consumption gaps and restrict forced borrowing cycles.

## Actions for Consideration

- Consider Grain banks as the solution to address unmet demand of staples after consumption from own land and public distribution systems
- Every village might not need a grain bank. Assess the level of productivity and consumption needs to take a decision around introducing them.
- Engage women to lead grain banks to leverage their food management skills and increase success rates of the solution

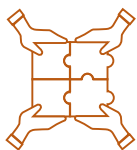


We could not feel the impact of the 2019 drought conditions on our food security as we had the Grain Bank

MEMBERS OF  
SAGUNMAHAL  
MAHILA SAMITY SHG  
Bongora Village, Purulia



Design climate change adaptation program on the bedrock of strong program guiding principles to improve impact and effectiveness



## Lesson 6

### Adopt a multi-stakeholder approach to harness collaborative effort for program design and implementation

#### Why ?

Climate change risks and the factors responsible are multipronged. Hence, a unidirectional approach with one sector working on it cannot produce an effective solution. The most effective way to conceptualize and deliver a climate change adaptation program is by bringing together specialized organizations from different spheres of the ecosystem. This multi-stakeholder approach helps in tackling each mutually exclusive factor responsible for increasing climate change vulnerabilities and collectively creates a robust, all-encompassing program.

#### Actions for Consideration

- Create long term partnerships to co-design and co-implement the program
- Identify and engage with partners who can multiply the impact of the program using modern technologies
- Facilitate an ecosystem to foster cross-learning and symbiosis of ideas among stakeholders

#### Key Stakeholders to consider

- Government Departments
- Donor Institutions
- Academia
- Technology Providers
- Climatologists
- Civil Society Organizations
- Knowledge Partners
- Community Members



## Lesson 7

### Form purpose driven groups, keeping women at the centre, to tackle overlapping vulnerabilities due to climate change

#### Why ?

Development programs attempt to create groups of community members with similar socio-economic vulnerabilities. However, if overlapping vulnerabilities e.g., food security, water security, livelihoods securities, etc. are not assessed at household level, groups may have individuals with different issues, concerns, and priorities. DRCSC in this program has developed purpose driven gender segregated groups which complement one another in reducing overlapping vulnerabilities due to climate change. For example, while men primarily receive and implement sustainable paddy growing techniques – which is the main crop in the region, women supplement the food security and income by growing seasonal vegetables and managing livestock. When the group members recognize they have similar issues, concerns, and priorities, it creates cohesiveness, and the members function more effectively as groups.

Furthermore, DRCSC emphasizes keeping women at the centre of program interventions. Women are more vulnerable to climate change. During lean seasons with limited availability of water and food from their own land, women experience increased drudgery as agro-labourers, migrant workers, and managers of food and water for their families. But, when they are empowered to take decisions in groups, women can harness their knowledge and wisdom to play an important role in the stewardship of natural resources.

**443**

Groups formed in the program with 312 groups exclusively with women

## Actions for Consideration

- Conduct a participatory climate vulnerability assessment in the beginning of the program to understand climate vulnerability levels and form homogenous groups
- Centre stage local women during program planning, execution and evaluation and leverage their inherent wisdom as primary users of natural resources
- Tailor all program interventions based on the needs emerging from different climate vulnerable groups



## Lesson 8

### Design interventions such that they evoke a sense of community ownership around the program and embed sustainability at design

#### Why ?

Shifting the community from the passive beneficiary to active implementers has always been a challenge, and the focus of donors and funders. The innovation in DRCSC's strategy flips the narrative on its head. Here, the community plays an active role in co-designing the program, implementing it, monitoring it continuously and evaluating the impacts and outcomes – all under the facilitation of DRCSC. This embeds sustainability at the core of the program and creates a smooth exit strategy. Furthermore, the community members contribute 25% of the cost of developing different village level assets like water harvesting structures, social forests by sharing their labour, which evokes a strong sense of ownership among them. The contribution is maintained by the block level watershed committee set up by DRCSC, which acts as a lynchpin for sustaining the program efforts.

## Actions for Consideration

- Promote the use of shared manual labour instead of mechanized tools to design a participatory approach in community asset creation
- Recruit community-based leaders for supervising group activities, continuous monitoring, and dissemination of learnings
- Encourage the community to contribute a portion of the cost of assets developed; this inculcates a strong sense of ownership

## The Way Forward

Individual farmers and groups have started to identify income generating opportunities from the program. DRCSC now wants to unlock the next level of impacts for its existing beneficiary farmers by creating effective market linkages for individuals and groups. This will need setting up robust agri business value chains. Simultaneously, DRCSC will continue to replicate the existing model in newer geographies. This roadmap will require forging the right partnerships, and DRCSC is eager to initiate dialogues with interested organizations.

### List of Acronyms

DRCSC	Development Research Communication and Services Centre
NABARD	National Bank for Agriculture and Rural Development
GIS	Geographic Information System
Sq.Km.	Square kilometre
SHG	Self Help Group

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## About the Climate Change Adaptation Program

The program aims at developing climate adaptive and resilient livelihood systems through diversification, technology adoption and natural resource management for rural small and marginal farmers associated with agriculture and allied sector in lateritic zone of West Bengal, India. It seeks to enhance adaptive capacities of vulnerable farm families in semi-arid regions of Purulia and Bankura districts of West Bengal by introducing measures to tide over the adverse impacts of climate change on their food and livelihood security. The program focuses on 5000 households covering about 26,350 direct beneficiaries and about 1,00,000 indirect beneficiaries who belong to vulnerable small and marginal farming communities and communities dependent on natural resources as livelihood option. The program is funded by Adaptation Fund Board and supported by NABARD.



[www.drcsc.org](http://www.drcsc.org)

In 1982, DRCSC was formed as a Resource Training Centre primarily in the field of development communication and community media focusing on child labour and informal sector workers. In 1987, the organization started consultation with several rural NGOs engaged in training local staff and volunteers. During this phase (1987-1993), DRCSC also started to identify and tackle problems around sustainable agriculture and biodiversity. In the next phase (1994 to 2014) of its work, DRCSC gradually deepened its focus on action research & participatory learning on sustainable resource management, particularly diversified integrated agriculture, focusing on problems faced by women/men who were sharecroppers & marginal farmers. In 2015, the organization realized the need for scalable solutions for climate change adaptation and disaster risk reduction, and since then has been focusing on implementing climate change aligned program in partnership with a network of multi-specialized NGOs, Inter Government Agencies, Donor Institutions and Academia.



[www.re-emergingworld.com](http://www.re-emergingworld.com)

As a strategic advisory firm, Re-emerging World works on identifying opportunities, designing, growing businesses, and evaluating investment ideas that serve the lower-income population in the emerging markets. Over the last 15 years, Re-emerging World has delivered over 85 research and advisory projects across 12 development sectors and 11 countries. As a knowledge partner to DRCSC, Re-emerging World has led the development of the lessons learned brief document along with the supplementary report.

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