Development Intelligence Unit

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Forum of Enterprises for Equitable Development

State Of Marginal Farmers of India - 2024

Theme - Impact of Climate Change on Marginal Farmers

June 10, 2024

Foreword

This second annual report by the Forum of Enterprises for Equitable Development (FEED) on the theme of Climate Change and Marginal Farmers underscores our commitment as a knowledge organization dedicated to advocacy and strategic leads for income enhancement of marginal farmers. From its inception , the FEED mandate has been clear and forthright : we have consistently strived to forge a new narrative around the struggles and triumphs of the marginal farmers through seminars, policy briefs, and research papers. Our mission is to create networks and collaborations among marginal farmers, farmer organizations, and corporate entities to create meaningful and mutually advantageous value chains .

Marginal farmers, those with less than one hectare of land, constitute the largest segment of India's agricultural sector. According to the 10th Agriculture Census (2015-16 they account for 68.5% of all farmers in India, but own only about 24% of the crop area. With a per capita holding of 0.38 hectares , the production surpluses at current levels of technology and institutional support systems makes it difficult for them to sustain their families thereby leading to rising distress in Indian agriculture.

This year's theme, "Impact of Climate Change on Marginal Farmers," delves into the multifaceted impacts of climate change on this vital group, offering data-driven insights and practical recommendations for resilience-building. Our survey, encompassing 6,615 respondents across 20 major states in India, provides a granular view of the situation. It shows that 40.9% of farmers have experienced droughts, while 32.6% have faced excessive rains, leading to significant crop losses. These challenges necessitate immediate and sustained action.

The Government of India has met these challenges head-on by realigning its interventions from a production-centric approach to farmers' income-centric initiatives, with a focus on better and new technological solutions. This includes the implementation of schemes like Pradhan Mantri Krishi Sinchai Yojana (PMKSY), Paramparagat Krishi Vikas Yojana (PKVY), Soil Health Card, Rainfed Area Development under National Mission for Sustainable Agriculture (NMSA), Pradhan Mantri Fasal Bima Yojana (PMFBY), National Agriculture Market scheme (e-NAM), National Food Security Mission (NFSM), Rashtriya Krishi Vikas Yojana (RKVY), and the National Mission on Agriculture Extension & Technology (NMAET). Additionally, farmers are provided information through Kisan Call Centres (KCCs), Agri-Clinics and Agri-Business Centres (ACABC) of entrepreneurs, Agri Fairs and exhibitions, and the Kisan SMS Portal.

Our findings reveal that while these government schemes have been initiated to support farmers, there remains a significant gap in the dissemination and adoption of climate-resilient practices, particularly among marginal farmers. The recommendations put forth in this report aim to bridge this gap by advocating for a paradigm shift in agricultural policy and practice. This includes promoting sustainable and natural farming practices, improving financial inclusion, and fostering partnerships for integrated solutions. On the other end of the spectrum, we cannot rule out -of -box solutions like leveraging the land and solar resources and human power of marginal famers for non-conventional approaches to farming, including biotechnology interventions , nanotechnology and plant-based proteins.

Climate change is no longer a mirage . It is here and now , and the unprecedented summer heat in the NCR this year is a good validation of this. As such , an adaptation strategy is not an option , but a compulsion The report documents various initiatives and government interventions designed to enhance climate resilience. It emphasizes the need for promoting climate-resilient agricultural practices, diversifying livelihoods, and improving access to financial services and technical advice.

Having served in the Rural Development , Agriculture , Horticulture , Co-operation and Food Processing departments in the states of Uttarakhand and West Bengal , and as the Mission Director for MIDH (then NHM) as well as the RKSY (earlier the NMMI) as well as the Managing Director of Nafed and NHB , I am aware of how our marginal and small farmers have achieved economies of scale and scope by organizing themselves into co-operatives , FPOs, SHGs and FIGs. At the ground level, coordination amongst all the land and livelihood related departments – agriculture, horticulture, forest, dairying, animal husbandry, poultry, rural development , co-operation etal needs to be further enhanced . I have mentioned forests, for after the allocation of land to those dwelling in the vicinity of forests, it is important that they harness the production potential of the land under their plough .One institutional mechanism would be to have a state level Agriculture Budget which would not only talk about resources to be deployed , but also outcomes that may be expected.

As the Chairperson of FEED, I take this opportunity to thank the Development Intelligence Unit for undertaking this initiative, and I look forward to receiving your inputs : not just on the report that is now in your hands, but also other suggestions on how marginal farmers can take greater control over their resources and livelihoods, and indeed transform their lives through adoption of new technologies and newer institutional innovations .

Sanjeev Chopra
Chairperson, Forum of Enterprises for Equitable Development (FEED)

Acknowledgement

I would like to acknowledge that the Impact of Climate Change on Marginal Farmers of India Survey is a joint publication of FEED and Development Intelligence Unit (DIU).

At the onset, we would like to extend our sincere gratitude to Professor Alka Singh, Professor Seema Bathla, Mr. P. V. S. Suryakumar and Ms Alka Parikh for their invaluable contributions to this survey. Their extensive knowledge and expertise in agriculture and climate change were instrumental in shaping the research, especially in the design of the survey instrument and the analysis of the primary data.

We are also particularly grateful to Shri Sanjeev Chopra, Chairperson of the Forum of Enterprises for Equitable Development (FEED), for his writing the Foreword for this survey. His support and encouragement proved significant throughout the research journey.

We extend our heartfelt gratitude to Mr. Suryamani Roul, Managing Trustee at FEED, for giving shape to this report and for sharing with us his knowledge and expertise on this topic. He has been the guiding light in this journey and the entire team has benefited from his wisdom.

Finally, I would like to thank our teammates in DIU and Sambodhi Panels, who worked tirelessly to produce this report, and the founder member of TRI and Sambodhi, whose unwavering support mader this research possible.

Sandeep Ghosh
Director
Development Intelligence Unit

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List of Abbreviations

ACABC	Agri Clinics and Agriculture Business Centres
AIF	Agri Infra Fund
ATMA	Agricultural Technology Management Agency
AIF	Agriculture Infrastructure Fund
AIR	All India Radio
A&N	Andaman and Nicobar Islands
AI	Artificial Intelligence
BBSSL	Bhartiya Beej Sahkari Samiti Limited
CSS	Central Sector Scheme
CSO	Civil Society Organisation
CC	Climate Change
CRA	Climate-resilient agriculture
CLF	Cluster Level Federations
CInI	Collectives for Integrated Livelihoods
CSC	Common Service Centre
COP	Conference of the Parties
CGTMSE	Credit Guarantee Fund Trust for Micro and Small Enterprises
CHC	Custom Hiring Centre
CHC	Custom Hiring Centre
DTT	Digital terrestrial television
DBT	Direct Benefit Transfer
DSR	Direct Seeded Rice

DTH	Direct To Home
DD	Doordarshan
FPC	Farmer Producer Company
FPO	Farmer Producer Organisation
(KUY)-MOVCDNER	Krishi Unnati Yojana - Mission Organic Value Chain Development for North Eastern Region
GIS	Geographical Information System
GACSA	Global Alliance for Climate-Smart Agriculture
GoI	Government of India
GKMS	Gramin Krishi Mausam Seva
GHG	Greenhouse gas
GDP	Gross Domestic Product
Ha	Hectare
IBISA	Inclusive Blockchain Insurance using Space Assets
ITC	India Tobacco Company
ICAR	Indian Council of Agricultural Research
IMD	Indian Meteorological Department
INR	Indian Rupee
IPPP	Innovative Poultry Productivity Project
ISS	Interest Subvention Scheme
IFAD	International Fund for Agricultural Development
J&K	Jammu and Kashmir
JLG	Joint Liability Groups
KCC	Kisan Credit Cards
KVK	Krishi Vigyan Kendra
KALIA	Krushak Assistance for Livelihood and Income Augmentation
LIC	Life Insurance Corporation
LGD	Local Government Directory
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MIS	Market Intervention Scheme
MIS-PSS	Market Intervention Scheme and Price Support Scheme
MFI	Micro Finance Institution
MIF	Micro Irrigation Fund
MoSPI	Ministry of Statistics and Programme Implementation

MIDH	Mission for Integrated Development of Horticulture
MIDH	Mission for Integrated Development of Horticulture
MISS	Modified Interest Subvention Scheme
MEL	Monitoring, Evaluation, and Learning
NAPCC	National Action Plan on Climate Change
NAPCC	National Action Plan on Climate Change
NAFCC	National Adaptation Fund for Climate Change
NAFED	National Agricultural Cooperative Marketing Federation of India Ltd
NAM	National Agriculture Market
NBM	National Bamboo Mission
NABARD	National Bank for Agriculture and Rural Development
NBHM	National Beekeeping & Honey Mission
NCT	National Capital Territory
NDDB	National Dairy Development Board
NeGPA	National e- Governance Plan in Agriculture
NICRA	National Innovations on Climate Resilient Agriculture
NLM	National Livestock Mission
NMSA	National Mission for Sustainable Agriculture
NMEO-OP	National Mission on Edible Oil - Oil Palm
NRLM	National Rural Livelihood Mission
NSS	National Sample Survey
NSSO	National Sample Survey Office
NRM	Natural Resource Management
NWR	Negotiable Warehouse Receipt
NBFC	Non Banking Financial Company
NGO	Non Government Organisation
PKVY	Paramparagat Krishi Vikas Yojana
PDMC	Per Drop More Crop
PMFBY	Pradhan Mantri Fasal Bima Yojana
PM-KMY	Pradhan Mantri Kisan MaanDhan Yojana
PM-KISAN	Pradhan Mantri Kisan Samman Nidhi
PMKSY	Pradhan Mantri Krishi Sinchayee Yojana
PSS	Price Support Scheme
PACS	Primary Agriculture Credit Society

PE	Producer Enterprise
PG	Producer Group
RAD	Rainfed Area Development
RKVY	Rastriya Krishi Vikas Yojana
RAWE	Rural Agricultural Work Experience
SATHI	Seed Authentication, Traceability & Holistic Inventory
SHG	Self Help Group
SAS	Situation Analysis Survey
SFAC	Small Farmers' Agribusiness Consortium
SHC	Soil Health Card
SOP	Specific Operating Procedures
SAPCC	State Action Plan on Climate Change
SBDA	State Bamboo Development Agency
SBM	State Bamboo Missions
SMAM	Sub Mission on Agricultural Mechanization
IPCC	The Intergovernmental Panel on Climate Change
TRIFED	Tribal Cooperative Marketing Development Federation of India
UT	Union Territory
UAE	United Arab Emirates
VISTAAR	Virtually integrated Systems To Access Agricultural Resources

01

Introduction

Overview of the study

In India, a marginal farmer is someone with up to one hectare of agricultural land where they conduct agricultural activities as a proprietor, sharecropper, or tenant. The National Sample Survey Office (NSSO), Ministry of Statistics and Programme Implementation (MoSPI) conducted a Situation Assessment Survey (SAS) of Agricultural Households during the NSS 77th round (January 2019- December 2019) with reference to the agricultural year July 2018-June 2019 in the rural areas of the country. As per the Survey, the percentage distribution of agricultural households owning less than two hectares of land is 89.4%. According to the All India Report on Agriculture Census 2015-16, while the highest share of cultivators is those of marginal farmers, accounting for 65.4%, their total operational landholding constitutes only 24% of the total cultivable land. This makes the average landholding size of marginal farmers only 0.38 hectares at the national level. This size has remained almost the same for the last 40 years.

For decades, marginal farmers have struggled to thrive and, in some cases, survive due to the prevalent economic landscape. They find themselves unable to pool in enough capital to be deemed creditworthy by banks for loans. The problem of marginal farmers' livelihood was and, to some extent, continues to be aggravated due to the lack of adequate use of quality inputs, poor irrigation facilities, absence of timely advisory, poor extension services leading to low yield, and crop failure, among others. But perhaps the biggest production risks are defined by unfavourable weather conditions, including drought, flood, extended periods of high or low temperatures, etc. Weather events that occur during the course of a cropping season can have a tremendous impact on crop survival, growth, and productivity. At various points in their development (e.g. post-germination, reproduction, yield formation), all crops have varying sensitivities to specific types of weather stresses. Viewed over time, observable trends in the frequency and/or changes in the severity of these intra-seasonal weather events define the principal attributes of climate change to which agriculture must adapt (e.g. rising maximum temperatures, shortening of the rainy season, or increased frequency of droughts during the reproductive phase).

A report by the International Fund for Agricultural Development (IFAD), called 'Small Farms, Big Impacts: Mainstreaming Climate Change for Resilience and Food Security', observed that climate change (CC) threatens the natural resource base across much of the developing world. It accelerates ecosystem degradation and makes agriculture riskier. As a result, smallholder farmers, who are so critical to global food security, are facing more extreme weather. Small-scale farmers are more immediately impacted by droughts, floods, and storms, while also experiencing the gradual effects of climate change. These include water stress in crops and livestock, coastal erosion from rising sea levels, and unpredictable pest infestations. With fewer assets to fall back on and limited ability to recover from climate extremes, smallholder farmers and their families are rendered particularly vulnerable. Exposure to such shocks can trap them in poverty and undermine their efforts to escape it, a trend already being observed globally. Increasing the resilience of smallholder farmers is, therefore, a matter of urgency.[1]

The Government of India is cognizant of the impact of climate change on agriculture and farmers' lives with climate change impact assessments being carried out using the crop simulation models by incorporating the projected climates of 2050 and 2080. In the absence of the adoption of adaptation measures, it has been estimated that rainfed rice yields in India may reduce by 20% by 2050 and 47% by 2080 scenarios, while irrigated rice yields are projected to reduce by 3.5% in 2050 and 5% by 2080 scenarios. For wheat yield, the statistics stand at a reduction by 19.3% by 2050 and 40% by 2080.

In such a context, solutions must optimise investments in the farm sector, intensify the gains from cultivable land, bring the markets closer, and figure out alternate courses to make farming a profitable business. Opportunities to expand and diversify the sources of income through off-farm activities such as aggregation, micro-processing, and trading have immense potential to engage young people in gainful employment.

[1] *Small farms, big impacts: mainstreaming climate change for resilience and food security: IFAD, November 2014*

In lieu of this, the Government of India has formulated schemes/plans to make agriculture more resilient to climate change. The National Mission for Sustainable Agriculture (NMSA) is one of the Missions within the National Action Plan on Climate Change (NAPCC). It aims to evolve and implement strategies to make Indian agriculture more resilient to the changing climate. The Union Government has already taken a slew of initiatives to address the production and marketing side of the sector, along with a social security net for farmers, especially smallholders. Under the former, we have seen the roll-out of the:

- Agriculture Infrastructure Fund (AIF),
- Formation & Promotion of new 10,000 FPOs,
- Market Intervention Scheme and Price Support Scheme (MIS-PSS),
- Soil Health Card (SHC), and
- Paramparagat Krishi Vikas Yojana (PKVY), etc.

For the latter, we have flagship schemes such as the:

- Pradhan Mantri Kisan Samman Nidhi (PM-KISAN),
- Pradhan Mantri Kisan MaanDhan Yojana (PM-KMY),
- Pradhan Mantri Fasal Bima Yojana (PMFBY), and
- Modified Interest Subvention Scheme (MISS), etc.

In this report, we investigate the extent to which such initiatives have reached and benefited marginal farmers.

Survey Objectives

The entire survey was designed to address three clear objectives, viz.

1. Measure impact of climate change on marginal farmers, including exposure to extreme weather events, impact on crop production, and quantum of loss;
2. Understand the availability and adoption of various climate resilient adaptation strategies that are part of government schemes and programs, and community response through community-led institutions, and constraints towards adoption; and
3. Document India's climate action in the field of agriculture and livelihood preservation of marginal farmers and provide policy recommendations for the way forward.

Survey Content

The survey findings are divided into four sections:

1. Profile of Marginal Farmers in India
2. Impact of Climate Change on Marginal Farmers
3. Adaptation strategies
4. Policy Implication

The first section deals with the characteristics of marginal farmers in India and their socio-economic status and livelihood patterns. Then, we move on to the impact of climate change on the study audience, looking

specifically at their degree of exposure to natural calamities and the impact of such weather events on crop production, productivity, and net loss in production.

In the third section, we discuss at length the adaptation strategies, viz. adaptation of climate resilient agriculture and challenges therein, livelihood diversification, access to and utilisation of government schemes and benefits, and challenges therein. We conclude with a detailed look at what initiatives Government on India has taken to address Climate Resilient Agriculture, the role being played by the private sector, and the recommendations for policy makers, including strategies for enhancing climate resilience among marginal farmers and policy interventions required at local and national levels.

02

Survey Methodology

A total of 6,615 marginal farmers were interviewed for this study, selected from a large pan-India panel of farmers (all categories) maintained by Sambodhi Panels. The respondents were selected after determining their land holding size through tele-calling.

To maintain some randomisation, the long list of farmer calling numbers was randomised and given to different callers located across different states for cold calling. The sample was drawn from 21 states (see Table 1 below), and the survey was telephonically administered. Each eligible farmer (with less than one ha of land) who was not able to give time at the first contact was called thrice before replacement. The sample distribution across states were roughly in proportion to their rural population (but smaller states had to be given a higher sample than their proportion contribution to the rural population to ensure minimum sample size), as also the likely availability of marginal farmers based on our experience from Round 1 of the survey conducted in 2023. In essence, this was a purposive sampling with a focus to represent only marginal farmers cultivating up to 1 Ha of land.

Table 1: Distribution of achieved sample

State	Zone	Sample achieved
Chhattisgarh	Central	410
Madhya Pradesh		417
Uttar Pradesh		646
Subtotal		1473
Bihar	East	525
Jharkhand		401
Odisha		395
West Bengal		399
Subtotal		1720

State	Zone	Sample achieved
Haryana	North	155
Himachal Pradesh		196
Punjab		145
Subtotal		496
Assam	Northeast	301
Nagaland		83
Tripura		102
Mizoram		80
Subtotal		566
Andhra Pradesh	South	316
Karnataka		323
Tamil Nadu		313
Telangana		310
Subtotal		1262
Gujarat	West	304
Maharashtra		402
Rajasthan		392
Subtotal		1098
Total		6,615

The erstwhile Planning Commission (now known as the NITI Aayog), as a result of the mid-term appraisal of the planning targets of the Seventh Plan, had divided the country into fifteen broad agro-climatic zones based on physiography, soils, geological formation, Climate, cropping patterns, and development of irrigation and mineral resources for broad agricultural planning and developing future strategies. The achieved sample of this survey can also be distributed as per the 15 Agro Climatic Zones of India. It may be stated that this is a rough distribution and is meant to be indicative

Table 2: Distribution of achieved sample by Agro Climatic Zones

Western Himalaya	196
Eastern Himalaya	566
Lower Gangetic Plains	399

Middle Gangetic Plains	848
Upper Gangetic Plains	323
Trans Gangetic Plains	398
Eastern Plateau and Hills	1008
Central Plateau and Hills	474
Western Plateau and Hills	407
Southern Plateau and Hills	851
East Coast Plains and Hills	410
West Coast Plains and Hills	235
Gujarat Plains and Hills	304
Western Dry Region	196
Islands	0
Total sample	6615

03

Profile of Marginal Farmers

Of the 6,615 marginal farmers interviewed, the majority were cultivating their own land, while around one in six were share croppers (where a landowner allows a share cropper to use the land either for a fixed rent or in return for a share of the crops produced on that land).

Table 3: Distribution of chief wage earner by landholding type

Landholding type	Percent
Farmer owning and cultivating up to a maximum of 1 ha of land	83.1
Sharecropper who is cultivating up to a maximum of 1 ha of land but has taken it on a fixed lease/rent or in exchange for a share of the produce	16.9
Base	6615

The gender distribution of the respondents was 78.5% male farmers and 21.5% female farmers. The median age of the respondents was 42 years.

Only 14.4% of the responding farmers had received formal training on agricultural practices. The rest relied on knowledge passed down through generations.

Profiling marginal farmers by their cropping practices looks at two different aspects of their farming:

- farmers' engagement by cropping season, and
- the crops cultivated by season.

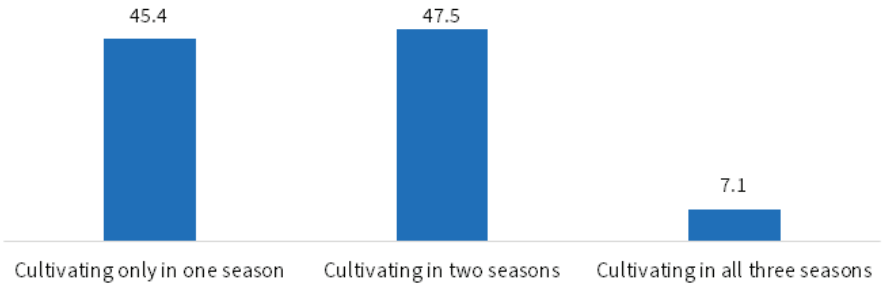

Figure 1: Engagement of farmers by cropping season (in %)

Base = 6,615 respondents

Little less than half the marginal farmers interviewed cultivated only in one season, which was overwhelmingly during the Kharif season. In India, the season is popularly considered to start in June and end in October. Kharif crops are usually sown at the beginning of the first rains during the advent of the south-west monsoon season, and they are harvested at the end of the monsoon season, between October and November. Farmers farming only during this season are mostly rainfall-dependent without adequate access to irrigation facilities. Or, they prefer to cultivate their own land during the rains but work on someone else's land as agricultural labour. Finally, some also prefer to engage in other wage labour-based occupations outside this sector during their off-seasons.

A slightly higher percentage of farmers engaged in tilling their own land across two seasons, viz. Kharif, as well as Rabi. Rabi crops are sown around mid-November, preferably after the monsoon rains are over, and harvesting begins in April / May. The crops are grown either with rainwater that has percolated into the ground or using irrigation.

The survey data shows that 95% of the farmers who practice farming across two seasons do so between Kharif and Rabi, while less than 4% do so during Kharif and Zaid and around 1% during Rabi and Zaid. Zaid crops are summer-season crops. They grow for a short time period between Rabi and Kharif crops, mainly from March to June.

Just about 7% of the marginal farmers practice farming on their own land across all three seasons, indicating nearly year-round access to irrigation.

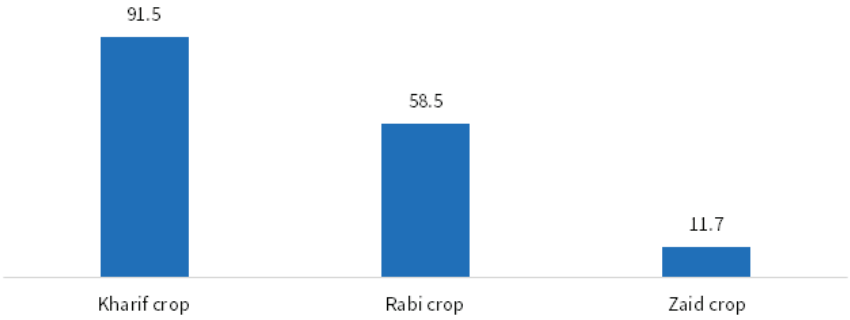

Figure 2: Distribution of farmers by cultivation of crops by season (in %)

Base = 6,615 respondents

Table 4: Distribution of marginal farmers by number of cropping cycles they cultivate

No. of seasons	% of total Farmers
1 season	
Kharif	91%
Rabi	9%
Zaid	0%
Proportion of all farmers	45%
2 seasons	
Kharif & Rabi	95%
Kharif & Zaid	4%
Rabi & Zaid	1%
Proportion of all farmers	48%
3 seasons	7%
Total Farmers	6615

The following table looks at the top five crops grown in the country by marginal farmers within each agricultural season.

Table 5: Top five crops grown in each agricultural season (in %)

Kharif - Top 5 Crops	Proportion of farmers growing the crop
Paddy	68.9
Maize	15.7
Bajra	8.6
Cotton	5.3
Tur (Arhar)	4.9
Rabi - Top 5 Crops	
Wheat	59.0
Rapeseed & mustard (toria)	15.6
Gram	11.7

Kharif - Top 5 Crops	Proportion of farmers growing the crop
Potato	9.0
Maize	8.3
Zaid - Top 5 Crops	
Moong	14.2
Urad	11.5
Paddy	9.4
Maize	9.4
Tur	6.2

Base = 6,615 respondents, of whom 6,052 farmers grew crops in Kharif, 3868 and 775 farmers grew crops in Rabi and Zaid, respectively.

In India, marginal holding farmers primarily cultivate paddy (focused exclusively on the Kharif season), followed by wheat (focused primarily on the Rabi season). This is followed by coarse cereals and pulses, which cut across seasons. These findings are in line with the findings of the Agricultural Census 2015-16.

04

Impact of Climate Change on Marginal Farmers

Some of the most important impacts of global climate change will be felt among subsistence or smallholder farmers, predominantly in developing countries. Their vulnerability to climate change comes both from being predominantly located in the tropics and from various socio-economic, demographic, and policy trends, limiting their capacity to adapt to change[2].

However, efforts to support marginal farmer adaptation are hindered by the lack of information on how they are experiencing and responding to climate change. There is an ardent need to generate more information on how different types of marginal farmers vary in their perceptions, experiences, and responses to climate change so that governments can tailor adaptation programs to different smallholder farmer contexts.

Degree of Exposure to Climate Risks

In this section, we present the distribution of marginal farmers who claimed that their village had been affected (or otherwise) by any of the mentioned extreme weather events related to climate change in the past five years.

[2] *The impact of climate change on smallholder and subsistence agriculture; John F. Morton, PNAS Research Article, December 11, 2007.*

Table 6: Distribution of marginal farmers whose villages had or had not been affected by extreme weather events in the past five years

Type of extreme weather event	In percentage
Early withdrawal/delayed arrival of monsoon	23.6
Floods	17.5
Cyclone	13.0
Droughts/much lower than normal amount of rainfall	40.9
Extreme heatwave	7.7
Rise in day temperature (above normal)	10.3
Prolonged summer/ increased number of hot days	11.5
Prolonged winter /increased number of cold days	12.3
Excessive rainy days/non-seasonal rains	32.6
Village was not affected by any of the above in the last five years	20.4
Total respondents	6615

The table above shows that in most cases, the damage appears to have been caused by rainfall-related events. Around 41% of the respondents reported that the extreme weather events were related to drought conditions or seasons with much lower-than-normal rainfall, while close to one in three had witnessed excessive or non-seasonal rains. A little less than a quarter of the respondents also cited early withdrawal or late arrival of the monsoons, all of which have adverse impacts on their cropping cycle. Excessive rainfall leading to floods was reported by over 17% of the survey participants. One in five respondents stated that they had not witnessed extreme weather events which were detrimental to cultivation in the last five years.

Furthermore, rice, vegetables, and pulses are significantly affected by the uneven rainfall distribution. Paddy fields in northern states can remain submerged for more than a week, destroying newly planted seedlings and forcing farmers to wait for waters to recede so they can replant. On the other hand, scant rainfall can delay the planting of rice, corn, cotton, soybeans, groundnuts, and pulses in states including Maharashtra, Telangana, Andhra Pradesh, Chhattisgarh, Bihar, and West Bengal.

Delays in planting after mid-July typically result in lower yields in much of India. For summer crops, delays in planting lead to delays in harvesting, ultimately resulting in the late sowing of winter crops such as wheat, rapeseed, and chickpeas. Cold weather is crucial for winter crops, but higher temperatures in recent years during the maturity phase have resulted in yield losses.

Table 7: Distribution of the number of times marginal farmers had reported that their village had been affected by extreme weather events in the past 5 years (in %)

Type of extreme weather event	Once	Twice	3 times	4 times or more
Early withdrawal/delayed arrival of monsoon	38.4	34.4	19.0	8.2
Floods	54.7	31.4	9.6	4.3
Cyclone	51.2	30.8	10.5	7.5
Droughts/much lower than normal amount of rainfall	38.5	37.7	19.6	4.2

Type of extreme weather event	Once	Twice	3 times	4 times or more
Extreme heatwave	50.7	33.9	11.7	3.7
Rise in day temperature (above normal)	51.5	35.7	10.2	2.6
Prolonged summer/increased number of hot days	41.7	30.8	16.2	11.3
Prolonged winter increased number of cold days	46.2	31.4	13.9	8.5
Excessive rainy days/non-seasonal rains	39.8	38.7	16.3	5.2

Base = 5263 farmers whose villages had been affected by extreme weather events in the last five years

Most farmers reported that their village had witnessed extreme weather events once or twice in the past five years. The incidence rate tapers down considerably thereafter. Nevertheless, the fact that over one in three marginal farmers had to cope with extreme weather events at least twice in a period of five years means their earning capacity from agriculture has been seriously constrained. The extent of the damage and the resulting financial loss have been described in detail in the following section.

Impact of Extreme Weather Event on Crop Output

First of all, as the data demonstrates, less than 10% of the farmers consistently reported no crop loss due to extreme weather events. The figure is slightly higher for cyclones, perhaps because, apart from coastal states, this is not a phenomenon that affects other parts of India to any significant degree. Farmers have seemingly adapted well to extreme temperature events. Over 40% of them reported either no crop loss or only a small proportion of their crops were affected by prolonged summer, an excessive number of hot days, higher than normal day temperatures, or early/late monsoon patterns. The most significant impact has been due to excessive or non-seasonal rains, prolonged winter conditions, droughts, and floods, with over 50% of farmers reporting that half or more of their standing crops have been lost.

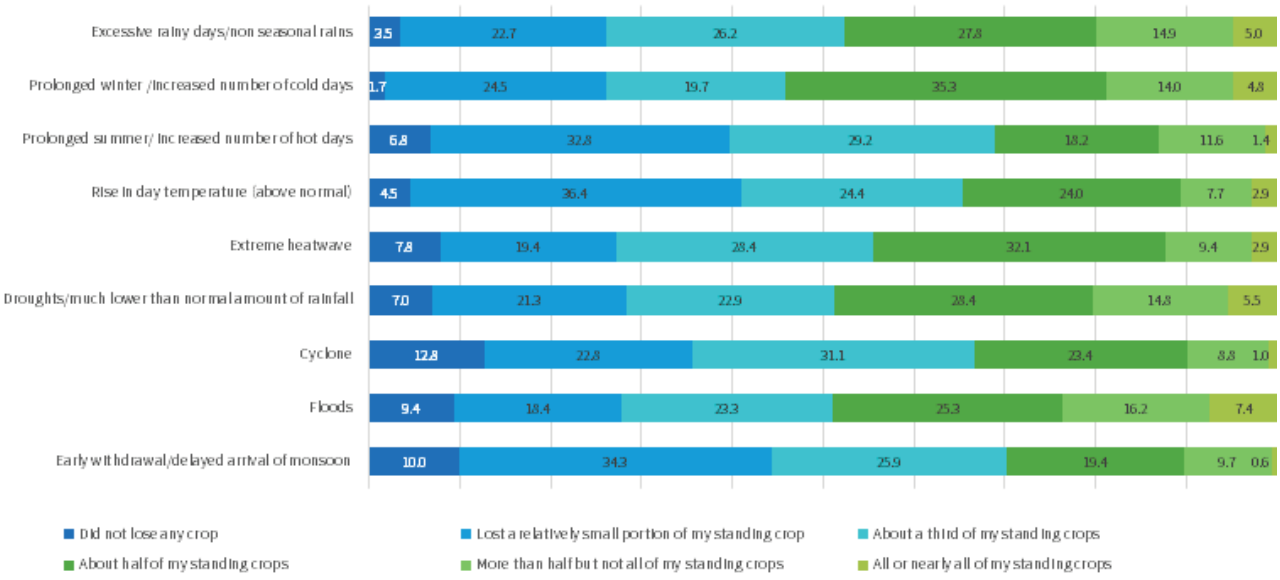

Figure 3: Distribution of reported loss of crop due to each of extreme weather event (in %)

Base = 5263 farmers whose villages had been affected by extreme weather events in last five years

Table 8: Proportion of farmers reporting loss of crop the last time an extreme weather event affected their farm output

	Crop Name	% of farmers reporting crop loss
Kharif Season	Paddy	49.6
	Cotton	47.5
	Bajra	39.4
	Maize	29.2
	Tur (Arhar)	24.1
Rabi Season	Wheat	45.0
	Gram	44.1
	Rabi Maize	41.4
	Mustard (Toria/ Taramira)	31.7
	Potato	19.3
Zaid Season	Maize	43.6
	Moong	29.7
	Urad	23.0
	Paddy	22.5
	Tur (Arhar)	18.4

Base = 5263 farmers whose villages had been affected by extreme weather events in last 5 years

The above table shows the proportion of farmers reporting crop loss in the last extreme weather event faced by them. Crop loss is being observed across all types of crops (rice, wheat, cotton, coarse cereals, as well as pulses) across all seasons but the incidence of loss is relatively lower during Zaid, perhaps also because very few marginal farmers have a Zaid crop to begin with. The alarming fact, however, is that in excess of half the farmers had reported loss in staples. The quantum of loss due to the last extreme weather event caused by climate change, have been discussed below.

Table 9: Proportion of crop loss reported in each season after the last extreme weather event affected their crop (in %)

	Lost a relatively small portion of standing crops	Lost about a third of standing crops	Lost about half of standing crops	Lost more than half but not all of standing crops	Lost all or nearly all of standing crops
Kharif					
Paddy	23.1	26.0	27.1	16.1	7.7
Cotton	19.6	25.5	30.7	20.3	3.9
Bajra	7.7	23.2	27.5	30.4	11.1

	Lost a relatively small portion of standing crops	Lost about a third of standing crops	Lost about half of standing crops	Lost more than half but not all of standing crops	Lost all or nearly all of standing crops
Maize	15.9	32.9	28.3	15.5	7.4
Rabi					
Wheat	17.4	40.2	29.1	9.9	3.5
Gram	18.1	21.1	19.6	22.6	18.6
Rabi Maize	19.6	35.3	30.8	12.0	2.3
Mustard	28.3	23.6	20.9	14.1	13.1

NB: The above table contains analysis for only those crops that at least 100 farmers reported cultivating. No crops in the Zaid season met this inclusion criteria.

If we consider Paddy and Wheat, the two major crops grown by marginal farmers during Kharif and Rabi seasons respectively, we can see that 50% of the farmers had lost at least half their standing crop of Paddy during the last extreme weather events, while 42% had lost at least half their standing wheat crop during the same period.

The data on crop loss proportions and severity from the latest extreme weather event reflects a recurring trend among the farmers. The survey also asked the farmers about their average crop loss in the past 5 years along with the quantum of crop loss and found very similar results as shown below.

Table 10: Average proportion of farmers reporting loss of crop at least once in the past 5 years for top 5 major crops grown in each season

	Crop Name	% of farmers reporting crop loss
Kharif Season	Cotton	64.6
	Paddy	57.4
	Bajra	51.0
	Maize	44.7
	Tur (Arhar)	31.2
Rabi Season	Maize	55.5
	Wheat	50.6
	Gram	45.5
	Mustard (Toria/ Taramira)	30.5
	Potato	22.2

	Crop Name	% of farmers reporting crop loss
Zaid Season	Maize	59.0
	Moong	41.4
	Urad	30.3
	Paddy	20.3
	Tur (Arhar)	10.2

Base = 5263 farmers whose villages had been affected by extremely weather events at least once in last 5 years.

The above table depicts that the crop loss faced during the last extreme weather event. This is more or less consistent with the trend of crop loss in the past 5 years. The quantum of loss is given in the following table.

Table 11: Proportion of crop loss by season (in %) in last 5 years

	Lost a relatively small portion of standing crops in last 5 years	Lost about a third of standing crops in last 5 years	Lost about half of standing crops in last 5 years	Lost more than half but not all of standing crops in last 5 years	Lost all or nearly all of standing crops in last 5 years
Kharif					
Paddy	19.0	28.9	29.0	16.1	7.0
Maize	12.0	38.3	29.3	15.5	4.9
Bajra	12.3	22.0	29.9	25.8	10.1
Cotton	5.3	39.4	30.3	20.7	4.3
Rabi					
Wheat	18.2	34.7	27.5	13.6	6.0
Gram	8.8	28.3	20.5	22.4	20.0
Mustard	27.7	25.0	23.4	13.0	10.9
Rabi Maize	12.9	36.0	37.1	10.7	3.4

NB: The above table contains analysis for only those crops where at least 100 farmers had reported cultivating the same. There were no crops in Zaid season which met this inclusion criteria.

Compared to the crop loss reported in the last extreme weather event, the cumulative trend over the past 5 years shows that a higher proportion of farmers are losing at least one-third to half of their crops due to these events. The study demonstrates that 50% of paddy farmers and over 40% of wheat farmers losing more than half of their crops is a consistent trend over the past 5 years. For all other crops, losing more than 50% of their crops had been reported by 45-65% of the farmers. These are alarming numbers and perhaps signifies the need for universalisation of crop insurance cover among this constituency.

An attempt was made to calculate the monetary value of crop loss based on reported volume and current market rates across different states. The results are given below.

Table 12: Median value of crop loss the last time an extreme weather event affected production

Loss (in INR)		Loss (in INR)		Loss (in INR)	
Kharif		Rabi		Zaid	
Paddy	8400	Wheat	9200	Maize	1475
Maize	6000	Gram	5000	Moong	3000
Bajra	2200	Mustard & Rapeseed	10000	Paddy	1680
Cotton	27200	Maize	3850	Urad	1488
Tur (Arhar)	12100	Potato	2000	Tur (Arhar)	1280

Base = 4,823 respondents who reported value of crop lost when the last calamity occurred

Let us look at two specific crops, Paddy and Wheat since these are sown by the majority of marginal farmers, albeit at different seasons. The median value of loss for Paddy during the Kharif cycle was INR 8,400 during the last incidence of crop loss owing to extreme weather events. Similarly, the median value of loss for Wheat during the Rabi season was INR 9,200.

Data from the Situation Assessment Survey (SAS) of Agricultural Households in the rural areas of the country conducted by the National Statistical Office (NSO), Ministry of Statistics and Programme Implementation (MoSPI) during the 77th round (January 2019- December 2019) with reference to the agricultural year July 2018- June 2019, estimates the following:

Size class of land possessed (ha.)	Average monthly income from net receipts from crop production (INR)	Average annual income from net receipts from crop production
0.01 – 0.40	977	11724
0.40 – 1.00	2683	32196

Now, the first round survey conducted by Development Intelligence Unit in 2023 titled 'Annual Survey of State of Marginal Farmers in India' had estimated that the average land holding size of marginal farmers in India was 0.38 ha. If we take this to be falling under the first category (.01 to .40 ha), then one can say that the proportion of loss in income for the 50% marginal farmers who only grew the Paddy crop during Kharif was to the tune of 72% {(Rs.8400 ÷ Rs.11724) x 100} (for farmers with holding below 0.4 Ha.). If we take the land holding to be between 0.40 – 1.00 ha, then the proportion of loss of Paddy crop stands at 26% {(Rs.8400 ÷ Rs.32196) x 100}. If the farmer was growing only Wheat during the Rabi season, then the extent of loss would be 78% (for .01 - 0.40 ha average land holding category) and 28% (for 0.40 – 1.00 ha land holding category respectively). This is, of course, with the assumption that average net loss of production of either crop is similar across both land holding sizes.

05

Adaptation Strategies

Tripathi and Mishra, in their article 'Knowledge and passive adaptation to climate change: An example from Indian farmers'[3] observes that climate change is no longer a distant problem. They argue that the world has been experiencing changes in climatic variables, such as rising temperature, variable rainfall, frequent droughts, hurricanes, and typhoons, and have almost failed to reach a global consensus on the mitigation of greenhouse gas (GHG) emissions. Additionally, they note that a slow mitigation response will not reduce the adverse effects of GHGs that are already in the atmosphere but would significantly reduce the rate of growth in global warming. Therefore, along with fast mitigation responses, what is also required is adaptation to climate change.

Adaptation to climate change refers to adjustments or changes in the system to minimize the negative impact and optimize the positive impacts of climate change (CC). While it is understood that adaptation could be at different levels of government, adaptation at the local level is the most critical issue, as local actors are the ones who realise the severity of climate change. Adaptation is a two-step process. First, one has to perceive climate change and associated risks; then, steps need to be taken to minimise the adverse effects of climate change. Perception should be more or less correct, otherwise steps taken based on wrong perception could have an adverse effect.

Adaptation strategies to CC is a major challenge, especially in a developing country like India, where a vast majority of farmers are marginal and smallholder farmers, less connected, and have significantly lower adaptive capacity. As a result, one cannot expect autonomous adaptation. Hence, the only way out is a planned or policy-driven and incentivised adaptation strategy.

Impact of Access to Support Systems for Marginal Farmer Government Services

Agriculture is a state subject. However, there is an emerging scenario of collective and coordinated action at all levels, i.e. Sarkar (Government, both Central and respective States), Samaj (Civil Society), and Bazaar (Markets) in implementing a comprehensive range of schemes, programmes and initiatives for the welfare of farmers in the country. These schemes encompass the entire spectrum of agriculture, including:

- credit,
- insurance,
- income support,
- infrastructure,
- crops,
- horticulture,
- seeds,
- mechanisation,
- marketing,
- organic and natural farming,
- farmer collectives,
- irrigation,
- extension,
- procurement at minimum support prices, and
- digital agriculture, etc

[3] *Knowledge and passive adaptation to climate change: An example from Indian farmers; Amarnath Tripathi and Ashok K. Mishra; 24 November 2016; www.elsevier.com*

For instance, under Sarkar, the central and state governments implement several agricultural and rural development schemes and programmes through various ministries and departments. Many of these are related to climate change adaptations directly or indirectly, focusing on regenerative and sustainable agriculture and natural farming, among others. The Ministry of Agriculture and Farmers' Welfare implements 27 different Central Sector Schemes and Centrally-sponsored Schemes (details available in Annexure) for promoting farmers' welfare and raising their income. Direct policy intervention by the Government of India and state governments in combating the impact of climate change on agriculture includes the National Action Plan on Climate Change (NAPCC) and the State Action Plan on Climate Change (SAPCC). They have been discussed in detail under Chapter 6. Under Samaj, there are community-level responses through various initiatives like FPOs/FPCs/PGs/PEs/PACS and SHGs, which harness the power of the collective to improve the bargaining power of farmers, including marginal farmers, for greater access to services and markets. Finally, under Bazaar, we are witnessing an enhanced presence of the private sector in promoting climate-smart agriculture. A few examples include ITC promoting Climate Smart Villages, or agricultural micro-insurer IBISA and Collectives for Integrated Livelihoods (CInI), a nodal agency of the Tata Trusts reaching out to thousands of small and marginal farmers with its digital weather index-based insurance, or EM3, a leading Custom Hiring company, creating a pan India network of farm service centres – "Samadhan Kendras" established under the Sub-Mission on Agricultural Mechanisation (SMAM).

The following section explores some of the key interventions and whether they have been utilised by the marginal farmers to build resilience to possible climatic shocks and secure their livelihood.

Membership in FPO/FPC/PG/PE/PACS

The idea behind Farmer Producer Organizations is to empower farmers as the primary producers of agricultural goods by enabling them to come together in groups. To facilitate this process, the Small Farmers' Agribusiness Consortium (SFAC) was mandated by the Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, to support the state governments in forming Farmer Producer Organizations (FPOs). The role of the FPOs is to act as an aggregator for member farmers, helping them manage everything from inputs to outputs, thereby enhancing the economy of scale and the member farmers' bargaining power. In the case of unsold lots, logistics arrangements are to be made by FPO/FPC. A Farmer Producer Company (FPC) can be formed by any ten or more primary producers, or by two of more producer institutions or by a contribution of both. An FPC is a hybrid between cooperative societies and private limited companies. Its primary objective is to ensure better income for the producers through an organisation of their own. Small producers do not have the volume individually (both inputs and produce) to get the benefit of economies of scale. Besides, in agricultural marketing, there is a long chain of intermediaries who, very often, work non-transparently, leading to a situation where the producer receives only a small part of the value that the penultimate consumer pays. However, through aggregation, the primary producers can avail themselves of the benefit of economies of scale. They will also have better bargaining power vis-a-vis the bulk buyers of produce and bulk suppliers of inputs.

A producer group (PG) may be formed with at least member size of 20 producers having common interest of producing similar products and services with the opportunity of collectivization, aggregation, value addition and marketing of produces. Producers' Enterprises (PEs) can be defined as registered, formal organisations of farmers, including co-operatives and FPCs. The primary objective of these organisations is to ensure better economic returns to the farmer producers by helping them take up business activities. These enterprises function as commercial organisations and being economically sustainable is crucial for their success.

Primary Agricultural Credit Societies (PACS), being a registered cooperative society, has been providing credit and other services to its members. It has been observed that PACS is generally meeting the credit requirements of its members. Some of the PACS are also assisting farmers in marketing their produce, access to subsidies and agriculture inputs. PACS provide both backward and forward linkages to its members, thereby acting as a PO, in order to promote efficient crop production practices for its members on the one hand and opportunities for better price realisation of their produce on the other.

This section will explore two aspects: marginal farmer membership in FPO/FPC/PE/PACS and the benefits members derive from such membership.

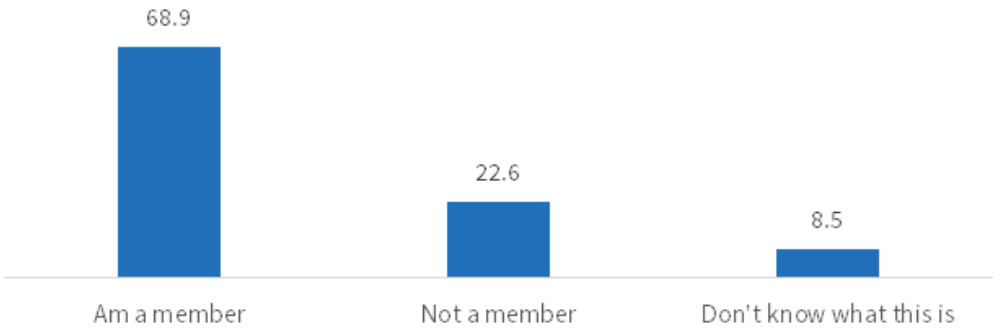

Figure 4: Membership in FPO / FPC / PG / PE / PACS (in %)

Base = 6,615 respondents who undertook this survey

It is clear that the majority of the marginal farmers (nearly 69%) are members of at least one of these organisations. Whether being economically compromised by the vagaries of nature leads farmers to seek security in numbers and the support and safety such associations offer is speculative at best and needs further research.

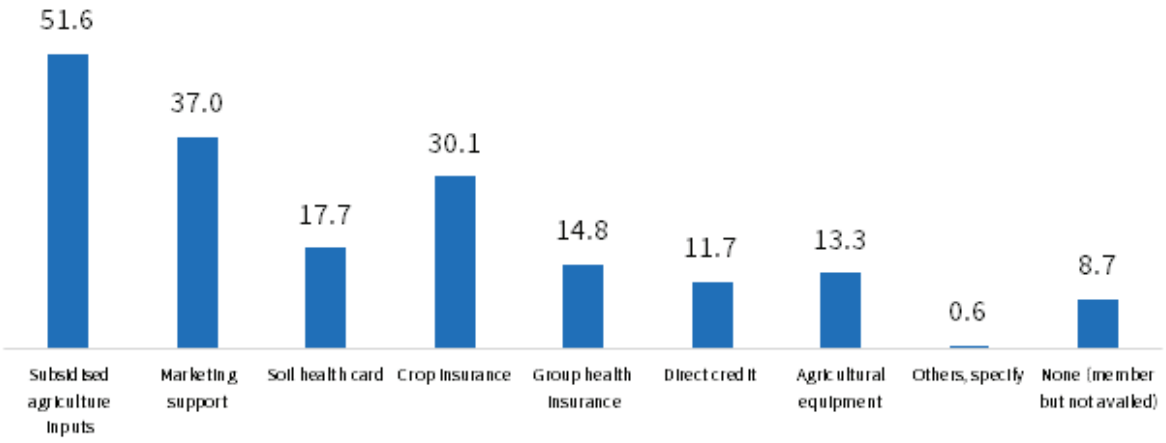

Figure 5: Nature of assistance received through the membership (in %)

Base = 4558 respondents who are members of an FPO/FPC/PG/PE/PACS

A little over half of the marginal farmers who were members had availed of subsidised agriculture inputs through their associations, while over a third had availed of marketing support. Around 30% of the members had availed of crop insurance through their associations.

It is to be noted that while all FPO/FPC/PG/PE/PACS act as facilitating organisations for marginal farmers to access financial assistance provided through government grants or bank assistance reach them through Direct Benefit Transfer. In such cases, the organisation is not the direct lenders. However, in some cases they do lend to their members from their own kitty but that proportion is much lower.

Receipt of DBT for PM Kisan Samman Nidhi or under other Farmer Welfare Schemes

The PM Kisan Samman Nidhi is a Central Sector scheme with 100% funding from the Government of India and has been operational since December 2018. Under the scheme, income support of INR 6,000 per year in three equal instalments is provided to all land-holding farmer families, which consists of the husband, wife, and minor child in

the context of the scheme. State Government and UT administration identify the farmer families which are eligible for support as per scheme guidelines. The funds are directly transferred to the bank accounts of the beneficiaries. There are other schemes, such as Krishi Unnati Yojana (KUY)-MOVCDNER and the Pradhan Mantri Fasal Bima Yojna, where Direct Benefit Transfer (DBT) takes place directly into the farmers' accounts.

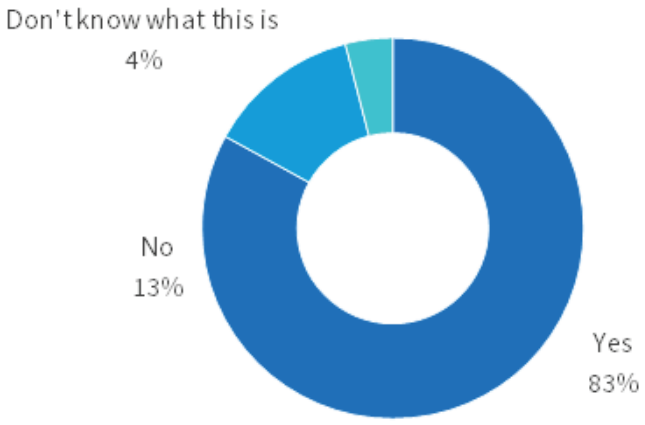

Figure 6: Receipt of Kisan Samman Nidhi or money under other farmer welfare schemes sent directly to bank account (in %)

Base = 6,615 respondents

Close to 83% of the marginal farmers surveyed had received some form of government grants or subsidies (primarily Kisan Samman Nidhi) directly to their bank accounts. According to the agriculture census of 2016 the total number of agricultural household in India irrespective of holding size is 14.64 Cr. According to the PIB in 2023-23 current official coverage of PM Kisan Samman Nidhi stands at 10.71 Cr, which is 73.15% of the total farmers. In this context, since our sample consisted of only marginal farmers, and the PM Kisan was geared towards small holder farmers, it was expected that the all India penetration will be higher. It is important to mention here that there are parallel schemes being implemented by the state government which have similar scope. For instance, the KALIA scheme (Krushak Assistance for Livelihood and Income Augmentation) has been launched by the Odisha Government to accelerate Agricultural Prosperity and reduce poverty in the State. Small and marginal farmers, landless agricultural households, vulnerable agricultural households, landless agricultural labourers, and share croppers (actual cultivators) are eligible under different components of the scheme. A total of 50 lakh families will be covered under the scheme. Financial assistance of INR 25,000 per farm family over five seasons is provided to small and marginal farmers so that they can purchase inputs like seeds, fertilisers, and pesticides and use assistance towards labour and other investments. Another state government initiative is the Bhavantar Bhugtan Yojana (price difference payment scheme), a programme by the Government of Madhya Pradesh in which the government compensates farmers for the difference between the official Minimum Support Price (MSP) and the rate at which they sell their crops, or the Model Price, whichever is higher.[4]

Penetration of Pradhan Mantri Fasal Bima Yojana

The Pradhan Mantri Fasal Bima Yojana (PMFBY) is a pivotal government initiative aimed at providing comprehensive crop insurance to farmers across India. Launched in 2016, the scheme seeks to mitigate the financial risks associated with crop failures due to natural calamities, pests, and diseases. By ensuring a stable

[4] *https://mpkrishi.mp.gov.in/hindisite_New/bhavantar_new.aspx*

income flow and safeguarding the livelihoods of millions of farmers, PMFBY plays a crucial role in promoting agricultural resilience and economic stability. 35% of the surveyed marginal farmers were enrolled for this scheme.

Irrigation System and Water Usage

Places that have sparse or seasonal rainfall could not sustain agriculture without irrigation. In areas that have irregular precipitation, irrigation improves crop growth and quality. By allowing farmers to grow crops on a consistent schedule, irrigation also creates more reliable food supplies[5].

Table 13: Irrigation facility usage by marginal farmers (%)

	Those impacted by climate change	Those not impacted by climate change
Yes, own tubewell/borewell	29.9	48.6
Yes, use water from public canal	28.5	38.6
Yes, use drip irrigation/sprinkler irrigation	10.0	10.1
Yes, purchase water from other's irrigation system	24.2	11.8
Well/pond	23.5	27.4
Spring water	7.1	10.1
None	13.4	11.7
Base	5263	1352

First of all, a little over 10% of the interviewed marginal farmers do not use irrigation water at all - they depend primarily on monsoon rains. Among those who do, we see a stark difference between usage patterns among those who said they were impacted by climate change and those who were not.

The survey data reveals that those farmers not impacted by climate change have far greater access to conventional irrigation sources, viz. tube-wells/borewells, water from public canals, and even wells and ponds, than those who were impacted by climate change. This leads us to conclude that those with greater access to affordable irrigation have somehow remained more insulated from the ill effects of severe weather events than those with lower levels of access. This is also reinforced by the fact that more the double the proportion of farmers from the latter category had to buy irrigation water (which is a huge financial burden for small and marginal farmers) than those who had greater access to more traditional forms of irrigation.

One in ten marginal farmers reported using sprinkler or drip irrigation, which is a positive testament to the Government of India's support of micro irrigation (MI), especially through the Pradhan Mantri Krishi Sinchayee Yojana (PMKSY), which has included MI as an integral component of the scheme.

Access to Custom Hiring Centres for Farm Mechanisation and Labour-saving Technologies

Custom Hiring Centres, or CHCs, are units comprising a set of farm machinery, implements, and equipment meant for custom hiring by farmers. Though certain implements and equipment are crop-specific, traction units like tractors, power tillers, etc., and self-propelled machinery like combine harvesters, etc., are used

[5] *National Geographic Society: https://education.nationalgeographic.org/resource/irrigation/*

in common. The utilisation of farm machinery and equipment reduces the unit cost of production through enhanced input use efficiency and judicious use.

The survey also explored whether marginal farmers had access to a Custom Hiring Centre within 10 km of their place of residence.

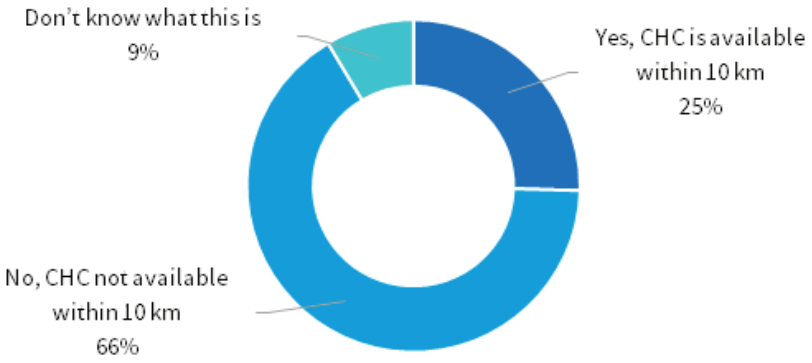

Figure 7: Availability of Custom Hiring Centre within 10 km of residence (in %)

Base = 6,615 respondents

Two out of three marginal farmers interviewed had confirmed that there was no CHC within 10 km of their village, demonstrating the difficulties faced by marginal farmers in availing benefits from CHC. But the more important question is whether or not marginal farmers hire agricultural equipment from these Centres for their farming activities. This question was asked only to those farmers who had reported that there was a CHC within 10 km of their residence and knew what it was.

Among those marginal farmers with access to a CHC within a reasonable distance of 10 km, the survey found that only 14.4% had ever hired agricultural equipment from the CHC. If we assume that marginal farmers would primarily own traditional farming equipment, this could indicate that most marginal farmers do not feel the need to switch to modern farming, given that their holding sizes are very small.

Access to Outlets Selling Subsidised Seeds and Fertilisers

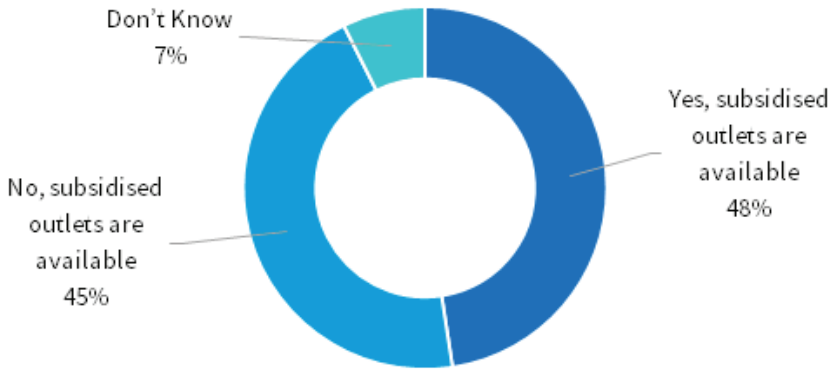

Figure 8: Availability of subsidised outlets for seeds and fertilizers within 10 km of residence (in %)

Base = 6615

Nearly half of the marginal farmers interviewed had confirmed that there were outlets within 10 km of their village from which they could procure subsidised seeds and fertilisers. The survey also explored whether such farmers could procure such products at subsidised rates for their farming activities.

Once again, the survey revealed that 21.9% of the marginal farmers who had access to subsidised seed and fertiliser outlets within 10 km of their residence had ever bought subsidised seed and/or fertiliser from these subsidised outlets. This low utilisation rate can be because most marginal farmers grow either rice or wheat and practice preserving a part of their produce every year so that they can use it to seed their fields the following cycle.

NSS 77th Round estimates that 22.1% of all farmers who grow paddy use their own seeds from home stock and 15.7% of those growing what during Rabi use seeds procured from subsidised outlets. For marginal farmers, these numbers are likely to be much higher. At the same time, paddy seeds and wheat seeds bought by farmers from subsidised outlets were 5.4% and 4.6%, respectively. Regarding fertilisers, NSS 77th Round had estimated that only 8% of all farmers procured fertilisers from subsidised centres. Since the total number of farmers in India is dominated by smallholders, the current survey figures compare quite favourably with the NSS data for seeds and fertilisers combined. It is worthwhile to mention here that Agritech companies like DeHaat, Gramophone, BigHaat, Agrimand, BharatAgri, Agrostar, NaPanta, Est Global, Krishiyog, etc. who, among other advisory services, deal with the distribution of seeds, fertilizers, and pesticides. In addition, one of the three mega State Cooperative set up by the government that deals with seed distribution is Bhartiya Beej Sahkari Samiti Limited (BBSSL).

Access to Cold Storage Facility

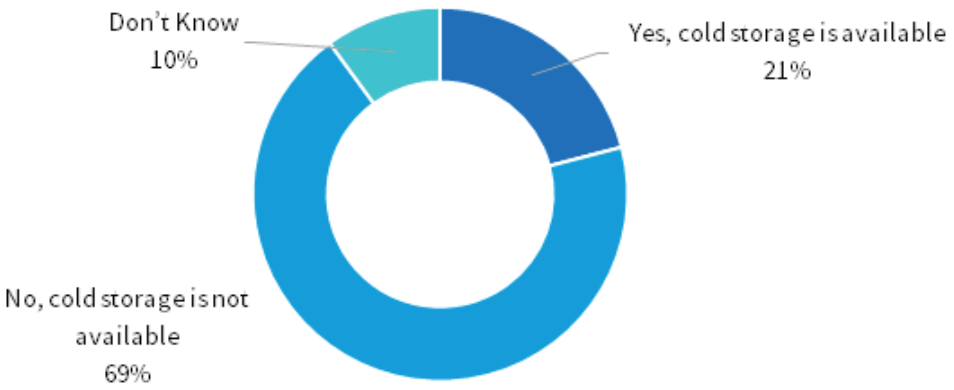

Figure 9: Availability of Cold Storage Facility within 10 km of residence (in %)

Base = 6615

As per available secondary information, there are 8,186 cold storage units with a capacity of 374.25 Lakh MT available in the country for storing perishable horticulture produce like fruits and vegetables. India ranks second in fruit and vegetable production in the world. Since these are perishable, their magnitude of loss is estimated at 35% to 40% in India. The rates at which fruits and vegetables perish are influenced primarily by product temperature and relative humidity in the vicinity, which can be controlled by using cold storage technologies. The current cost of grid-powered micro cold stores is very high and not affordable for marginal farmers. Hence, state intervention is warranted.

69% of marginal farmers interviewed confirmed that there was no cold storage facility within 10 km of their village. Among the percentage who do and know its purpose, how many end up using a cold facility to store their produce?

The survey revealed that 15% of the marginal farmers who had access to a cold storage facility within 10 km of their residence and knew what it was had never used the same. One explanation for the low numbers could be that the majority of marginal farmers were growing Paddy (during Kharif) and Wheat (during Rabi) and selling locally (because their production from their small landholdings was not large enough to hoard and sell in bulk to organised procurement agents. Marginal farmers, whoever grew fruits or vegetables, did not do so in large quantities (not among their top five crops per season), and hence their need for cold storage was limited.

Membership in SHG

SHGs are voluntary associations of the economically poor, usually drawn from the same socio-economic background and who resolve to come together for a common purpose of solving their issues and problems through self-help and community action. They are small groups of people, mainly women, who live in rural areas and come together to save money and provide loans to each other. They decide on savings and loan activities together, including the purpose, amount, interest rate, and repayment schedule. The group also discusses and takes action on various social issues such as health, nutrition, and domestic violence.

Initially, NABARD, along with impanelled NGOs, designed and developed the promotional ecosystem, including the SHGs-Bank linkage program. In 1990, the RBI recognised SHGs as an alternate credit flow model.

Today, there are over 80.7 lakh SHGs registered under the National Rural Livelihood Mission[6]. A Self-Help Group (SHG) is the primary building block of the NRLM institutional design. It serves the purpose of providing women members space for self-help, mutual cooperation, and collective action for social and economic development. It promotes savings, builds own funds, and becomes the local financial institution to provide a range of financial services including providing credit for debt-swapping and livelihoods.[7]

Figure 10: Membership in SHGs

Base = 6615

Despite the SHG movement having reached a mature stage in the country with over 80 lakh active SHGs under NRLM, 60% of the marginal farmer households could confirm that no member of their family was a member of an SHG.

Access to Credit

Nearly 27% of all the marginal farmers who participated in this survey (6,615) confirmed that someone in their household had accessed bank loans in the past. 23% had taken a loan from an SHG (it may be recalled that 40% had at least one member affiliated with an SHG). 5.7% had accessed credit through an MFI and 13% through FPO/FPC/PG/PACS membership or from a cooperative society. As high as 51% did not access loans from any of these sources, probably indicating an over-dependence on more informal sources of credit.

Agriculture-related Technical Advice/Information/Extension Services

Agriculture forms the backbone of our economy as it acts as a source of livelihood for a large section of our population (share of Gross Value Added of agriculture and allied sectors in total economy at current prices for 2022-23 was 18.3%)[8]. Indian farmers have a deep knowledge of agricultural practices and techniques given by their ancestors. However, these days, many improved practices and techniques of agriculture are gaining

[6] *DAY-NRLM website; https://nrlm.gov.in/shgOuterReports.do?methodName=showShgreport*
[7] *https://aajeevika.gov.in/work-structure/community-institutional*
[8] *https://pib.gov.in/PressReleasePage.aspx?PRID=1909213*

popularity, especially in an age of adverse climatic effects on traditional production processes. However, a major problem arises when it comes to the dissemination of these technologies. The root cause behind this is a lack of awareness, training, and education, resulting in the exploitation of farmers at various levels. As a response strategy, Common Service Centres offer a very unique platform where farmers can avail advisory services by video conferencing with qualified Agriculture Scientists of the Krishi Vigyan Kendras (KVK). The farmers simply need to visit the nearby CSC and register themselves for the consultation.[9]

The sole purpose of the Agriculture Tele-Consultation service is to provide quick and best advisory services to the farmers in their regional language. CSCs have been opened across India where farmers can get the benefit of this service. Farmers visiting CSCs can get advisory services on various agricultural aspects such as new and improved practices of farming, soil health, cultivation practices of various agricultural and horticultural crops, fertilisers and their optimum doses, control of insects, pests and diseases of crops, irrigation and fertigation. Apart from these, advisory on livestock production and management is also available to farmers.

Kisan SMS Portal for farmers enables all Central and State government organisations in agriculture and allied sectors (including State Agriculture Universities, Krishi Vigyan Kendras, Agromet Forecasts Units of India Meteorological Department, ICAR Institutes, Organization in Animal Husbandry, Dairying & Fisheries, etc.) to give information/services/advisories to farmers by SMS in their language, preference of agricultural practices and locations.

The project conceptualised, designed, and developed in-house within the Department of Agriculture and Cooperation has widened the outreach of scientists, experts and government officers posted down to the block level to disseminate information, give advisories and provide advisories to farmers through their mobile telephones. These messages are specific to farmers' specific needs and relevance at a particular point in time and generate a heavy inflow of calls in the Kisan Call Centres, where people call up to get supplementary information. USSD (Unstructured Supplementary Service Data), IVRS (Interactive Voice Response System) and Pull SMS are value added services which have enabled farmers and other stakeholders not only to receive broadcast messages but also to get web-based services on their mobile without having internet. Semi-literate and illiterate farmers have also been targeted to be reached through voice messages.[10]

Through the survey, we found that close to 30% of the marginal farmers did not access any technical advice or extensive service providing such advice. Of the 72% who did, the source of advisory services related to their agriculture practice has been tabulated below.

Table 14: Source of advisory services on agricultural practice received by marginal farmers (in %)

Access to advisory services	
Did not access to any technical advice/extension services	28.4
Have accessed advisory services	71.6
Total base	6615
Source of advisory services (among those who have accesses)	
KVK (Krishi Vigyan Kendra)	15.0
Govt. extension agent/ATMA	18.4
TV/Radio/Newspaper	31.9
Progressive farmers, other farmers, elders	59.9
Input dealers	42.0
Agricultural university/college	3.7
Private commercial agent (contract farming sponsors, companies, drilling contractors, etc.)	9.4

[9] *http://cscagriadvisory.in/*
[10] *https://mkisan.gov.in/Home/About*

Access to advisory services	
FPO/cooperative society	5.0
Private processor	5.1
Agri Clinics and Agriculture Business Centres (ACABC)	3.9
NGO	4.3
Kisan Call Centre	6.4
Smartphone app-based information	12.9
Total base	4736

Input dealers are the single most important source of advisory services for marginal farmers. Agri-input dealers in the country are a prime source of farm information to the farming community in general, in addition to supplying inputs and credit, even though most of these dealers do not have formal agricultural education.

The second most popular source is actually other farmers, especially older farmers who have a repertoire of institutional memory. One in five got information from2q21 other progressive farmers in their locality. Almost a quarter of the marginal farmers got their information on different agricultural practices from them. Almost a similar proportion got their information from the electronic and print media.

Providing access to broadcasting services in rural areas in India has been an ongoing challenge. However, the Indian government has taken various initiatives to improve connectivity and ensure that broadcasting services reach remote and underserved regions. Here are some of the key measures that have been undertaken:

- Prasar Bharati is India's public broadcasting agency, operating Doordarshan (DD) television channels and All India Radio (AIR) radio stations. The organisation has been working to expand its network and increase the coverage of DD and AIR signals in rural areas.
- The Indian government launched the Digital India campaign, which aimed to digitise cable TV services across the country. This move has led to increased digital cable TV services penetration in rural areas, providing access to a broader range of channels.
- DTH services have gained popularity in both urban and rural areas due to their accessibility and the variety of channels they offer. Various private DTH service providers have expanded their reach to rural regions, bringing television content directly to homes via satellite signals.
- Community radio stations have been set up in rural areas to provide localised content and information tailored to the specific needs of the local population. These stations play a crucial role in disseminating information and connecting communities in remote regions.
- The government has been gradually introducing DTT services in select areas to improve TV broadcasting quality and expand the reach of digital TV services to rural communities.
- The Bharat Net project aims to provide broadband connectivity to all gram panchayats (village-level local government bodies) in India. This initiative will significantly bridge the digital divide and facilitate access to online broadcasting services in rural areas.

Most marginal farmers access advisory services when the need arises (47%) or seasonally (31%). Only around 15% did so on a monthly basis or more frequently.

Table 15: Type of agriculture-related information sought from advisory services (in %)

Improved seed variety	53.6
Fertilizer application	46.5
Disease management	45.3
Water management	30.8
Planting method	29.2
Time of sowing	28.5
Pest management	27.9
Farm machinery	19.4
Soil management	19.1
Weather forecast	16.0
Market prices	14.0
Crop insurance	12.8
Credit and loan	8.2
Non-crop information needs (Harvesting/marketing/grading/storage)	4.2

Base = 4736 respondents who utilize agriculture-related advisory services.

Over one in five marginal farmers who use agriculture-related advisory services did not face any constraints in adopting or acting upon the advice. Others have had to face various types of problems, including financial restrictions preventing them from carrying out what they have learnt, the non-availability of inputs/physical resources in their area, or just a lack of follow-up technical inputs. Just about one in four had found advisories of poor relevance and usefulne

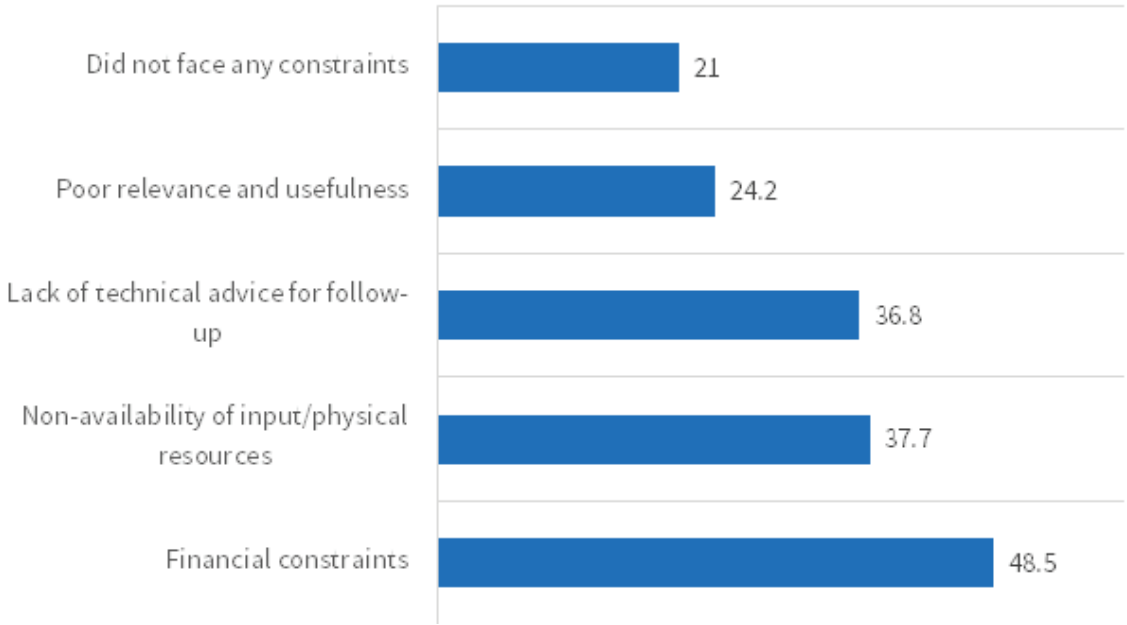

Figure 11: Constraints faced while adopting any of the advisories (in %)

Base = 4736 respondents who utilized agriculture related advisory services

Impact of Climate Change on Income Diversification

All the survey participants were asked whether they have had to supplement or change their current livelihood and whether this change had anything to do with adverse climatic events affecting agriculture. The survey results appear to be quite conclusive.

Table 16: Change in livelihood pattern by farmers affected or not affected by adverse climatic events in the last five years (in %)

	Village affected by adverse climatic events	Village not affected by adverse climatic events
People who changed their livelihood pattern	83	61
People who did not change their livelihood pattern	17	39
Base	5263 respondents	1352 respondents

It is quite clear that a higher proportion of farmers residing in villages that have witnessed adverse climatic events to the extent that their farming output has been compromised have had to diversify or change their current farm-dependent livelihood as compared to those residing in locations not adversely impacted by climate change.

Statistically, this difference is significant at a 99% level of confidence (The value of z is 17.7256. The value of p is < .00001. The result is significant at p < .01).

Table 17: Degree of impact of climate change in changing livelihood pattern (in %)

To a great extent	40.5
To some extent	45.7
To a limited extent	12.8
No impact	1.1

Base = 4379 respondents affected by climate change and made changes in livelihood pattern

In excess of 86% of the farmers who have had to make adjustments in their occupations had attributed this change to climate impact. Even though this is self-attribution only, nevertheless, this can be considered as a clear testimonial towards how climate change has impacted marginal farmers in India.

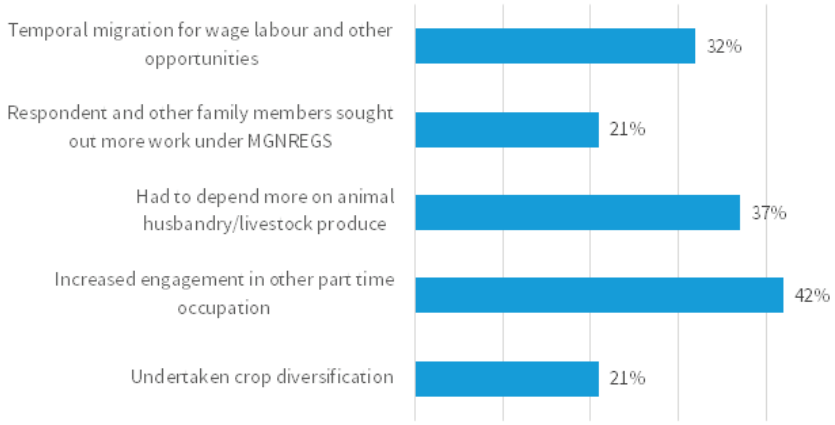

Figure 12: Nature of livelihood diversification being practiced

Base = 6,615 respondents

Most of the income diversification had to do with increased engagement in other part-time occupations, increased dependency on animal husbandry, i.e. earning through livestock produce, including sale of milk, eggs, and sometimes meat, or as one in three stated, temporal or distress migration for wage labour earnings. The issue that needs further investigation is that whether or not such livelihood diversification is happening anyway because of shrinking farm incomes (as concluded by the first-round survey conducted by Development Intelligence Unit in 2023 titled 'Annual Survey of State of Marginal Farmers in India') or whether it is a direct outcome of erratic weather conditions rendering agriculture farmers a risky proposition. The following table elaborates.

Table 18: Distribution of impact of climate change on change in livelihood pattern (in %)

	To what extent is climate change impact responsible for this change			
	To a great extent	To some extent	To a limited extent	No impact
Undertaken crop diversification	32.6	53.7	12.5	1.2
Increased engagement in other part time occupation	30.4	54.5	14.3	0.8
Had to depend more on animal husbandry/livestock produce	32.5	49.3	17.5	0.8
Respondent and other family members sought out more work under MGNREGS	47.5	37.2	13.8	1.5
Temporal migration for wage labour and other opportunities	53.9	37.6	7.5	1.1

Base = 4,379 respondents who were affected by climate change and made changes in livelihood pattern

All the cited response strategies had been a direct result of losses due to inclement weather conditions negatively impacting crop production. However, temporal migration in search of alternate livelihood opportunities, and seeking more person-days of work under MGNREGS as a preferred response stratagem to climate change was reported by the majority.

Adaptation of Practices of Climate-resilient Agriculture

One of the critical challenges for a country's food security is climate change and its impact in the form of extreme weather events. The predicted 1-2.5 degrees Celsius temperature rise by 2030 is likely to show serious effects on crop yields. High temperatures may reduce crop duration, permit changes in photosynthesis, escalate crop respiration rates and influence pest population.[11]

The impact of climate change is directly or indirectly related to crop, water, and soil as it influences the water availability, changes the intensity and frequencies of drought, effects microbial population, soil organic matter reduction, yield reduction, depletion of soil fertility as driven by soil erosion, etc. The Economic Survey of 2017-18 cautioned that "climate change might be reducing annual agriculture income in the range of 15 per cent to 18 per cent and up to 20 per cent to 25 per cent for unirrigated areas"[12]. This creates food shortages, nutrient deficiencies in humans due to inadequate intake of healthy food makes humans vulnerable to health issues.

[11] *Ch Srinivasarao; Climate resilient agriculture systems: The way ahead; Down To Earth; 04 February 2021*
[12] *Chapter 6 – 'Climate, Climate Change, and Agriculture'; Economic Survey 2017-18, Vol 1*

Climate-resilient agriculture (CRA) is an approach that includes sustainably using existing natural resources through crop and livestock production systems to achieve long-term higher productivity and farm incomes under climate variabilities. This practice reduces hunger and poverty in the face of climate change for forthcoming generations. CRA practices can alter the current situation and sustain agricultural production from the local to the global level, especially in a sustainable manner. Improved access and utilisation of technology, transparent trade regimes, increased use of resources conservation technologies, an increased adaptation of crops and livestock to climatic stress are the outcomes from climate-resilient practices.

Pratap Singh Birthal, in his research titled 'Climate Change and Risk Management in Indian Agriculture'[13], observes that farmers are not passive to climate risks. Based on their exposure to climate anomalies in the past, attitudes towards risk and access to information and finances, they use several traditional as well as modern risk management measures. The traditional measures include the use of stress-tolerant crops, changes in planting dates and input applications, including irrigation and fertilisers, and soil and water conservation techniques. The modern measures are crop insurance and hedging. Based on their risk functions, these measures can be classified as risk-mitigating, risk-transferring, and risk-coping. The evidence shows that farmers benefit from the adoption of all types of risk management strategies, but more so from their joint adoption. Crop diversification is observed to enhance farm productivity and lower risk exposure. Irrigation plays a dual role in raising crop yield and reducing its sensitivity to heat stress and droughts. Crop insurance also improves farm productivity and reduces downside risk exposure, but perhaps not as much as irrigation does.

Challenges and Barriers to Adaptation of Climate-resilient Agriculture Practices

This section looks at the adoption of various climate resilient farming practices adopted by marginal farmers impacted by climate change, reasons for adoption of different practices, and challenges faced in adopting climate resilient agriculture.

First, 31.2% of all respondents who had reported being affected by extreme weather events in the last five years had not adopted any CRA practices. 68.8% marginal farmers who did report to have adopted one or more CRA practices. The distribution of different practices adopted has been tabulated below.

Table 19: Distribution of adoption of different CRA practices (in %)

Changes in sowing time	28.2
Changes in sowing method (broadcasting/tractor operated/bullock drawn)	70.6
Changes in crop duration	37.2
Adopting water management strategies	40.5
Adopting disease management strategies	35.8
Crop diversification	14.6
Energy management	1.3

Base = 3,620 respondents who reported being affected by climate change and have adopted some CRA practice

70% of the marginal farmers have changed their sowing methods, while over one in three have made changes in crop duration, adopted disease management strategies, and close to 30% had made changes in sowing time. Two out of five have adopted water management strategies.

[13] *Climate Change and Risk Management in Indian Agriculture; Pratap Singh Birthal, NABARD Research and Policy Series No. 4/2022*

The top five reasons why marginal farmers had resorted to adopting above practices are as follows:

Table 20. Top five reasons for adoption of CRA practices by marginal farmers

1.	Reduced use of fertilizers and pesticides	54.8%
2.	Enhance water availability/reduced water loss	50.9%
3.	Mitigate soil pollution/ maintain soil fertility/minimize soil erosion	39.2%
4.	Stabilise productivity	36.2%
5.	Reduced labour use	27.9%

Base = 3,620 respondents who reported being affected by climate change and have adopted some CRA practice

First of all, 13.4% of all those who had adopted any CRA practice had reported to have not faced any constraints or challenges while doing so. As for the majority who did face problems, the biggest challenges that marginal farmers face when adopting climate resilient agricultural practices had to do with high up-front cost, limited knowledge about options, small land holdings and lack of physical resources.

Table 21: Challenges faced in the adoption of climate resilient farming (in %)

High up-front cost	52.2
Limited knowledge	50.4
Small land holding	41.6
Lack of physical resources	37.5
Lack of credit facility	23.9
Access to extension and training	21.8
Market barriers	15.0
Social and cultural barriers	13.6
Total Base	3136

06

Public and Private Sector Initiatives in Promoting CRA

India's commitments at COP

India's pledge of Panchamrit (five-fold strategy) to fight climate change, announced during the 26th Conference of the Parties (COP26) in Glasgow, Scotland, has captured the world's attention. The country's new commitments include reaching 500 GW of non-fossil fuel energy capacity by 2030; producing 50 per cent of energy requirements via renewable energy sources by 2030; a reduction of 1 billion tonnes of carbon by 2030; reducing the carbon emission intensity of the GDP by 45 per cent by 2030; and most importantly, achieving the target of net-zero emissions by 2070.[14]

While Indian agriculture is adversely impacted by the vicissitudes of climate change, the sector is also a significant contributor (14 per cent) to greenhouse gas (GHG) emissions. India's approach has been a balancing act between growth and sustainability in its climate change policies, and it is leading the developing nations to place agriculture in the ongoing negotiations. The National Mission on Sustainable Agriculture, as part of the National Action Plan on Climate Change for more than a decade now, has focused on making Indian agriculture sustainable, considering likely risks arising from climate variability.

The 28th Conference of the Parties (COP 28) began with the promising adoption of the UAE Declaration on Sustainable Agriculture, Resilient Food Systems, and Climate Action. In addition to this, for the first time at a COP, an entire day was dedicated to Food Systems. Endorsed by 134 countries, the UAE Declaration marked a significant step in integrating agriculture into climate discussions. Yet, the broader context of COP 28 revealed some policy deficiencies. A critical issue was the exclusion of food systems from the Global Stocktake Draft, a key component of the Paris Agreement for assessing global climate mitigation progress. This omission is alarming, considering the agriculture sector's substantial emissions and vulnerability to climate impacts. The sector's dual role as both a contributor to and a mitigator of climate change underscores the need for its inclusion in comprehensive climate assessments and policies.

India's decision not to sign the Global Methane Pledge or the UAE Declaration at COP 28 underscores the challenge of balancing environmental commitments with economic needs, particularly in countries with large agricultural sectors like India, where addressing methane emissions is complex due to the impact on farmers' livelihoods. This reflects a broader dilemma for the Global South between immediate economic concerns and long-term environmental goals.[15]

India's Leadership in Promoting Climate-Smart Agriculture at the G20

Building on the momentum of India's G20 presidency, the government is prioritizing Climate-Smart Agriculture (CSA) as a critical strategy for achieving sustainable food security and climate resilience.[16] Recognising the vulnerability of marginal farmers to climate change (IPCC, 2022)[17], this policy aims to empower them through a multifaceted approach, informed by global best practices.

India's G20 leadership role provides a unique platform to champion the cause of marginal farmers impacted by climate change. As outlined in the Think20 Policy Brief by Neog et al. (2023)[18], the government will actively engage with G20 partners to strengthen multi-stakeholder collaboration for CSA development and implementation.

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[14] *Indian agriculture: The route post-COP 26 - Strategies and pathways that can make Indian agriculture resilient and sustainable in a changing climate; By Arabinda K Padhee, Anthony Whitbread; Published: Tuesday 18 January 2022*
[15] *Zoomed Out | COP 28 — Why linking food systems and climate change is crucial in today's context; By Ambika Hiranandani December 15, 2023.*
[16] *A Short History of the Evolution of the Climate Smart Agriculture Approach and Its Links to Climate Change and Sustainable Agriculture Debates | SpringerLink*
[17] *https://report.ipcc.ch/ar6syr/pdf/IPCC_AR6_SYR_SPM.pdf*
[18] *Kangkanika Neog et al., "Identifying Pathways for Scaling up Climate-Smart Agriculture," T20 Policy Brief, July 2023*

This policy echoes the recommendations of the brief, focusing on:

- Strengthening existing platforms like the Global Alliance for Climate-Smart Agriculture (GACSA) developed by the FAO to facilitate knowledge sharing and collaboration[19].
- Enhancing data collection and analysis to tailor CSA interventions for specific contexts and optimize their impact on marginal farmers' livelihoods.
- Prioritizing capacity building to equip marginal farmers with the knowledge and skills necessary to adopt CSA practices effectively[20].
- Implementing robust MEL processes to ensure continuous improvement and track the effectiveness of CSA interventions in empowering marginal farmers[21].

By spearheading these initiatives, India aims to not only ensure its own food security but also contribute to a global agricultural transformation that prioritizes climate resilience and empowers the most vulnerable farmers.

Government of India's Response to Climate Resilience in Agriculture

The state can play a significant role in making agriculture resilient to climate change by, one, designing context-specific policies and programmes and ensuring their effective implementation through better coordination across different administrative levels for the smooth flow of information, knowledge and resources to the farmers; and, two, the convergence of different programmes operated by different ministries and departments for efficient and sustainable use of financial and human resources.

The Government of India (GoI) has been implementing the Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), which assures employment of 100 days to a household. Although the scheme is not meant to address climate risks, it contributes toward enhancing the resilience of agriculture. More importantly, 60% of the permissible spending under MGNREGA was related to Natural Resource Management (Mission Water Conservation blocks have to maintain at least 65% of the MGNREGS expenditure on NRM-related works). Furthermore, participation in MGNREGA has eased financial constraints on the adoption of direct risk-coping measures. The GoI also implemented a National Food Security Act, 2013, which provides affordable access to food for the poor. Like MGNREGA, the subsidised provision of food is also hypothesised to motivate farmers to adopt risk management strategies.

The central and state governments implement several agricultural and rural development programmes through various ministries and departments. Many of these are related to climate change adaptations directly or indirectly. The Ministry of Agriculture and Farmers' Welfare implements 27 different Central Sector Schemes and centrally-sponsored Schemes (details available in Annexure) for promoting farmers' welfare and raising their income. However, some may argue that there is a lack of synergy among these. A typical example is the work under the MGNREGA scheme, which is implemented by the Ministry of Rural Development. About two-thirds of its works are related to agriculture and natural resource management. Some of these include water conservation and water harvesting, drought proofing, afforestation, irrigation works, restoration of traditional water bodies, land development, flood control and construction of rural roads. All these activities are closely linked to the adaptation options for climate change. Hence, there is a huge scope for harnessing the complementarities of different schemes.

The GoI has launched several initiatives to combat climate change and promote sustainability. Direct policy interventions by the GoI and state governments at combating the impact of climate change on agriculture include the National Action Plan on Climate Change (NAPCC) and the State Action Plan on Climate Change (SAPCC). Released on 30th June 2008, the NPACC serves as the national framework, outlining eight key missions. Its core missions are solar energy, energy efficiency, sustainable agriculture, water conservation, and the Himalayan ecosystem. These missions target crucial areas like ramping up solar power generation, enhancing energy efficiency across sectors, and promoting sustainable urban development. Importantly, the NAPCC recognises the need for sustainable development, striving for economic growth that goes hand-in-hand with environmental protection. To complement this national approach, individual states formulate their own State Action Plans on Climate Change (SAPCCs). These plans delve deeper, addressing the specific climate

[19] *https://www.fao.org/gacsa/about/en/*
[20] *Kangkanika Neog et. al., "Climate adaptive water management practices in climate-smart agriculture and their impact: Learnings from Bihar, Odisha and Uttar Pradesh" (CEEW, report manuscript in preparation, May 30 2023)*
[21] *sustainabledevelopment.un.org/content/documents/22113FAOai8145e.pdf*

vulnerabilities of each state, be it water scarcity or rising sea levels. SAPCCs prioritise adaptation and mitigation strategies tailoured to local needs, such as promoting drought-resistant crops or developing early warning systems for coastal regions. This bottom-up approach ensures focused action at the state level. By combining the national framework of the NAPCC with the state-specific strategies of the SAPCCs, the governments strive for a comprehensive and effective strategy to tackle climate change and build a more resilient and sustainable future for all its citizens.

Building upon the national framework established by NAPCC and the state-specific strategies outlined in SAPCCs, India has taken a multi-pronged approach to empower farmers in combating climate change. National Action Plans provide a crucial top-down vision, but the real impact is felt at the ground level. This is where Agricultural Contingency Plans come into play. Formulated at the district level, these plans translate broad goals into actionable steps for farmers. Considering the unique vulnerabilities of each region, they outline strategies to deal with specific threats like droughts, floods, or heat waves. This localised approach empowers farmers with immediate solutions, such as alternative planting schedules during erratic rainfall or using drought-resistant crop varieties to minimise losses.

Further bolstering this fight against climate change is the National Innovations on Climate Resilient Agriculture (NICRA) programme, established in 2011. NICRA acts as a bridge between research and on-ground application. By focusing on strategic research for climate-resilient technologies like drought-resistant seeds and efficient irrigation methods, NICRA equips farmers with the tools they need for long-term adaptation. Through field demonstrations and targeted training programmes on climate-smart practices, NICRA empowers even the most vulnerable – marginal farmers. These farmers gain the knowledge and tools to adapt their agricultural practices based on weather conditions, improve resource management, and ultimately become more resilient to the vagaries of a changing climate. This not only secures their livelihoods but also contributes significantly to India's overall food security in the face of climate challenges.

The National Adaptation Fund for Climate Change (NAFCC), established in 2015 by the Indian government, has been instrumental in helping the country adapt to the challenges of climate change. It provides financial support for state and union territory-level projects that directly address climate change vulnerabilities. It helps in supporting projects aimed at enhancing drought resistance, promoting water conservation techniques, and developing climate-resilient crop varieties. It helps in building rainwater harvesting structures, improving irrigation efficiency, and addressing the challenges of floods and rising sea levels in coastal areas. NAFCC-funded projects also aim to strengthen early warning systems of natural calamities, improve preparedness for extreme weather events, and support resilient infrastructure development.

States are starting to understand the urgency, too. Programmes such as the Odisha Integrated Irrigation Project for Climate Resilient Agriculture, Maharashtra's Project on Climate Resilient Agriculture, and Bihar's Climate Resilient Agriculture Programme have been promoting climate-resilient technologies like direct seeded rice (DSR), drum seeder, micro-irrigation, and nutrient support tools to improve production.

Marginal farmers reliant on agriculture for their income often face reduced harvests and financial insecurity due to erratic weather patterns and unpredictable rainfall brought on by climate change. As observed in this survey, those affected by the vagaries of uncertain climatic conditions have changed or supplemented their livelihood pattern. In a DIU publication titled "Annual Survey of State of Marginal Farmers in India", released in 2023 (the first in the series of annual publications focused on marginal farmers), it was ascertained that 68% of the marginal farmers were engaged in non-farm activities to supplement their income from crop cultivation. In the current survey, it was found that close to 72% of farmers who reported being affected by climate change to some extent or to a great extent had to depend on animal husbandry more for a stable source of income.

The GoI has implemented several key programmes specifically designed to help marginal farmers diversify their income streams and build resilience in the face of climate challenges. One such initiative is the National Livestock Mission (NLM), launched in 2014. Recognising the potential of livestock rearing to supplement income, the NLM provides crucial support to farmers venturing into dairy, sheep, goat, and pig farming. This support comes in multiple forms. Financial assistance with setting up livestock units, acquiring high-yielding breeds, and accessing essential feed and veterinary services helps reduce initial investment costs and encourages participation. Additionally, the NLM focuses on empowering farmers through skill development and training programmes. The NLM recognises the importance of market access, and it actively facilitates connections between farmers and potential buyers like dairy cooperatives and meat processing units. This ensures farmers receive fair prices for their produce and reduces dependence on middlemen, further bolstering their financial security.

Another programme targeting income diversification for marginal farmers is the Innovative Poultry Productivity Project (IPPP), launched in 2017. This initiative specifically focuses on states with high poultry farming potential, and it empowers farmers in several ways. Recognising that many marginal farmers have limited landholdings, the IPPP promotes the establishment of small-scale, backyard poultry units. These initiatives, coupled with others like the Blue Revolution (Neel Kranti Mission) which promotes integrated fish farming with livestock

operations, provide a multifaceted approach to empowering marginal farmers and fostering climate resilience in the agricultural sector.

At the same time, one also needs to look at the safety nets that have been provided to all farmers in the form of various social security schemes. The GoI launched the Pradhan Mantri Fasal Bima Yojana (PMFBY) - or Prime Minister's Crop Insurance Scheme in 2016 as a crucial safety net for India's farmers, particularly marginal farmers facing the brunt of climate change. This comprehensive programme offers financial protection against crop losses due to natural calamities like droughts, floods, hailstorms, pests, and diseases. By covering a wide range of food, oilseed, and horticultural crops at subsidised premiums, PMFBY ensures even small and marginal farmers can participate and avoid financial ruin from unforeseen events. Additionally, the scheme prioritises quick claim settlements to minimise hardship and get farmers back on their feet. Easy enrolment through banks, service centres, and CSCs makes PMFBY accessible across the country. The uptake of PMFBY has been promising, as close to 35% of the marginal farmers surveyed were covered by it. The need of the hour is to saturate coverage.

To further build resilience among marginal farmers and bring the focus on regenerative agriculture and natural farming through soil management, the GoI launched the Soil Health Card (SHC) in 2015. This programme empowers farmers by providing them with a detailed analysis of their soil's health every two years. This analysis includes vital information like nutrient levels, organic matter content, and overall fertility. Armed with this knowledge, marginal farmers can make informed decisions about fertiliser application, improving soil health, and adopting sustainable practices. SHC not only helps optimise resource use and reduce costs but also promotes practices that enhance soil's ability to retain moisture, a critical benefit in times of erratic rainfall. While it is a great tool for supporting marginal farmers, as observed from the survey, only 17.1% of members of SHGs have availed SHCs. Thus, there's a need to increase awareness and accessibility of SHGs in order to maximise the utility of the programme.

Complementing the focus on soil health, two other initiatives target organic farming and improved water management. The Paramparagat Krishi Vikas Yojana (PKVY), launched in 2016, specifically promotes organic farming practices among marginal farmers. This programme provides financial assistance for organic certification, training on organic methods, and support for establishing producer collectives for better market access. By encouraging organic farming, PKVY helps reduce dependence on chemical fertilisers, which can harm soil health in the long run. Additionally, organic practices often promote techniques like composting and crop rotation, which further improve soil health and resilience in the face of climate change. Furthermore, the Mission Organic Value Chain Development in North-eastern Region (MOVCDNER), launched in 2016, focuses on developing a robust organic value chain specifically in the North Eastern states. This mission supports infrastructure development for organic processing and marketing, creating a supportive ecosystem for organic farmers in the region. Finally, the Per Drop More Crop programme emphasises efficient water management practices. This initiative promotes techniques like micro-irrigation and drip irrigation, which allow farmers to maximise water use efficiency.

As noted earlier in the report, the Government has been providing information regarding agriculture through different mediums to create awareness for climate-resilient practices and provide knowledge support to the most vulnerable sections of the farming community. The Indian Council of Agricultural Research (ICAR), in collaboration with the India Meteorological Department (IMD), is issuing Agromet advisories twice a week (Tuesday and Friday) to around six crore farmers of the country through the Gramin Krishi Mausam Seva program (GKMS).[22] Broadly, the GKMS, launched in 2004, empowers farmers by providing them with localised, district-level weather forecasts and agro-meteorological advisories. These advisories are tailored to specific crops and climatic conditions, helping farmers make informed decisions about sowing, irrigation, pest control, and harvesting practices. GKMS is disseminated through various channels, including SMS, radio broadcasts, and mobile applications, ensuring that even marginal farmers with limited internet access can receive crucial information. The impact of such services is noted in the report, as it shows that close to half of the surveyed respondents access agriculture-related information in times of need. Close to one-third of these respondents seek out information about sowing, irrigation, and pest control. While 16% of those seeking information depend on these channels for weather related information.

Details of schemes being run by the Department of Agriculture and Farmers' Welfare for welfare/increasing incomes of farmers and the achievements made therein, scheme-wise, are attached in Annexure.

In short, one can conclude that the GoI already has a large number of relevant programmes and schemes in place designed to protect farming communities from the vagaries of climate change. The need of the hour is to improve the efficiency of delivery so that coverage among the marginal segment can be saturated.

[22] *Shri Narendra Singh Tomar, Minister of Agriculture and Farmers Welfare, response to Rajya Sabha unstarred question no. 981, answered on 28/07/2023.*

Dawn of AgriTech: Private Sector Participation

Over the last few years, there have been enough deliberations at the industry and policy level to make the food supply chain climate-resilient. However, to bring about the desired change, the policy prescriptions and industry actions need to match the emerging entrepreneurial energy.

If one looks at the history of Indian agritech, while it first began in India about 15 years ago, climate-tech remained peripheral to it for over a decade. It's only in the recent past that climate-tech is becoming more nuclear and integral to agritech, not only to entrepreneurs' business models but also to the investors' thesis. This is driven by entrepreneurs' realisation that climate-tech and agritech are not binary but essentially two sides of the same coin. Resource optimisation and unit economics go hand in hand in value creation for unlocking VC-friendly returns. Also, many customers and users of agritech, especially the large food companies like Unilever, Nestle, Danone, Olam, etc. and retailers like Amazon and Walmart have made commitments publicly on making the supply chains net-zero over the next two to three decades, so these companies have no option but to partner with their supplier base to honour their commitments.[23]

The type of innovations the agri-climate space is witnessing may be summarised as given below.

Largely Digital: These innovations typically include capturing data about weather, soil and plant health from a multitude of sources such as weather stations, satellites, drones, sensors, IoT devices, scanners, smartphones etc. The evolution of hardware devices, along with growing data modelling capabilities, is at the core of such innovations. The use cases of such digital solutions are essentially in climate risk mitigation, including farmer advisory to reduce crop loss, estimate losses on account of flood/ drought, estimate soil nutrition and moisture for optimising, etc. Examples of startups in this category include SatSure, CropIn, Leads Connect, RMSI, Bharat Rohan, Frugal Labs, Borlaug Web Services, Agnext, Boomiitra, Stellapps etc.

Largely Physical: These solutions include a variety of physical interventions, including products, devices, machines, and biologicals to drive climate resilience. The use of dehydrators, cold rooms, bulk coolers, CA storages, silos for reducing post-harvest losses, etc., would fall into this category. Some examples in this category would include likes or S4S Technologies, Promethean, Inficold, Ecozen, Rukart, EF Polymer, GreenPod, Absolute, Bioprime, Sea6 Energy, Marut drones, Urdhvam, Distinct Horizon, Kheyti, Takachar, etc.

Supply Chain Innovations: These include tech-enabling supply chains for dis-intermediation to align supply with the demand. The market linkage startups operating in the whole or parts of farmers-to-consumer value chain, such as WayCool, DeHaat, FarMart, Samunnati, Falca, Bioveda, Innoterra, KisanKonnect, Maalexi, Mango Dairies, Digigrain are some of the examples.

Though the primary activity for this segment of startups has been around building demand-driven tech-enabled supply chains, in this process, these business models have contributed to shrinking food losses/waste, thus improving the climate resilience of food supply chains. Likewise, factory-to-farm models focused on supplying quality inputs to farmers, riding on prescriptive farmer advisory models, end up optimising the use of agri-inputs, including chemical fertilisers, agrochemicals and water. Startups like Agrostar, BigHaat, Behtar Zindagi, Unnati, Upaz, Freshokartz, and Hesa would fall into this category.

[23] *Time To Build Climate-Stack For Indian Agriculture; 10 Dec'23 By Hemendra Mathur; inc42.com*

07

Policy Implications Moving Forward

Key Highlights from the Survey

FPO/FPC/PACS/PG/PE/Coops Membership

Close to 69% of the marginal farmers surveyed were members of an FPO/FPC/PACS/PG/PE/Coops. A little over half of the marginal farmers who were members had availed of subsidised agriculture inputs through their associations, while over a third had availed of marketing support. Around 30% of the members had availed of crop insurance through their associations.

SHG Membership

60% of the marginal farmer households surveyed did not have any household member who were part of any SHG, thus depriving them from a significant source of credit.

Kissan Samman Nidhi and/or other Similar DBT Schemes

Close to 60% of the marginal farmers surveyed had received some form of government grants or subsidies (primarily Kisan Samman Nidhi). It may be noted that the excluded population in not dominated by sharecroppers (23%) who remain ineligible, but actual landowners (77%).

Irrigation Facilities

- 10% of marginal farmers have adopted micro irrigation like sprinkler or drip.
- Close to a quarter of those affected by climate change had reported having access to wells or ponds for irrigation, but about a quarter more still has to buy water from other irrigation facilities.
- 45% of all surveyed marginal farmers grew crops in only one season, clearly indicating their limited or no access to irrigation facilities. 91% of those farming in one season were Kharif (mostly rice) farmers, indicating their over-dependence on the monsoon.
- 48% of all marginal farmers grew crops in two seasons, namely Kharif and Rabi.

Access to CHC:

- Only 9% of marginal farmers surveyed reported not knowing what a CHC is, which shows that there's awareness about CHCs, but access itself is very low, with only 34% of those aware of CHCs had reported not having a CHC within ten km of their village.
- Again, only 14.4% of those with access to CHC within a reasonable distance had ever hired equipment from the same.

Access and Utilisation of Subsidised Seeds and Fertilisers

- Close to half (48%) of surveyed marginal farmers had reported having access to outlets for subsidised seeds and fertilisers within ten km of their residence.
- At the same time, utilisation was very low, with only 22% of those with access within a reasonable distance having products from such outlets.

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Access and Utilisation of Cold Storage

- 69% of surveyed marginal farmers had reported that there were no cold storage facilities within ten km of their residence (around 10% just did not know whether there was one or not).
- Among the 21% of marginal farmers who had access to cold storage within ten km of their residence, the utilisation rate was just 15%.

Access to Credit

- The survey data shows that around 52% of households that had at least one member belonging to an SHG have managed to get a loan from the SHG. However, 60% of marginal farmer households had no SHG membership.
- Little over a quarter of the marginal farmers had taken bank loans in the past, but less than 15% had ever accessed credit directly from any MFI or directly from a FPO/FPC/PACS/PG/PE/Coop.
- Over half the marginal farmers had never taken any loan from formal sources (as above), meaning they were probably indebted to moneylenders paying exorbitant debt servicing charges, including loss of mortgaged collateral.

Access to Agriculture-related Technical Advice and Extension Services

- 28.4% of the surveyed marginal farmers had never accessed any agriculture-related technical advice or extension services.
- For marginal farmers who sought advice, major sources include their input dealers (in which case they might not be getting unbiased advice), followed by advice from other farmers or elders, or other progressive farmers from their village.
- Little less than a third sourced advice from print and electronic media.

Type of Information Sought by Marginal Farmers

- Among the marginal farmers who utilised agriculture-related technical advice, around half sought information regarding improved seed variety. A similar proportion sought information on fertiliser application and disease management.
- 30% of surveyed respondents sought information regarding water management, pest management, time of sowing, and new and efficient planting methods.

- While only 12.8% of respondents looked into crop insurance, weather forecast services were accessed by only 16% of respondents.

Constraints Faced while Adopting Agriculture Related Advisory

- 48.5% of respondents utilising agriculture related technical services reported that financial constraint was the major constraint while adopting new techniques.
- Little over a third had reported non-availability of input or physical resources as the major constraint. A similar number has issues with follow up on technical advice.
- Around one in four found the technical advice to be irrelevant or not useful.

Climate Resilient Agricultural Practices

- The survey observed that nearly one in three marginal farmers had not adopted any Climate Resilient Agricultural practices (CRAs).
- Among those who did, 70% reported changing their sowing methods, while 40% adopted improved water management practices. A similar number also changed their crop duration.
- Very few reported undertaking crop diversification of any kind.

Impact of Climate Change on Changing Livelihood Pattern

- 83% of the marginal farmers who reported to be impacted by climate-related extreme weather events reported augmenting their income source.
- Comparatively, 61% of marginal farmers who did not face any extreme weather events had to change their livelihood pattern.
- Over 40% of marginal farmers who have had to diversify their livelihood do so through part-time work, another third had to depend on animal husbandry, and a further third resorted to distress migration for work opportunities.
- 86% of marginal farmers who had been affected by extreme weather events and who had also reported shifting from just farming to augment their incomes could attribute this change largely to climate change.

Key Recommendations

The Need for a Paradigm Shift Putting Water at the Centre

As observed by Dr. Ashok Gulati, distinguished Professor at ICRIER and a thought leader in the Indian agricultural economics space, groundwater is turning into an increasingly finite resource. Thus, India needs to adopt a two-pronged strategy with respect to water in agriculture. On the supply side, it must augment buffer stocking of water during the monsoon season in its reservoirs, and recharge groundwater through check dams and watersheds, etc. Next, it must work on the demand side to ensure more rational allocation and efficient use of water across crops.[24]

This calls for not only institutional reforms in the Indian irrigation sector but also in the pricing of water and power for irrigation. While almost half of India's gross cropped area is irrigated today, we need to take it to at least 75 per cent if we must cope with weather vagaries associated with climate change.

[24] *How India can Minimise Climate Risk in Agriculture: Ashok Gulati; October 2023; https://indianexpress.com/article/opinion/columns/ashok-gulati-writes-how-india-can-minimise-climate-risk-in-agriculture-8984596/*

Dr. Gulati points out that if we must minimise this climate risk, we need a paradigm shift in our thinking. First and foremost, we need to shift focus from land productivity to water productivity. For example, we need not look at, say, so much tonne/hectare, but of kg of grain per cubic metre of irrigation water. Once we start looking at productivity from a water angle, we can identify the inefficiencies in the allocation and use of water in agriculture.

Mission Mode Approach on Education, Training, Orientation, and Extension Support

Within the framework of The National Mission for Sustainable Agriculture (NMSA), the range of interventions can be expanded to encompass all agricultural activities, including horticulture and livestock. This expansion would involve a greater allocation of resources for training, education, and the sensitisation of farmers. It would also involve the development of customised packages of practices to be adopted in response to changing climate scenarios and associated risks. A special focus on targeting marginal and women farmers in agriculture production clusters would be a meaningful addition. These interventions and actions can be made using both available and upcoming new digital technologies being developed by AgriTech companies as well as existing government extension systems and private sector innovative solutions.

Planning and Action based on the Climate-Resilient Agriculture Index

Looking at the climate risks and associated implications, particularly on marginal farmers, planning, action, and continuous evaluation of resilience across climatic zones is essential for developing and scaling suitable location-need-context specific interventions and policies. Developing and implementing a comprehensive approach to assess resilience across different agro-climatic zones and States through a Climate-resilient Agriculture Index that encompasses environmental, technological, socio-economic, institutional, and infrastructural dimensions would be beneficial. A reference is made to a recent study[25] undertaken by researchers from the Indian Institute of Forest Management (IIFM) Bhopal and Solidaridad Network, who have tried to find answers by developing an index for evaluating climate-smart agriculture (CSA) in India. Covering five dimensions - governance, farm management practices, environment management, energy management, and awareness and training, the study finds that the involvement of farmers in activities such as improved seeds, integrated nutrient management practices, crop residue management practices, direct seeding of rice, zero tillage farming, mulching, agroforestry enhances the ownership and strong commitment to undertaking these resilient agriculture practices.

The recently constituted two high-level scientific panels by the Government of India to assemble an advanced countrywide agricultural weather information system and introduce tech-enabled assessment of crop yields to ward off the impacts of extreme weather linked to climate change is a much-appreciated step.

Promotion of Sustainable and Natural Farming Practices

Sustainable agriculture is farming in such a way as to protect the environment, aid and expand natural resources, and make the best use of non-renewable resources. Many climate and weather risk management strategies fit squarely into such sustainable agriculture practices: locally adapted cropping patterns using local and natural resources and processes, based on local knowledge, skills, and innovations. Adopting climate-resilient practices such as mulching, micro-irrigation, intercropping, and crop diversification helps optimise the input supply and mitigate climate and market risks like price volatility. These need to be promoted in a big way by government programmes and policies[26].

The strategies that need universalisation, including among marginal farmers, need to include changes in cropping patterns and cropping systems, multiple/mixed cropping, intercropping systems with legume components, ecological farming practices (including those tapping into indigenous knowledge) which can maximise local resource use, e.g. building soil biological productivity, non-Pesticidal Management, Organic Soil Management, Community Seed Banks, soil moisture management, etc. Strategies would also include locally adopted crop varieties, short cycle crops, Participatory plant breeding, etc., and developing suitable farming systems that integrate agriculture, horticulture, and livestock.

[25] *Down to Earth; February 22, 2024: HT 29, 2024*
[26] *https://www.actionaidindia.org/publications/climate-change-and-indian-agriculture/*

Investing in Natural Resource Management

Soil health, ITS fertility, and watersheds need to be recognised as critical natural resources for adaptation, and the Government should invest in reviving them with appropriate incentives. To this effect, the strategies that need universalisation include enrichment and increase of soil organic matter and soil conservation through agroecological practices and revival of traditional water harvesting structures by convergence between MNREGA funds and funds available with the Water Resources department. Utility and usage of Soil Health Cards by marginal farmers is a very critical aspect to take forward.

Promote Farmer-led Initiatives and Collectives

Organised communities have proven to be more effective in planning and managing their resources and livelihoods, lobbying for policy changes and securing entitlements. This includes forming and expanding membership in community-led structures like FPOs, FPCs, PACS, PEs, Cooperative societies, Women SHGs, Water Users Committees, etc.

Strategies would include establishing institutional systems for each locality, which can plan, mobilise resources, organise production, and take up post-harvest management and marketing activities. It is understood that producer collectives like those mentioned above can improve the collective bargaining power of farmers and help internalise market activities.

At the same time, marginal farmers need a different set of crop varieties for which seed will have to be produced. Decentralised seed production (and stocked in community seed banks) involving local communities will help to produce locally adapted seeds for the main and contingency crops.

Diversify Food Production and Distribution to Increase Food and Livelihood Security

Sustainable agriculture does not imply a compromise on food security. Data from the National Centre for Organic Farming (NCOF), ICRISAT and CMSA has proven that crop productivity can be maintained with organic/ ecological farming. But this can be done only if the food basket of marginal farmers diversifies from just wheat and rice and a few pulses, oilseeds, and vegetables. One way of doing it is by expanding the Public Distribution System to include millets and, other coarse cereals, dryland fruits, and uncultivated greens, all of which also increase nutrition security.

Beyond PDS and mid-day meal schemes, the food security system needs to improve livelihood security by sustaining food production in villages and by improving income generation opportunities for small farmers (going beyond agriculture labour and foraying into animal husbandry activities like micro-dairy, as also 100 days of wage employment under MGNREGA). Such a system must ensure that marginal farming households have food and means of sustaining themselves and their livestock during lean periods of the year and during droughts and other climate failures.

Once again, the strategies could include incentivising suitable cropping patterns to promote proper diversification, procuring coarse grains, pulses, and other locally grown food through the PDS to set up local grain storage and distribution systems, and identifying and generating suitable off-farm and non-farm employment opportunities to ensure food and income.

Improve Financial Inclusion and Access to Rural Credit for Agriculture Production

Strategies would include revamping agriculture subsidies by providing direct subsidies to farmers for the production, use and maintenance of their own local ecological inputs (manure, organic fertiliser, composting, seedbanks and generation) rather than the current practice of subsidising external inputs. Side by side, integrate MGNREGA with sustainable agriculture so that each marginal farmer with job cards has the potential to get 100 days of wages. At the same time, we need to look beyond price support to farmers and explore tools like Direct Income Support. Formal credit systems (banks, NBFC, MFI) must be accessible and practical for obtaining and repaying credit by marginal farmers. Money lending and the concentration of inputs and output purchases in

the hands of local moneylenders must be stopped and regulated.

Finally, the Government and Civil Society need to put in all efforts to universalise the coverage of the Pradhan Mantri Fasal Bima Yojana[27] so that marginal farmers are shielded from crop loss owing to climate risk. At the same time, agriculture credit and insurance systems must be made climate-responsive and more sensitive to the needs of small farmers.

Building Partnerships to Develop Integrated Solutions

Partnerships between various governmental, private, and non-governmental agencies at the district level must be created to implement CRA programmes. An alliance of public sector research organisations, extension agencies, departments dealing with rural livelihoods and farmers' groups and CSOs at the national level should be formed and engage on sustainable agriculture/organic/natural/ecological farming. The Gyan Chaupals and Village Resource Centres, with satellite connectivity, should disseminate value-added weather data from the Government's Agromet Service to marginal farmers through mobile telephony, giving them information on rainfall and weather in real-time. Big data and analytics can transform agricultural practices by providing insights into weather patterns, soil health, and crop performance. Training students to harness these tools can significantly improve agricultural outcomes.

All these factors are expected to drive actions to empower and enable our small-scale farmers to effectively manage and maintain soil quality, enhance crop production, optimise water and energy usage, and apply knowledge in accordance with evolving weather conditions.

[27] *https://pmfby.gov.in/*

Annexure

Brief of major schemes implemented by the Department of Agriculture and Farmers Welfare[28]

S No.	Name of the Scheme	Purpose
I.	Central Sector Schemes	
1	Pradhan Mantri Kisan Samman Nidhi (PM-KISAN)	PM-KISAN is a central sector scheme launched on 24th February 2019 to supplement financial needs of land holding farmers, subject to exclusions. Under the scheme, financial benefit of Rs. 6000/- per year is transferred in three equal four-monthly installments into the bank accounts of farmers' families across the country, through Direct Benefit Transfer (DBT) mode. Till now, Rs.2.81 lakh crores have been transferred through Direct Benefit Transfer (DBT) to more than 11 crores beneficiaries (Farmers) through various instalments.
2	Pradhan Mantri Kisan MaanDhan Yojana (PM-KMY)	Pradhan Mantri Kisan Maandhan Yojna (PMKMY) is a central sector scheme launched on 12th September 2019 to provide security to the most vulnerable farmer families. PM-KMY is contributory scheme, small and marginal farmers (SMFs), subject to exclusion criteria, can opt to become member of the scheme by paying monthly subscription to the Pension Fund. Similar, amount will be contributed by the Central Government. The applicants between the age group of 18 to 40 years will have to contribute between Rs. 55 to Rs. 200 per month till they attain the age of 60. PMKMY takes care of the farmers during their old age and provides Rs. 3,000 monthly pensions to the enrolled farmers once they attain 60 years of age, subject to exclusion criteria. Life Insurance Corporation (LIC) is pension fund manager and registration of beneficiaries is done through CSC and State Govts. So far 23.38 lakh farmers have enrolled under the scheme.
3	Pradhan Mantri Fasal Bima Yojana (PMFBY)	PMFBY was launched in 2016 in order to provide a simple and affordable crop insurance product to ensure comprehensive risk cover for crops to farmers against all non-preventable natural risks from pre-sowing to post-harvest and to provide adequate claim amount. The scheme is demand driven and available for all farmers A total of 5549.40 lakh farmer applications were insured under the scheme since 2016-17 and Rs 150589.10 crore has been paid as claim.
4	Modified Interest Subvention Scheme (MISS)	The Interest Subvention Scheme (ISS) provides concessional short term agri-loans to the farmers practicing crop husbandry and other allied activities like animal husbandry, dairy, and fisheries. ISS is available to farmers availing short term crop loans up to Rs.3.00 lakh at an interest rate of 7% per annum for one year. Additional 3% subvention is also given to the farmers for prompt and timely repayment of loans thus reducing the effective rate of interest to 4% per annum. The benefit of ISS is also available for post-harvest loans against Negotiable Warehouse Receipts (NWRs) on crop loans for a further period of six months post-harvest to small and marginal farmers having Kisan Credit Cards (KCCs), on occurrence of natural calamities and severe natural calamities. As on 05-01-2024, 465.42 lakh new KCC applications have been sanctioned with a sanctioned credit limit of Rs. 5,69,974 crore as part of the drive.

[28] *Posted On: 02 FEB 2024 6:48PM by PIB Delhi; This information was given by the Union Minister of Agriculture and Farmers' Welfare, Shri Arjun Munda in a written reply in Rajya Sabha as on date.*

5	Agriculture Infrastructure Fund (AIF)	In order to address the existing infrastructure gaps and mobilize investment in agriculture infrastructure, Agri Infra Fund was launched under Aatmanirbhar Bharat Package. AIF was introduced with a vision to transform the agriculture infrastructure landscape of the country. The Agriculture Infrastructure Fund is a medium - long term debt financing facility for investment in viable projects for post- harvest management infrastructure and community farming assets through interest subvention and credit guarantee support. The Fund of Rs. 1 lakh crore under the scheme will be disbursed from FY 2020-21 to FY2025-26 and the support under the scheme will be provided for the duration of FY2020-21 to FY2032-33. Under the scheme, Rs. 1 Lakh Crore will be provided by banks and financial institutions as loans with interest subvention of 3% per annum and credit guarantee coverage under CGTMSE for loans up to Rs. 2 Crores. Further, each entity is eligible to get the benefit of the scheme for up to 25 projects located in different LGD codes. Eligible beneficiaries include Farmers, Agri-entrepreneurs, Start-ups, Primary Agricultural Credit Societies (PACS), Marketing Cooperative Societies, Farmer Producers Organizations(FPOs), Self Help Group (SHG), Joint Liability Groups (JLG), Multipurpose Cooperative Societies, Central/State agency or Local Body sponsored Public Private Partnership Projects, State Agencies, Agricultural Produce Market Committees (Mandis), National & State Federations of Cooperatives, Federations of FPOs (Farmer Produce Organizations) and Federations of Self Help Groups (SHGs). As on 31-12-2023, Rs.33.209 Crores have been sanctioned for 44,912 projects under AIF, out of this total sanctioned amount, Rs 25,504 Crores is covered under scheme benefits. These sanctioned projects have mobilized an investment of Rs 56.471 Crores in agriculture sector.
6	Formation & Promotion of new 10,000 FPOs	The Government of India launched the Central Sector Scheme (CSS) for “Formation and Promotion of 10,000 Farmer Producer Organizations (FPOs)” in the year 2020. The scheme has a total budgetary outlay of Rs.6865 crores. Formation & promotion of FPOs are to be done through Implementing Agencies (IAs), which further engage Cluster Based Business Organizations (CBBOs) to form & provide professional handholding support to FPOs for a period of 5 years.
		FPOs get financial assistance up to Rs 18.00 lakh per FPO for a period of 03 years. In addition to this, provision has been made for matching equity grant up to Rs. 2,000 per farmer member of FPO with a limit of Rs. 15.00 lakh per FPO and a credit guarantee facility up to Rs. 2 crore of project loan per FPO from eligible lending institution to ensure institutional credit accessibility to FPOs. Suitable provisions have been made for training and skill development of FPOs. Further, FPOs are onboarded on National Agriculture Market (e-NAM) platform which facilitates online trading of their agricultural commodities through transparent price discovery method to enable FPOs to realize better remunerative prices for their produce. As on 31.12.2023, total 7,774 FPOs were registered under the scheme in the country.

7	National beekeeping and Honey Mission (NBHM)	Keeping in view the importance of beekeeping, a new Central Sector Scheme entitled National Beekeeping & Honey Mission (NBHM) was launched in 2020 under Atma Nirbhar Bharat Abhiyan for its implementation in the field for overall promotion and development of scientific beekeeping & to achieve the goal of "Sweet Revolution". Some of the achievements include; Honeybees/ beekeeping have been approved as 5th Input for Agriculture. 4 World Class State of the Art Honey Testing Labs and 35 Mini Honey Testing Labs have been sanctioned under National Beekeeping & Honey Mission (NBHM) for testing of honey. Madhukranti portal has been launched for online registration of Beekeepers/ Honey Societies/ Firms/ Companies. Till date 23 lakhs bee colonies registered on Portal. 100 Honey FPOs targeted under 10,000 FPOs scheme in the country. 88 FPOs have been registered by NAFED, NDDB & TRIFED. 25 States/UTs have been covered under NBHM under MM-I, II & III. 160 Projects sanctioned under MM- I, II & III of Rs. 202.00 crores.
8	Market Intervention Scheme and Price support Scheme (MIS-PSS)	Ministry of Agriculture & Farmers Welfare implements the Price Support Scheme (PSS) for procurement of pulses, oilseeds and copra. Market Intervention Scheme (MIS) for procurement of agricultural and horticultural commodities which are perishable in nature and are not covered under the Price Support Scheme (PSS). The objective of intervention is to protect the growers of these commodities from making distress sale in the event of a bumper crop during the peak arrival period when the prices tend to fall below economic levels and cost of production.
9	Namo Drone Didi	The Government has recently approved a Central Sector Scheme for providing drones to the Women Self Help Group (SHGs) for the period from 2024-25 to 2025-26 with an outlay of Rs. 1261 Crores. The scheme aims to provide drones to 15000 selected Women Self Help Group (SHGs) for providing rental services to farmers for agriculture purpose (application of fertilizers and pesticides). Under this Scheme, Central Financial Assistance @ 80% of the cost of drone and accessories/ancillary charges up to a maximum of Rs. 8.0 Lakhs will be provided to the women SHGs for purchase of drones. The Cluster Level Federations (CLFs) of SHGs may raise the balance amount (total cost of procurement minus subsidy) as loan under National Agriculture Infra Financing Facility (AIF). Interest subvention @ 3% on the AIF loan will be provided to the CLFs. The scheme will also provide sustainable business and livelihood support to SHGs and they would be able to earn additional income of at least of Rs. 1.0 lakh per annum.
II	Centrally Sponsored Schemes	
10	Rastriya Krishi Vikas Yojana - Detailed Project Report based schemes (RKVY-DPR)	The scheme focuses on creation of pre & post-harvest infrastructure in agriculture and allied sectors that help in supply of quality inputs, market facilities, etc. to farmers. It provides flexibility and autonomy to states to implement projects as per the local farmers' needs and priorities from a bouquet of activities in agriculture and allied sectors. The scheme aims to fill the resources gap of agriculture and allied sectors by providing financial support to states for undertaking various activities to increase in overall growth of agriculture and allied sectors and farmers' income. Under RKVY Agri-startup Programme, since 2019-20, 1524 Start-ups have been selected and Rs. Rs. 106.25 crore released as grants-in-aid for funding the Start-ups.

11	Soil Health Card (SHC)	Soil health card provides information to farmers on nutrient status of their soil along with recommendation on appropriate dosage of nutrients to be applied for improving soil health and its fertility. The indicators are typically based on farmers' practical experience and knowledge of local natural resources. The card lists soil health indicators that can be assessed without the aid of technical or laboratory equipment. The Scheme rolls out a decentralized system of soil testing which will help in developing a nationwide soil fertility map on a GIS platform that can easily be integrated with the real time decision support systems being developed. In order to develop the soil fertility map, Government of India has decided to conduct 5 Crore Soil Samples across the country during year 2023-24 to 2025-26.
12	Rainfed Area Development (RAD)	RAD is being implemented since 2014-15. RAD adopts an area-based approach in cluster mode for promoting Integrated Farming System (IFS) which focuses on multi-cropping, rotational cropping, inter-cropping, mixed cropping practices with allied activities like horticulture, livestock, fishery, apiculture etc. to enable farmers not only in maximizing the farm returns for sustaining livelihood, but also to mitigate the impacts of drought, flood or other extremes weather events. An amount of Rs. 1673.58 crores has been released and an area of 7.13 lakh hectare has been covered under RAD programme from the year 2014-15 to till date.
13	Per Drop More Crop (PDMC)	In order to increase water use efficiency at the farm level through Micro Irrigation technologies i.e. drip and sprinkler irrigation systems, Per Drop More Crop (PDMC) scheme was launched during 2015-16. The Micro Irrigation helps in water saving as well as reduced fertilizer usage through fertigation, labour expenses, other input costs and overall income enhancement of farmers. It also supports micro level water harvesting, storage, management etc. activities as Other Interventions (OI) to supplement source creation for Micro Irrigation. OI activities allowed on need basis up to 40% of the total allocation for North East States, Himalayan States, Jammu & Kashmir, Ladakh and up to 20% for other States. An area of 78 lakh hectare has been covered under Micro irrigation through the PDMC scheme from 2015-16 to 2022-23.
14	Micro Irrigation Fund (MIF)	A Micro Irrigation Fund (MIF) of initial corpus Rs 5000 crore has been created with NABARD with major objective to facilitate the States in mobilizing the resources for expanding coverage of Micro Irrigation. Under the funding arrangement, NABARD lends to the States/UTs at 3% lower interest rate than the corresponding cost of fund mobilized by NABARD from the market. The interest subvention on the loan under MIF is borne by Centre under PDMC. Projects with loans under MIF worth Rs 4710.96 crore have been approved so far. Loans amounting Rs.2812.24 crore has been disbursed to States of Andhra Pradesh, Tamil Nadu, Gujarat, Punjab, Haryana and Rajasthan. The Ministry provides interest subvention on the loan availed by the States which is met from PDMC Scheme. As per the Budget 2021-22, the corpus of the fund is to be doubled to Rs.10000 crores. MIF is now merged with PDMC.
15	Paramparagat Krishi Vikas Yojana (PKVY)	Paramparagat Krishi Vikas Yojana (PKVY) aims to increase soil fertility and thereby helps in production of healthy food through organic practices without the use of agro-chemicals. The scheme is implemented in a cluster mode with unit cluster size of 20 hectares. A group shall comprise minimum 20 farmers (maybe more if individual holdings are less). Farmers in a group can avail benefit of maximum of 2 ha as per provision of PKVY. 25 such clusters are converted into one large cluster of about 500 ha area to facilitate marketing of organic produce. The scheme provides for an assistance of Rs. 31,500 per ha to states, out of which i.e., Rs. 15,000 is given as incentives to a farmer directly through DBT.

16	Sub-Mission on Agriculture Mechanization (SMAM)	Sub Mission on Agricultural Mechanization (SMAM) is being implemented w.e.f April, 2014 which aims at catalyzing an accelerated but inclusive growth of agricultural mechanization in India with the objectives of Increasing the reach of farm mechanization to small and marginal farmers and to the regions where availability of farm power is low, promoting 'Custom Hiring Centres' to offset the adverse economies of scale arising due to small landholding and high cost of individual ownership, creating hubs for hi-tech& high value farm equipment, creating awareness among stakeholders through demonstration and capacity building activities and Ensuring performance testing and certification at designated testing centers located all over the country. Till date Rs. 6748.78 Crore have been released to State Governments, distributed more than 15,75,719 agricultural machinery & equipment's including Tractors, Power Tillers, Self-Propelled Machineries and Plant Protection Equipment and established 23472 number of Custom Hiring Centres, 504 number of Hi-Tech Hubs and 20597 nos. of Farm Machinery Banks. **Promotion of Drone Technology under SMAM** Looking into the unique advantages of Drone technologies in agriculture, a Standard Crop Specific Operating Procedures (SOPs) released the for use of drones in pesticide and nutrient application in public domain on 20.04.2023, which provides concise instructions for effective and safe operations of drones. From within the funds of SMAM, so far, an amount of Rs.138.82 crores have been released towards Kisan drone promotion, which include purchase of 317 Drones for their demonstration in 79070 hectares of land and supply of 461 drones to the farmers on subsidy and also supply of 1595 drones to the CHCs for providing drone services to the farmers on rental basis.
17	Crop Residue Management	Crop Residue Management was implemented from 2018-19 in Punjab, Haryana, Uttar Pradesh and NCT of Delhi. Its objectives include protecting environment from air pollution and preventing loss of nutrients and soil micro-organisms caused by burning of crop residue through promoting in-situ management of crop residue. In this regard, it proposes to set up Farm Machinery Banks for custom hiring of in-situ crop residue management machinery. It also aims to creating awareness among stakeholders through demonstration, capacity building activities and differentiated information, education and communication strategies for effective utilization and management of crop residue. Rs. 3333.17 crore has been released under the scheme since inception and distributed more than 2,95,845 CRM machinery. CRM is now merged with SMAM.
18	Agro-forestry	Agro-forestry was conceived on the recommendation of the National Agro-forestry Policy 2014 to promote plantation on farmlands. The restructured agro-forestry under RKVY is aimed to provide Quality Planting Materials (QPM) and the certification in order to promote planting of trees on farm land for improving the livelihood of farmers.
19	National Food Security Mission (NFSM)	The Mission aims at increasing production of rice, wheat, pulses, coarse cereals (Maize and Barley) and Nutri-Cereals through area expansion and productivity enhancement in a sustainable manner in the identified districts of 28 States and 2 UTs (i.e., J&K and Ladakh). Other objectives include restoring Soil fertility and productivity at the individual farm level, enhancing farm level economy to restore confidence amongst the farmers and post harvest value addition at farm gate. Since the declaration of the International Year of Millets (IYM) 2023 by the UNGA in 2021, Government has taken a proactive multi stakeholder engagement approach to achieve the aim of IYM 2023 and taking Indian millets globally. 25 seed-hubs have been established to ensure availability of quality seed of latest improved varieties of Nutri cereals in the country. Millet missions have been launched across 13 states including Odisha, Tamil Nadu, Chhattisgarh, Assam, Karnataka, Madhya Pradesh, Maharashtra, Uttarakhand, Uttar Pradesh, Bihar, Himachal Pradesh, Gujarat and Rajasthan. More than 500 start-ups and 350 FPOs have been established and are operational in the millet ecosystem as of now.

20	Sub-Mission on Seed and Planting Material (SMSP)	SMSP covers the entire gamut of seed production chain, from production of nucleus seed to supply of certified seeds to the farmers, to provide support for creation of infrastructure conducive for development of the seed sector, support to the public seed producing organisations for improving their capacity and quality of seed production, create dedicated seed bank to meet unforeseen circumstances of natural calamities, etc. For effective monitoring, efficiency and transparency covering Seed chain from Nucleus-Breeder-Foundation-Certified Seed, first phase of Seed Authentication, Traceability & Holistic Inventory (SATHI) portal was launched on 19th April, 2023. SMSP is now merged with NFSM.
21	National Mission on Edible Oils (NMEO)-Oil Palm	A new Centrally Sponsored Scheme namely, National Mission on Edible Oil (NMEO)-Oil Palm (NMEO-OP) has been launched by Government of India in 2021 in order to promote oil palm cultivation for making the country Aatamnirbhar in edible oils with special focus on North-Eastern States and A&N Islands. The Mission will bring additional area of 6.5 lakh ha under Oil Palm plantation with 3.28 lakh ha in north-eastern states and 3.22 in rest of India in next 5 years from 2021-22 to 2025-26.
22	Mission for Integrated Development of Horticulture (MIDH)	Mission for Integrated Development of Horticulture (MIDH), a Centrally Sponsored Scheme was launched during 2014-15 for holistic growth of the horticulture sector covering fruits, vegetables, root and tuber crops, mushrooms, spices, flowers, aromatic plants, coconut, cashew, cocoa and Bamboo. Major components include plantation infrastructure development, establishment of new orchards and gardens for fruits, vegetables, spices and flowers, rejuvenation of unproductive, old, and senile orchards, protected cultivation, promotion of organic farming, pollination support through bee keeping, horticulture mechanization, post-harvest management (PHM) and marketing infrastructure etc. Under MIDH since 2014-15 to 2023-24 (as on 31.10.2023) an additional area of 12.95 lakh ha. of identified horticulture crops has been covered, 872 nurseries established for production of quality planting material, 1.41 lakh ha. of old and senile orchards has been rejuvenated, 52069 ha. been covered under organic practices and 3.07 lakh ha. has been covered under Protected Cultivation.
23	National Bamboo Mission (NBM)	The Scheme is implemented in 23 States and 1 UT (J&K) through the State Bamboo Missions (SBM)/ State Bamboo Development Agency (SBDA). NBM mainly focuses on the development of complete value chain of the bamboo sector. It is envisaged to link growers with consumers with a cluster approach mode. Under NBM, 367 Bamboo Nurseries established, 212 bamboo Nurseries Accredited by the State Level Accreditation Committees, 46000 ha bamboo plantations established in non-forest Government & private lands, 81 units for bamboo primary processing established, 416 units established for value addition and product development, and capacity building for 15000 persons including farmers, artisans and entrepreneurs. NBM is now merged with MIDH.
24	Integrated Scheme for Agriculture Marketing (ISAM)	ISAM supports state governments in governing the agricultural produce marketing through creation and improvement of market structures, capacity building and generating access to market information. During 2017-18, National Agriculture Market Scheme popularly known as e-NAM scheme has also been made part of the same. National Agriculture Market (e-NAM) is a pan-India electronic trading portal which networks the existing APMC mandis to create a unified national market for agricultural commodities. 1389 mandis of 23 States and 04 UTs have been integrated to e- NAM platform and more than 1.76 Crore Farmers & 2.5 Lakh traders have been registered on e-NAM portal.

25	Mission Organic Value Chain Development for North Eastern Region	The MOVCDNER aims at development of commodity specific, concentrated, certified organic production clusters in value chain mode to link growers with consumers and to support the development of entire value chain starting from inputs, seeds, certification, to the creation of facilities for collection, aggregation, processing, marketing and brand building initiative in Northeast Region (Arunachal Pradesh, Assam, Manipur, Meghalaya, Mizoram, Nagaland, Sikkim, and Tripura). Since 2015-16 (as on 06.12.2023), Rs 1035.17 crore has been released, 379 FPO/FPCs created covering 189039 farmers and 172966 ha area.
26	Sub-Mission on Agriculture Extension (SMAE)	The scheme aims at making the extension system farmer driven and farmer accountable by disseminating technology to farmers through new institutional arrangements viz. Agricultural Technology Management Agency (ATMA) at district level to operationalize extension reforms in a participatory mode. Digital initiatives taken up in agricultural extension include; VISTAAR - Virtually integrated Systems To Access Agricultural Resources being developed as a DPI for Agriculture Extension Apurva AI- Capturing farmer innovations- Acts as a peer-to-peer learning Platform and provide content for advisory retrieval through VISTAAR Bot and also for impact Assessment of schemes (AIF completed) Wadhwani- Krishi 24X7 for Realtime News monitoring, Tamil language and image-based cotton pest identification to be plugged in with FLEW/farmer profile mapping Kisan Call Centre - Integration with VISTAAR and other IT applications and with Kisan Sarathi (ICAR) for direct contact with Agri experts RAWE- Integration of Agri students for behavioral interaction through VISTAAR Bot and Feedback system IMD- Weather forecast integrated through DAMU along with advisory delivery through VISTAAR NRLM- Decentralised Extension Mechanism (Krishi Sakhi, Pashu Sakhi, Matsya Sakhi etc.) - Capacity building on Digital Extension -VISTAAR
27	Digital Agriculture	The scheme aims to improve the existing National e- Governance Plan in Agriculture (NeGPA) by developing a digital public infrastructure for agriculture that will be built as an open source, open standard and interoperable public good to enable inclusive, farmer-centric solutions through relevant information services for crop planning and health, improved access to farm inputs, credit and insurance, help for crop estimation, market intelligence, and support for the growth of Agri Techs industry and start-ups. AgriStack architecture has the following foundational layers: - • Core registries • Base databases • Farmers Database: Farmers ID linked with land records • Geo-referencing of plots • Crop Survey, Crop planning and • Soil Mapping, Soil Fertility • Unified Farmers Service Interface for state, Pvt. Players • Data Exchange

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Forum of Enterprises for Equitable Development

The Forum of Enterprises for Equitable Development (FEED) is dedicated to enhancing the livelihoods of marginal farmers through advocacy, research, and collaboration with various stakeholders. It strives to ensure that these farmers have access to new opportunities and resources that can lead to sustainable development.

FEED is committed to improving the economic wellbeing of marginal farmers in India. It aims to transform agricultural practices, enhance local markets, and develop human capital. FEED's strategy includes engaging with professional agencies to improve farm production systems and transition from subsistence to commercial farming. By leveraging public investments and technology, FEED seeks to create institutional aggregations and modern value chains.

FEED advocates for marginal farmers by connecting them with the private sector and promoting their interests through seminars, policy briefs, and research papers. It emphasizes the importance of data-driven decision-making and partnerships to support the resilience and growth of these farmers. FEED's goal is to foster a business-oriented approach to small-scale farming, encouraging dialogue and forming program coalitions that can change the narrative for marginal farmers.

DiU | Development Intelligence Unit

The Development Intelligence Unit (DIU) brings data and expert analysis to the intersection of opportunity and deprivation in rural India. The DIU supports stakeholders who navigate the increasingly opaque, complex and uncertain world of data to analyse social and economic developments, forecast trends and better understand development programmes and practices. Doing so provides actional insight to improve the efficacy and effectiveness of development initiatives.

The DIU platform is a clearing-house of rural information presented in a user-friendly format, addressing the needs of diverse stakeholders in public, private and civil society. It brings rural India into focus and furthers the field of rural analytics for understanding, positioning and informing stakeholders and decision makers. DIU specialises in evidence-based insights that will create an impact for governments and non-profits. It has expertise to develop data-driven solutions to public policy challenges based on robust evidence, expert insights and data analysis. It is providing data, research and tools to amplify issues in order to help rural India gain a voice, spark deeper conversation and help shape the future of India.


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