The power of ‘tech plus people’ in collective climate action

How CRISP-M’s online technology and community-driven approach support inclusive climate resilience in India

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Cover photo: villagers in Puddar

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Partnering Hope into Action Foundation (PHIA) is an Indian Charitable Trust. With a vision of a society free from poverty, exclusion, and discrimination, and all people living with justice, peace, and dignity, PHIA works for the eradication of poverty among the poor, vulnerable, and marginalised communities in India. It works in partnership with civil society and community-based organisations facilitating empowerment of poor, vulnerable, and marginalised communities so that they can be in charge of their own development. Gender equality crosscuts all of PHIA's work. PHIA Foundation interventions and programmes are present in the states of Bihar, Jharkhand, Madhya Pradesh, Uttar Pradesh, and Delhi NCR. It works on both long-term development programmes and humanitarian responses. PHIA works in partnership with civil society organisations (CSOs), private sector, multilateral and bilateral development agencies, philanthropy institutions, and the Government to bring capabilities and capacities together to find scalable solutions to address poverty, and promote social justice, equity, and dignity.

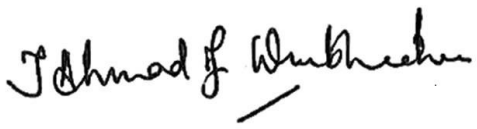
Foreword

The devastating impacts of climate change can be seen on every continent, and they are challenging us in ever more destructive and complex ways.

Vulnerable countries and the most marginalised communities on the frontline are increasingly finding it difficult to cope and recover from extreme weather. More and more vulnerable people are being driven from their homes.

This collection of case studies demonstrates the need for a community-centred approach to building climate resilience. They show how technology and societal reform can make communities stronger.

As we approach COP27, these case studies offer a vision of a more secure future for people at the sharp edge of climate change. They provide hope for the future.



Lord (Tariq) Ahmad of Wimbledon

Minister of State for the Middle East, South Asia and the UN United Nations and the Commonwealth

Foreword

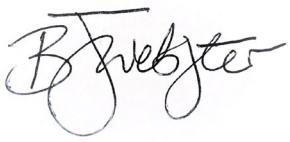
With every new report launched by the IPCC, it becomes ever more apparent that we have much still to do in the race to adapt our world to the increasingly severe impacts of climate change. Unless urgent action is taken, we will simply be left firefighting one emergency after another, reeling from one failed harvest to the next. But **how** can we adapt more effectively?

One of the simplest and most effective options available is to modify existing tools, approaches and instruments (such as social protection mechanisms) in a way that makes them 'climate smart' — harnessing climate information and technology, so that assistance can be provided to the people most affected in a timely and relevant manner. And even better than providing assistance after the impact, is anticipating the hazard and taking action in advance; thereby reducing the impact and offering people agency to protect themselves, their families, their homes and their livelihoods.

This was the premise when the Risk-informed Early Action Partnership[1] (or REAP) was launched in 2019 — identifying ways we can work across governments, civil society, academia, the private sector and international organisations (and across the silos of climate, development and humanitarian communities) to take these effective early action approaches and adaptations to scale.

The CRISP-M modification to MGNREGS is such a great example of what the partnership is about: ensuring that early warning systems are people-centred and enable action to be taken in 'last-mile' communities; collaborating across different stakeholder groups and reducing silos; ensuring that communication is flowing in all directions to ensure learning and that the views of the most marginalised are heard; integrating climate information into planning processes more systematically; and adapting existing social protection mechanisms to truly reach scale. In 2021, the partnership launched some key policy recommendations[2] to encourage this approach to be the norm rather than the exception.

As this case study collection makes clear, technology is only ever part of the solution. It is people that make systems, tools, mechanisms and initiatives effective. These case studies offer some excellent examples of how people are already taking action to improve the outlooks of their — and their children's — futures. The Climate *Saathis* are an inspiring group of individuals; my hope is that this case study collection will inspire others to take up the challenge and will help to make many more people resilient to the impacts of climate change.



Ben Webster

Head of Secretariat, Risk-informed Early Action Partnership

1 www.early-action-reap.org/who-we-are

2 www.early-action-reap.org/linking-social-protection-and-early-action-game-changer-people-centred-climate-action

Contents

Introduction

Many of India's rural communities are ill equipped to predict, plan for or cope with the intensifying impacts of climate change.[1] To counter this, the Ministry of Rural Development is working with IIED and local partners[2] to integrate climate resilience outcomes in its national social protection programme: the Mahatma Gandhi National Rural Employment Guarantee Scheme. Reflecting the scheme's 'top-down, bottom-up' ethos, we launched an online tool: this seeks to enable and inform more inclusive village-level planning by providing climate risk data, including locally specific information on soil, topography and more. A year on, these case studies illustrate a key learning from the launch: that strong community engagement amplifies and extends the impact of tech-based solutions.

Facing complex challenges

Millions of livelihoods rely on the rainfed agriculture practiced across much of India, which makes the country's rural populations vulnerable to climate change. In recent years, the state of Madhya Pradesh has seen crop after crop devastated by heatwaves[3] and erratic rains (see box on case study context, p.10).[4] Water scarcity and failed crops push people to undertake distress migration, often leading to the breakdown of families as adults are forced to leave their village in search of alternate livelihoods. These climate-driven hardships also intensify the existing risks facing rural communities — food insecurity, disease, debt burden and poverty — and exacerbate pre-existing inequalities. Local farming expertise is deep but is undermined by the loss of more reliable weather patterns.

To support rural communities to safeguard their futures, IIED has been working with national and state governments and other local-level partners to embed climate resilience in the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). This nationwide employment-based social protection programme is the largest of its kind in the world, able to reach rural communities with the most precarious incomes (see p.11). The scheme seeks to support communities to solve their own problems at village level, recognising that 'top-down' resource is most effective if combined with 'bottom-up' priorities and participation.

Amplifying a tech-based solution

In 2021, IIED worked with the Madhya Pradesh Council of Science and Technology to design an online tool that could support rural communities suffering from the impacts of climate change. We co-created the Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M): a user friendly 'app' that allows rural households to find and share localised climate data, as well as access resources that can help protect their livelihoods when faced with climate crisis (for a fuller introduction to the tool, see p.13). The CRISP-M tool was developed with FCDO support under the Infrastructure for Climate Resilient Growth programme. CRISP-M, which can be accessed via computer or smartphone, was launched in October 2021 across 18 *Gram Panchayats* (decentralised elected village bodies) in the Badwani District of Madhya Pradesh.

Farmer Rukmani Bai introduces her community to the CRISP-M tool (see case study 1)

CRISP-M mirrors the MGNREGS 'bottom-up, top-down' ethos. In theory, with freely accessible climate risk data added to their own local knowledge and experience, rural communities should be able to create more informed and inclusive climate action plans for both the short and long term. But for this to truly work for the whole community — including marginalised groups like women, Scheduled Castes and Scheduled Tribes[5] — simply providing a tech-based climate tool and instruction for use is not enough.

This case study collection illustrates how **an inclusive, volunteer-led community engagement process** supports climate technology to work in favour of poor and marginalised communities: by providing them a voice and authority in decision making at local level. In demonstrating the purpose and impact of the 'Climate *Saathi*' ('friend' in Hindi) community engagement approach, these case studies offer lessons that can inform future plans for scaling up CRISP-M, across India and even beyond. They also make the more general case for a 'tech plus people' approach when introducing digital or tech solutions in a location where pre-existing social challenges and prejudices are at play.

'Climate friends' create local agency

These case studies will introduce you to 12 men and women living in rural Madhya Pradesh, all of whom recognise the threat posed to their livelihoods by an increasingly unpredictable climate. This common ground has inspired many of those profiled here to volunteer as Climate Saathis — a recently-devised, community-focused role with MGNREGS — or to seek Saathi support and advice.

But the similarities end there. In line with the MGNREGS commitment to leave no one behind, these determined local climate champions span ages, genders and castes. Diversity is critical if the Saathis are to provide every part of the community with climate support, including through the CRISP-M tool, and — most importantly — advice on how to translate access to data into influence on village-level climate action plans. (For more information about the Climate Saathi role see p.14; for a full list of volunteers, see p.16.)

Together, the case studies show that community engagement is what elevates CRISP-M from an informative tool to a lever that supports more democratic village-level decision making. When relevant climate data and the encouragement of a passionate Climate Saathi are added to marginalised groups' long experience of farming in the region, they are able to raise their priorities more confidently in village-wide forums like the *Gram Panchayats.* This confidence is also supported by the design of CRISP-M: the tool crowdsources data, which reframes every user as a valuable contributor whose input increases the reliability and reach of available information over time.

> "When I go to village meetings, people look at me with respect and awe because I have information that they don't have. But I don't just use the information to help myself. I share it, so that others can benefit from it."
>
> Rukmani Bai, 55, farmer and women's self-help group leader

Here, we can see the 'tech plus people' approach has impact beyond climate resilience: once the poorer families, women, Scheduled Castes and other marginalised groups in a community grow in confidence and influence, they can make their voices heard on many more issues that affect them, such as land tenure and rights. And with a wider cross-section of society present in local debate around climate resilience, it is also easier for communities to make connections between resilience planning and other development schemes.

Establishing a learning loop

The Climate Saathi engagement approach illustrated in these case studies creates a 'learning loop', as volunteers act as a link between rural communities using the tool and the MGNREGS programme. Iterative feedback will support IIED and partners both to evolve CRISP-M in terms of technology and content and to hone the tool so it works in the ways the users need it to. This is especially important as CRISP-M is being distributed further within the Raisen and Sehore districts of Madhya Pradesh in late 2022, and the Ministry of Rural Development has subsequent plans to scale the tool to pan India level.

Emerging impacts

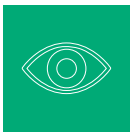
A year into our 'tech plus people' approach, the case studies capture some useful early lessons, trends and impacts that can be applied at future planning stages for CRISP-M and other climate resources. These findings fit under six broad headings, which also form the structure of this collection, with two case studies in each category:

1. Gender and intersectionality

Technology makes it easier for women to access information, speak in village meetings, and take charge of the agendas that matter to them.

2. Marginalised and Indigenous groups

Participatory vulnerability assessments (see Annex) help Scheduled Castes, Scheduled Tribes and other marginalised groups prioritise their demands and ensure their needs and aspirations are heard by others in the village planning process. Being heard, in turn, restores self-confidence.



3. Transparency and accountability

The CRISP-M monitoring system confers power to the community by crowdsourcing information to verify claims around progress and highlighting the structures needing repair or maintenance.

4. Early warning and early action

CRISP-M meets the local need for early drought warnings, particularly in terms of agriculture, water availability and household decision making on migration.

5. Supporting integrated planning (agriculture, forestry and skill development)

The CRISP-M tool and related planning activity supports recognising and leveraging resources from other development programmes, for more holistic development.

6. Landscape-based planning for long-term drought proofing

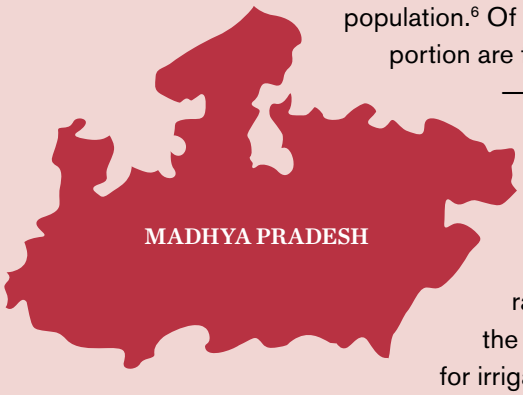
Participatory village resource planning helps to demystify geographic information system (GIS) technology and enable everyone in the community to take part in the planning process (this meets the interests of small and marginal farmers, for example, by locating water harvesting structures near their farmland). This is necessary to ensure land development, water conservation and harvesting efforts are applied across the whole village area, in order to achieve permanent drought proofing in the long run.

"My father used to tell me stories of farmers committing suicide, unable to bear the brunt of extreme weather conditions. The information available on CRISP-M has not only helped me take better care of my crops but has also given me hope that things can change for the better if we all work together."

Brajlal Baribal, 27, soya bean, pigeon pea and maize farmer

We expect more impacts to emerge as the plans developed by communities using CRISP-M are realised. Meanwhile, these early impacts already show the value of combining scientific climate risk information, methods, practices and technology with traditional knowledge practices, skills and community experience.

Case study context: Madhya Pradesh



Madhya Pradesh is India's second largest state by area and sixth largest by population.[6] Of the state's approximately 73 million residents, a significant portion are from Scheduled Castes (15.6%) and Scheduled Tribes (21.1%)[6] — both are among the most disadvantaged socioeconomic groups in the country.

More than 72% of the Madhya Pradesh's rural workforce is employed in agriculture and the allied sectors.[7] The main crops include wheat, soybean, gram, sugarcane, rice, maize, cotton, rapeseed, mustard and Arhar (pigeon pea). But two-thirds of the cropped area in the state is rainfed, reliant on erratic monsoons for irrigation; this results in high crop loss and damage, and low crop productivity compared to the national average.[7] In addition, climate change is directly or indirectly affecting crops, water and soil across the region; for example, intense and late rainfall depletes soil fertility, and drives soil erosion.

After agriculture, forests are the most important source of livelihoods for the rural community, particularly for Madhya Pradesh's tribal communities (providing livelihoods for nearly two million tribal people, as well as ecological services). Nearly 25.14% of the state's land area is covered by forest, which also acts as an important source of revenue for the government.[8]

1 Carrington, D (18 May 2022) Climate crisis makes extreme Indian heatwaves 100 times more likely – study. *The Guardian*. Available at: https://www.theguardian.com/environment/2022/may/18/climate-crisis-makes-extreme-indian-heatwaves-100-times-more-likely-study

2 Ministry of Rural Development (MoRD) of India; State Panchayati Raj and Rural Development Department in Uttar Pradesh; State Panchayati Raj and Rural Development Department in Madhya Pradesh; State Panchayati Raj and Rural Development Department in Rajasthan; Indian Meteorological Department (IMD); Indian Institute for Tropical Meteorology (IITM); Madhya Pradesh Council for Science and Technology; Department of Science & Technology, State Remote Sensing Application Centre, Rajasthan; Remote Sensing Applications Centre, Department of Science & Technology, Uttar Pradesh; National Institute of Hydrology (NIH), Roorkee; Indian Institute of Forest Management (IIFM), Bhopal; Water & Land Management Institute (WALMI). For more project information, see www.iied.org/enhancing-climate-resilience-impacts-indias-social-protection-programme

3 Indo-Asian News Service (IANS) (26 April 2022) At 25, Rajasthan and Madhya Pradesh Have Suffered The Most Heatwaves So Far This Summer: IMD. Available at: https://weather.com/en-IN/india/news/news/2022-04-26-rajasthan-and-madhya-pradesh-suffered-the-most-this-summer

4 Ayub, J (6 June 2022) Climate change effect: Rainfall to be more erratic in Madhya Pradesh. *The Times of India*. Available at: https://timesofindia.indiatimes.com/city/bhopal/climate-change-effect-rainfall-to-be-more-erratic-in-madhya-pradesh/articleshow/92034516.cms

5 'Scheduled Castes' and 'Scheduled Tribes' are officially designated groups recognised in the Constitution of India.

6 www.censusindia2011.com/madhya-pradesh-population.html

7 Madhya Pradesh Agriculture Economic Survey 2016 http://des.mp.gov.in/Uploads/2/11%20AGRICULTURE%20SURVEY%20ENGLISH.pdf

8 Madhya Pradesh Forest Survey of India https://fsi.nic.in/isfr19/vol2/isfr-2019-vol-ii-madhya-pradesh.pdf

Supporting information

The Mahatma Gandhi National Rural Employment Guarantee Scheme

Potential to deliver climate resilience

Climate change is manifesting itself in many ways in India, often with the most severe consequences for the poor and vulnerable. Hazards associated with climate change exacerbate and act as threat multipliers to risks that already exist, such as food insecurity, disease, migration and poverty. The government must build and promote integrated climate risk management approaches that can tackle the underlying causes of climate vulnerability, while also addressing the drivers of poverty and food insecurity. Equally, development programmes need to incorporate building resilience against climate-related shocks and stressors.

India's Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is one such programme, with the potential to support rural communities to prepare, cope with and recover from climate risks. With an annual budget of US$13 billion and reaching more than 270 million rural workers, MGNREGS is the world's largest public works-based social protection programme. The scheme provides a rights-based social safety net to India's rural poor by guaranteeing 100 days of waged employment to every rural household. Through waged employment, the scheme also seeks to create durable assets to enhance land and water resources, improve rural connectivity and strengthen the resources that form the foundation for low-income rural livelihoods.

MGNREGS includes an additional risk management instrument to provide another 50 days of waged employment in times of severe drought. The programme has certainly helped low-income households and communities cope with poverty and marginalisation, but MGNREGS has to date had little impact on climate resilience outcomes. However, our research suggests that with some adjustments, this scheme could help communities absorb the effects of climate risk, adapt to climate impacts, and transform their capacities and strategies to address growing climate stressors (see box below).[1]

Current MGNREGS interventions that could enhance climate resilience

1. **Guaranteed wages:** 100 days of guaranteed waged employment for every rural household (+50 days in times of severe drought) can contribute to climate resilience by supplementing other sources of income and smoothing consumption gaps during climate hazards, when other livelihood sources may be undermined.
2. **Creating private and public assets:** MGNREGS interventions build natural resource management assets to support long-term livelihood strategies in rural areas; assets include water and soil conservation infrastructure such as check dams, ponds and trenches, afforestation, fodder development and land development works.
3. **Strengthening institutions:** MGNREGS mandates that all planning and decision making on waged employment and infrastructure selection go through the village assembly (*Gram Sabhas*) and decentralised elected village bodies (*Gram Panchayats*); funds are transferred directly to the village level, into community members' bank accounts.

Barriers to meeting resilience potential

We know that integrating climate information services (CIS) into MGNREGS can help enhance the scheme's climate resilience impacts: this is acknowledged by the Ministry of Rural Development, and the 2019 MGNREGS Master Circular (an annual implementation report) specifically mentions using CIS in the planning and design of works. However, the practical implementation of CIS in MGNREGS is being hampered by issues and challenges in several areas:

Access, communication and use of CIS: Household-level evidence from three states (Madhya Pradesh, Rajasthan and Uttar Pradesh) shows that while 58% of households have access to CIS via mobile, TV, radio or newspaper, only 25% of those households use CIS to plan or select MGNREGS assets or plan waged labour.[2–4] This is because (i) climate information is not communicated in a household-friendly format; (ii) households are not able to interpret, analyse and use any data for MGNREGS planning and decision making; and (iii) they do not understand the benefits of CIS in MGNREGS decisions.

Wage planning: MGNREGS' additional risk management instrument provides an extra 50 days of waged employment in times of severe drought, based on the premise that this cash can help households cope with climate shocks by maintaining a basic level of consumption and paying for essential goods (for both people and livestock). However, household-level evidence shows that only 4% of households received any additional drought relief days. IIED's research found that there are delays of four to six months in the official declaration of drought (a process involving both state and central governments),[2] a lag which holds up sanctioning the 50 additional days of waged employment that would help families cope and recover during a critical period when they are pushed towards distress migration. Migrants usually return to their home village near the end of the financial year and so are unable to take up the benefit of additional waged days.

Asset planning: MGNREGS assets generate environmental benefits such as recharging groundwater, improving soil and water conservation, protecting biodiversity and promoting sustainable food production. These benefits could help build resilience against current climate risks such as moisture stress, delayed rainfall and droughts, as well as safeguard against future climate-driven impacts. However, MGNREGS assets contributed only 18% and 29% respectively towards households' absorptive and adaptive resilience capacity.[5] This could be because the assets:

1. Did not deliver the drought-proofing that would have benefited agriculture and protected livelihoods during the time of climate crisis
2. Were not optimally designed according to the landscape and community needs, limiting their impact
3. Were not chosen with reference to local conditions
4. Were located in places where vulnerable or marginalised communities could not access the benefits.

Community-based planning: MGNREGS decisions on labour allocation and asset selection must be done at *Gram Sabhas* (village assemblies), which should support needs-based and demand-driven planning. Strong household participation can also help strengthen adaptive capacity. However, our research[2] shows that household participation in MGNREGS decision making at the *Gram Sabhas* level is low, with only 15% of households reporting selection of their preferred MGNREGS asset. Households led by women are significantly less likely to have their choices heard.[2] A recent effort by the the Ministry of Rural Development to scale up the top-down geographic information system (GIS) based approach to planning MGNREGS assets may further limit community participation in and influence on asset selection.

The Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M)

What is CRISP-M and how can it help MGNREGS overcome existing barriers?

The CRISP-M tool provides:

1. **A drought monitoring and reporting system, to support early action on the provision of additional waged employment.** CRISP-M's drought reporting mechanism provides early warning to MGNREGS functionaries and communities about the initial stages in the onset of droughts. The tool has established thresholds at which it indicates decision makers should trigger a drought declaration and initiate anticipatory response and planning measures for the additional 50 days of waged employment.
2. **Climate risk-informed planning of MGNREGS' integrated natural resource management assets, to strengthen climate resilience.** CRISP-M integrates GIS layers of information (such as land use, topography, contours, geomorphology, geology, lineaments, groundwater prospect, drainage polygons and so on) with past and future climate data, enabling the 'future fit' planning of structures that can cope with climate impacts, such as reduced groundwater, increased runoff and so on. The tool also supports communities to carry out participatory vulnerability assessments, then check the information provided through the GIS tool against lived experience, so the plan can be modified or updated based on local/traditional knowledge, needs and local field conditions. Communities can also identify and prioritise assets that can help to strengthen their existing livelihoods, as well as reduce exposure to climate risks by diversifying their income base through agroforestry, horticulture, sericulture, fisheries, fodder development, and livestock-based farming systems.
3. **Transparency and accountability by remote sensing-based monitoring, and crowdsourcing data on MGNREGS assets and beneficiaries.** To introduce two-way accountability, and move beyond conventional top-down approaches to monitoring and impact assessment (often orientated solely to the needs of policymakers), CRISP-M helps to build an information system crowdsourced from the community. This enables farmers to verify claims on progress, report the status of their natural resource management assets, highlight structures needing repair or maintenance, and ensure more equitable benefit sharing. The tool also includes a remote sensing-based monitoring dashboard feature that provides time series-based impacts by MGNREGS assets, based on different biophysical indicators (such as changes in cropped area, wastelands, forest area, area of bodies of water and so on).

The case for a 'technology plus people' approach

While MGNREGS design stipulates that all planning must be carried out at village level (through the *Gram Sabhas*), the Ministry of Rural Development's current plans to scale up GIS-based planning only consider a top-down planning approach with limited strategy or process to involve the community. This erases the community's right to have a say on which assets are chosen and created, their location, who the beneficiaries will be, and which activities are prioritised. Technology can bring together a range of information to enable a more scientific assessment of the risks and suggest options, but unless it is blended with local and context-specific knowledge and information it will not address the climate risks of the most vulnerable people. As with any technical solution, the CRISP-M tool alone cannot address the problem or be the primary decision maker on behalf of any community. Instead, it must be integrated with a people-focused process that enables the community to use technology as an input to aid their decision making.

Therefore, when developing a strategy to deliver the CRISP-M tool, we focused on developing a people-centred approach. Further, while CRISP-M supports the more scientific and risk-informed planning of soil and water conservation and engineering interventions, we also wanted it to provide opportunities for marginalised sections of rural communities to have a greater say, not just in planning and implementation, but also in monitoring and ensuring equitable access to the assets, resources and benefits created by the programme. To meet all these goals, our delivery model for CRISP-M focuses on:

- Ensuring rural people have complete ownership over the process, using the tool as an input to support and aid decisions related to planning, implementation, monitoring, management and maintenance
- Bringing diverse groups together, encouraging marginalised groups to voice their aspirations and needs, and converting community demand into community action, and
- Harnessing all the available techno-scientific resources alongside all the available Indigenous/local knowledge to support the decision-making process at village level.

The delivery model used for CRISP-M is a bottom-up participatory strategy, facilitated through use of a mobile application part of the CRISP-M tool. Key elements of the model are:

- Establishing coordinating structures to act as mentors for the Climate *Saathis* ('friend' in Hindi), with the help of grassroots nongovernmental organisations at block and district level. The mentors offer support around awareness generation, capacity building, planning, implementation, monitoring and community action processes, as well as helping to solve technical issues that arise when the tool is used at village level.
- Creating a cadre of Climate Saathis, chosen from among the community and trained in using the tool. They are supported by block-level mentors to mobilise and conduct participatory planning at the village level. The Saathi role includes:
    - Creating awareness within the community: mobilising people and helping them understand how to use the tool for individual and community-specific needs around the planning, implementation and monitoring of MGNREGS. Where required, organising awareness and training programmes for community members on how to use the tool for planning, implementation and monitoring.
    - Working with individuals and smaller groups of marginalised communities within the village to help them become familiar them with the tool. This helps make marginalised people aware of both how MGNREGS can support them, and how information from the tool could help them voice their needs and priorities in the *Gram Sabha* meetings.
    - Working on building the capacity of people's representatives, members of village Panchayats and Rozgar Sahayaks/Mates (MGNREGS appointed functionaries at village level, who assist the *Gram Panchayat* in executing MGNREGS works) on how to use the tool to support planning, implementation and monitoring.
    - Supporting the community to contribute to a social audit via the mobile app, helping to create transparency for the equitable sharing of gains and benefits.

In many respects, the Climate Saathis act as local climate warriors: they are the key to successful and effective delivery of the CRISP-M tool among communities. The Annex describes the key elements of the planning process that this role supports; a full list of the Climate Saathis currently supporting climate resilience in Madhya Pradesh and their mentors is given on p.16.

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Climate *Saathis*: India's frontline climate champions

Every volunteer with the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) who has stepped up to the role of Climate *Saathi* truly deserves a title more often given to distant actors: that of 'climate warrior'. While managing multiple challenges in their own lives, these men and women were moved to become advocates for climate justice and inspire others to be heard in the spaces where village-level decisions are made, including the most overlooked members of the community. The launch of the Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) has presented the Saathis with a dual task: to get to know a new technology, then to champion its full potential in pursuit of better informed, locally led climate action.

We wish to acknowledge and thank all the Climate Saathis currently working with MGNREGS in Madhya Pradesh, only some of whom are featured in our case studies, as well as mentors who support them.

Climate mentors, state level

Ms Belu George
Mr Avinav Kumar
Mr Aneesh Thillenkery

Climate mentors, district level

Ms Vaishali Gajbhije, Raisen
Mr Pallav Thudgar, Sehore

Climate Saathis

Name, block	Name, village
Raisin District	
Manohar Yadav, **Obedullaganj Block**	Vinod Kumar Kurve, **Bineka-Borda** Rakesh Kanash, **Kamton Kashiya** Sharmila Chauhan, **Piplani-Goli** Satyanarayan Dhurve, **Karmoda** Indulata Lolvanshi, **Agariya** Saraswati Ukey, **Bamani** Ramprasad Ukey, **Borpani** Mukesh Kumar Dhurve, **Dhob**
Pawan Kumar, **Silwani Block**	Brajlal Baribal, **Pratapgadh** Saroj Purte, **Amgaon** Deepak, **Narayanpur** Tikaram, **Deori** Anil Dhurve, **Hinotiya** Ganeshi, **Khamgua**
Bhavar Laal, **Sanchi Block**	Ankit Rajpoot, **Birholi** Ravi Yadav, **Manpur** Sandeep Gond, **Nayapur** Sangeeta Kakodiya, **Ghuarai** Dinesh Kumar Purvi, **Hinotiya** Monika, **Hinotiya** Varsha, **Bhusimeta** Kavita Purvi, **Chilwaha** Rambabu Ahirwar, **Bankhedi** Balkishan Ahirwar, **Padhari**

Name, block	Name, village
Sehore District	
Rakesh Ratan Singh, **Narsullaganj Block**	Mukesh Barela, **Ameerganj** Prakash Barela, **Bhilai** Rajesh Barela, **Manji Khedi** Sarita Barela, **Itawa Khurd** Megha Rathor, **Basantpur** Vinita Uike, **Sirali** Bhimsingh, **Singpur** Tikaram Barela, **Rafique Ganj** Shobharam Barela, **Ghutwani**
Jitendra Sharma, **Sehore Block**	Rahul Verma, **Baradi Kalan** Brajmoandas Bairagi, **Muhali** Hemlata Patel, **Janpur Babariya** Sandhya Sharma, **Nipanya Kalan** Sultana Mansuri, **Satorniya** Pragya Rajpoot, **Pipliya Mira** Sooraj Giri Goswami, **Sevniya** Kishore Palasiya, **Sonda**
Santoshi, **Icchawar Block**	Kallu Barela, **Loha Pathar** Sanjay Barela, **Dhai Kheda** Santosh Parmar, **Dhabla Mata** Mahendra Gohiya, **Kudi** Bahadur Kalmiya, **Alipur** Rinku Kanjaliya, **Gadiya** Manisha Bagwan, **Balondia** Sandip Korku, **Fangiya**

Climate Saathis attending a training session, September 2022. Credit: Raashee Abhilashi

1. Women take a leading role in water conservation

Women farmers are voicing their needs after local volunteers showed them how a new tool can help to predict drought and save water. After years of discrimination, these women — now armed with vital information — are being recognised as farmers with an active role to play in resource management. As they in turn share this knowledge with other women, this once marginalised group now has a cadre of female leaders with a collective voice in the community.

Image 1: Rukmani Bai takes the lead at a self-help group for local women

India has a primarily agrarian economy, with the agriculture sector employing 80% of economically active individuals — 33% in the agricultural labour force, 48% as self-employed farmers and about 18% as farming families. This workforce is predominantly female, with women contributing to the production of 60–80%[1] of India's food. Yet these rural women are often marginalised, treated as invisible workers without the same access to government services as men.

Rukmani Bai, 55, lives in the remote village of Barela in Madhya Pradesh (see image 1). Since her husband fell ill and could no longer work, Rukmani has shouldered the responsibility of feeding and sustaining the family. As well as her own five children, this also includes the four children from her husband's previous marriage. Rukmani started cultivating her husband's farmland, growing wheat, maize and gram (chickpea).

However, the discrimination she faced made this difficult. Although the marginalisation of women is a widespread issue across India, it is particularly acute for women like Rukmani, who do not have the active support of their husbands in community meetings. They face discrimination from all sides, including from their own families, communities and the government. Women are expected to perform domestic tasks such as cooking, cleaning and childcare, leaving them with little time or opportunity to pursue other activities, such as education or income-generating work, further limiting their access to knowledge and information.

On top of these challenges, climate change impacts are damaging Rukmani's crops. She said: "Rainfall pattern has changed in the past few years. It does not occur at the time as it used to previously occur. This leads to loss of standing crops ready to be harvested." Yet Rukmani was unable to claim government benefits available to small and marginal farmers because she did not own the land. (While 85% of rural women in India are engaged in agriculture, only about 13% own land.[1]) "Under such circumstances my family will go hungry unless I took loan," she said. "I did not know what to do. But participation in NREGA (MGNREGS) scheme and support from CRISP-M changed things."

Knowing her rights

The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is a gender-positive social protection programme, which promotes the participation of women by providing wage parity with men, crèche facilities, work-side shelters for children and childcare services. However, Rukmani — like many rural women — was not aware she could demand wage employment under the scheme should her crops be damaged and/or when she has no other source of income. She was also unaware of the scheme's women-centred provisions, which can enable her to get the wage employment closer to home, so she can take care of her family while working.

The Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) is a web and mobile phone-based tool that uses weather predictions and geographic information system (GIS) mapping to support the planning, implementation and monitoring of MGNREGS at community level. The project's Climate *Saathi* ('friend' in Hindi), a volunteer who is tasked with creating community awareness of how to use the CRISP-M tool and gain access to the benefits provided by MGNREGS, made Rukmani aware of her rights under the scheme. She helped her to understand the provisions of the programme — how to get her job card registered, raise the demand for work, and participate in the planning and social audit of the scheme. This helped her to overcome gender discriminatory norms, as well as her own fears and limitations to officially claim the title to the ancestral land, making herself heard as a legal land owner.

> "When I go to village meetings, people look at me with respect and awe because I have information that they don't have. But I don't just use the information to help myself. I share it, so that others can benefit from it."

The Climate Saathi also helped Rukmani understand how to use CRISP-M, helping her to decide what type of water conservation structures were needed to support long-term climate resilience in her village. Women like Rukmani, who cultivate land and manage households are often the collectors, users and managers of water at home and on the farmlands. Consequently, they accumulate considerable knowledge about water management. Rukmani was therefore able to blend her local and traditional knowledge with the scientific knowledge provided by the tool to understand the best water conservation solution in and around her farm. Armed with this knowledge, she could demand work and worksite facilities that met not just her needs, but the needs of several women like her.

Image 2: Rukmani has become confident using CRISP-M on a smartphone, with support from a Climate Saathi 'sister'

Rukmani said: "When I go to village meetings, people look at me with respect and awe because I have information that they don't have. But I don't just use the information to help myself. I share it, so that others can benefit from it."

But this transition was not easy. Rukmani took time to learn how to use the smartphone to help her and her community (see image 2). She explained: "Earlier I only used the phone to make calls and my son helped me with it. I was afraid to touch it, now I can open it and navigate though the app. Climate [Saathi] *didi* [sister] also explained how to talk to phone [voice search] and get information and told me not to hold back myself from exploring other features of the phone. In my leisure time I hear songs on YouTube. I am now teaching other women to use it. Sometime three or four of us get together and watch movie on the phone."

Spreading the word

Easy access to information though CRISP-M has improved the involvement of Rukmani and other women in the village to demand for inclusive development. While Rukmani had already started voicing her opinions with the *Gram Sabha* (village assemblies), her familiarity with CRISP-M gave her access to vital information, improving her interactions with the administration and village representatives. It has also given her the confidence to mobilise more women to stand up for themselves and to make the most of their rights.

Image 3: a meeting of the women's self-help group led by Rukmani

Rukmani already led a village self-help group of 25 women — aimed at improving their livelihoods through collective savings, income generation, natural resources management, literacy, childcare, nutrition, and so on (see images 3 and 4). She is now using CRISP-M to equip the group members with knowledge on water management, so they have a collective voice in village *Gram Sabha* meetings, make suggestions and participate in decision making.

Image 4: Rukmani uses the self-help group to support other women farmers to access CRISP-M and use it for collective priority setting

Women are now increasingly being recognised as farmers with an active role in the planning of water and land resources in village institutions — where their demands are backed with information and justification. There has also been a shift in women's identity. Their communities see them as mentors, social mobilisers and self-help group leaders who engage with the governing systems.

1 Oxfam India (2018) Move over 'Sons of the soil': Why you need to know the female farmers that are revolutionizing agriculture in India. www.oxfamindia.org/women-empowerment-india-farmers#:~:text=Agriculture%20sector%20employs%2080%25%20of,only%20about%2013%25%20own%20land

2. Inspiring women to fight for their rights

For India's marginalised Indigenous population, getting access to government support is not easy. CRISP-M volunteers are working with Scheduled Tribes across India to give them better access to paid employment and water resource management information. This is enabling women to participate in community decision making, breaking the cycle of poverty and discrimination.

Image 1: Saraswati Ukey (centre) talks to women in her community about the land topography of their village

India's Indigenous tribal communities — categorised as Scheduled Tribes — account for just 8.6% of the total population, and 11.3% of the total rural population.[1] While the Constitution of India confers certain constitutional privileges and protection to them,[2] these rights do not protect Scheduled Tribes women from gender-based violence and discrimination (see Box 1). Saraswati Ukey is a 45-year-old woman from the marginalised Scheduled Tribes Gond community, living in Bamani village, in the state of Madhya Pradesh (see image 1). With little education and no skills or land to her name, Saraswati had few options to make ends meet. The impact of climate change on farm production — decreasing monsoons, erratic rainfall and prolonged dry spells — means there are fewer opportunities to earn a wage. The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), which offers 100 days of paid employment through the construction of soil and water management structures, seemed a viable option to help her to support her family. But it was difficult for Saraswati to raise her demand for the work, and even once she had completed it, her wage payments were delayed.

Box 1. Gender inequality and violence

The World Economic Forum's 'Global Gender Gap Report 2022' revealed India's gender gap had further widened to 62.9%. The situation is even worse for women in marginalised communities such as Scheduled Tribes. They experience multiple discrimination due to their gender, caste, religion and economic status.

In India, 47% of every married Scheduled Tribes women aged 15–49 has experienced emotional, physical or sexual violence — this is higher than that of any other social group. Of this 47%, 65.4% have never told anyone about the violence.[3]

Saraswati said: "What is the point of working under NREGA [MGNREGS] if the payment is done after three to four months? I do not have time to visit *Panchayat* [decentralised elected village bodies] office. I have to feed my family, and no one listens to us there [*Panchayat* office].

"It was getting difficult to feed the family. I have no land to cultivate and farm labour opportunities are reducing. Delayed rains, long dry spells are pushing farmers in debt they are not able to employ or pay us."

Becoming a Climate *Saathi*

The Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) is a web and mobile phone-based tool that uses weather predictions and geographic information system (GIS) mapping to support the planning, implementation and monitoring of MGNREGS at community level. When the CRISP-M team organised a meeting in Saraswati's village to explain how the tool worked, everything changed. She approached the team and volunteered to become a Climate *Saathi* ('friend' in Hindi) to promote awareness of climate change and CRISP-M.

Image 2: Saraswati uses CRISP-M to gather data from village households

The project team trained Saraswati on the provisions of MGNREGS, as well as other complementary social protection programmes, and explained how CRISP-M works to support climate-resilient natural resource management built under MGNREGS. They also trained her to conduct participatory vulnerability and capacity assessments with the community using the tool, and help the villagers to identify the families most in need, to ensure they have access to MGNREGS entitlements (see image 2).

Standing up for other women

The difficulties Saraswati faced trying to earn a living for her family in a male-dominated society inspired her to stand up for other women in the community. Most women in the area do not speak up for themselves or participate in decision-making processes due to fear of retribution from their husbands or other male members of their households. Saraswati wanted to change this by motivating women to understand how to use CRISP-M, gain knowledge and then raise their voices for what they need in meetings.

She started by going from village to village, encouraging women to fight for decision-making rights over MGNREGS planning and implementation so that they may improve water and fodder availability, and agricultural productivity. Many of the women she spoke to were sceptical at first, but her perseverance paid off, and over time she gained the trust of the local women, while convincing the men of the community to stand behind them. Saraswati said: "Initially when I went to the village women would say that these things are not for us. I started showing to them how the information in the tool can help them get both wage employment and water related structures near their field. They started understanding the value of it."

Image 3: Saraswati holds a village-level meeting to plan future projects and discuss their entitlements under MGNREGS

Image 4: community members discuss water and land resource planning for the village

During this process Saraswati was mentored by the CRISP-M project team. They advised her on how to use the tool to mobilise communities, collectively identify the most vulnerable households, analyse problems, and find context-specific solutions with the help of CRISP-M. She gradually started organising village-level meetings on her own and telling the community about MGNREGS, its eligibility criteria and entitlements, and how to carry out water and land resource planning (see images 3 and 4). She also helped poor rural households to fill out job applications and presented them to the *Gram Sabha* (village assembly) for endorsement.

Breaking the cycle of poverty

Saraswati's story is an inspiring reminder of the potential that every woman has to make a difference in her community. She has played a vital role in promoting CRISP-M among marginalised communities, acting as a 'helpdesk' for women and households to get them access to MGNREGS and other entitlements, such as health benefits.

The introduction of CRISP-M has made MGNREGS planning more equitable, giving everyone access to knowledge and inclusion in decision making. The tool has allowed women and other marginalised households to have a voice by getting them better access to information, helping them identify the right structures for the area, enabling them to demand work under the scheme, and providing a platform for them to share their experiences and engage in community-level decision making. Women can also track their work progress under MGNREGS, and report incomplete work or structures needing maintenance through the tool — this is instrumental in helping women get paid on time.

But none of this would be possible without the work of Climate Saathis like Saraswati. Her strong connection with the women of the region has helped the community gain access to CRISP-M and the support they are entitled to. She has established a rapport with MGNREGS government functionaries and is confident talking to them about wage payment delay issues on her own.

Although it's still early days, CRISP-M is working as a catalyst in enabling women like Saraswati to take control of their lives and escape the cycle of poverty and marginalisation. As the educator and influencer of the platform, Saraswati's voice in the decision-making process is now being valued more than ever before.

"Initially when I went to the village women would say that these things are not for us. I started showing to them how the information in the tool can help them get both wage employment and water related structures near their field. They started understanding the value of it."

This new role will enable Saraswati to make herself heard. With technology as her partner, she is set to carve out a unique identity that doesn't just redefine her position in the community but also creates tangible change.

1 https://ruralindiaonline.org/en/library/resource/scheduled-tribes-in-india-as-revealed-in-census-2011/ (see slide 8)

2 The Constitution of India, Article 366 (25) defines Scheduled Tribes as "such tribes or tribal communities or part of or groups within such tribes or tribal communities as are deemed under Article 342 to the scheduled Tribes (STs) for the purposes of this Constitution".

3 Murti Mishra, A and Kumar Nag, M (2017) Socio-economic status of agriculture women labour of Bastar. In: Kumar Behera, J (ed.) *Tribal Women in Central India: Issues and Challenges.* The Women Press, Delhi.

3. Helping marginalised farmers prepare for drought

Marginalised tribal communities in India struggle to access the support they need to withstand increasing climate-related droughts, leaving them vulnerable to crop failure and poverty. Thanks to the work of community volunteers, CRISP-M is helping farmers to access the data they need to plan ahead and demand adequate provision for future climate risks.

Image 1: Suresh uses CRISP-M to geotag photos of a site identified as a suitable location for water conservation works

Suresh Kumar lives in the remote village of Sarra, in the state of Madhya Pradesh (see image 1). The 33-year-old farmer belongs to India's largest but most marginalised Scheduled Tribe Gond community. Their culture and livelihoods are intertwined with forest, water and land, and they have traditionally held control over these resources, governing them in terms of their own laws, traditions and customs. However, over the years, new regulations have gradually alienated the Gond community, eroding the land-based rights they traditionally held.

Although caste-based discrimination has long been criminalised in India, it persists today and millions like Suresh still struggle with the hardships it brings. They are faced with constraints on input supply, credit availability, proper transport and access to markets. Meanwhile, a lack of education and resources leaves Scheduled Tribe farmers under-represented in village institutions and decision-making processes. This means their needs and requirements are not taken on board in development decisions at village level.

Suresh depends entirely on the 4.5 acres of land he owns — where he grows wheat and chana (chickpea) — to support a family of seven. But with no alternative source of income during the non-farming season and more frequent climate-induced droughts occurring in this part of India, the family are becoming increasingly vulnerable to crop failure. This can have a devastating impact on the lives of marginalised farmers like Suresh, who do not have adequate support. Although he has a 110ft-deep tube well, in November–December water stress causes it to dry up. As a result, he is unable to irrigate his winter rabi crop, meaning he can only cultivate a single crop on his farmland. Suresh said: "We don't get rains in the same way as before. Everything has changed in the last five years. We have dry period of 20–25 days during monsoon period which damages our crop. I lost almost half of my crop in the last season."

Getting to grips with the tech

The government's Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) aims to provide guaranteed employment and help build necessary structures to conserve water, develop land resources and improve crop productivity. However, in the absence of historical and future climate change information, communities are unable to take climate risks into consideration when planning the structures, so many of the natural resources management assets created under the scheme are not fit for purpose.

"Earlier I did not understand one thing in these maps, but now I know how to see things closely and understand it. People in the village now come to me to help them get the information they want from the tool."

This is where the Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) comes in. Accessed on mobile phones, it provides the community with information about geophysical and biophysical characteristics, and potential climate risks, setting out a process to help them identify who in the community is most vulnerable and how they can mitigate those risks.

On-the-ground peer-to-peer volunteers known as Climate *Saathis* ('friend' in Hindi) raised awareness of the tool in Suresh's community through individual and group meetings. Initially, farmers like Suresh were overwhelmed by the tool's high-resolution geographic information system (GIS) map. But with the help of the Climate Saathis, who used a projector in the community centre to help visualise the village landscape on the map, villagers were able to start identifying the locations of their farmlands, forest areas, living areas and so on. This then enabled the Climate Saathis to teach villagers how to read the map to identify the possible climate risks, such as change in rainfall, droughts, floods, groundwater recharge, water yield and so on. Suresh said: "Earlier I did not understand one thing in these maps, but now I know how to see things closely and understand it. People in the village now come to me to help them get the information they want from the tool."

Prioritising those most in need

Using the tool, the Climate Saathis then worked with villagers to carry out participatory vulnerability assessments to help identify those who are most vulnerable to climate change (see image 2). They encouraged the community to organise themselves into smaller groups to try to understand the problems they faced relating to soil, water and biomass degradation and their causes. The Gond communities were then able to bring their traditional knowledge of water and land conservation together with scientific knowledge. This process helped to build more robust plans that took local knowledge and community needs into consideration.

Image 2: villagers work together in groups to identify the problems facing them

As a result, Suresh was identified as one of the most vulnerable households in his community and the *Gram Sabha* (village assembly) prioritised water conservation works in his field. Suresh said: "Earlier I did not join these meetings because it would be a waste of time. Our request was never taken up. Instead of wasting half days earning by sitting in a meeting I thought would rather go and work in the field. Now we have the information and we know we have the right to demand water conservation work on my field. I stood up in the meeting and made a strong demand. Now I have field bund[1] sanctioned on my farmland." (See image 3)

Image 3: Suresh voices his opinion at a *Gram Sabha* (village assembly) meeting

Helping marginalised communities adapt

Today, thanks to the work of on-the-ground volunteers, CRISP-M is changing the lives of many people like Suresh. It is enabling them to assess their climate risks, participate in village-level meetings, contribute to decision-making processes related to natural resources management, and demand the construction of the right types of structures in the *Gram Sabhas.*

> "Now we have the information and we know we have the right to demand water conservation work on my field. I stood up in the meeting and made a strong demand. Now I have field bund sanctioned on my farmland."

By making crucial information accessible to marginalised communities, the tool — brought to communities by the Climate Saathis — is gaining them equitable access to the provisions of MGNREGS. Water conservation and harvesting structures are being built on or near their farmlands, allowing communities like the Gond to take up work in their own fields — and be paid for it. This can help small farmers revive their degraded farms or allow them to take up a second crop, giving them a chance of a brighter future.

1 Bunds are retaining walls used around agricultural fields, which help contain rainwater, reduce soil erosion, and protect fertile soil.

4. Boosting vulnerable farmers' voices in decision making

Erratic monsoon rains are forcing smallscale farmers from marginalised communities to migrate to cities in search of work, often landing in exploitative working conditions. With the help of on-the-ground project teams, they can now access climate data to help them plan for and mitigate the dry seasons, allowing them to manage crop failure and take control of their futures.

Image 1: CRISP-M is allowing Santram Adivasi (centre) to better prepare for erratic rainfall

According to the Census of India 2011, a quarter of India's population is categorised as Scheduled Castes and Scheduled Tribes.[1] These are among the most vulnerable and marginalised communities in the country, traditionally having little participation in decision-making institutions.

In the state of Madhya Pradesh, 37% of the population is from one of these communities, with the majority living in remote villages.[2] One such place is the village of Puddar, home to 48-year-old Santram Adivasi (see image 1). Like many of the other villagers, Santram is a farmer with a small parcel of land — 1.2 acres in total. Here he grows seasonal crops such as rice, wheat and gram, producing just enough to sustain himself and his family of five, with nothing left to sell for a profit.

Farmers like Santram depend predominantly on the increasingly erratic monsoons to irrigate their land, leaving them and their crops vulnerable to decreasing rainfall. This has become even more acute with the effects of climate change. A deficit monsoon is a dreaded scenario for farmers like Santram, since it leads to crop failure — leaving them with little food to eat, and no income to manage other family expenditure and repay their debts taken to buy farm inputs, such as seeds.

With no alternative left to fend for their families, villagers are forced to migrate to nearby cities in search of work. Their dire need leaves them open to exploitation from employers paying low wages. In 2021, this was the case for Santram, and the money he earned was barely enough to feed his family. To make matters worse, his new daughter-in-law fell ill and despite using his earnings to pay for her treatment, she didn't survive, leaving them without a safety net and even further in debt.

Image 2: Santram shows a visiting Climate Saathi the well on his farmland, which is in need of repair and deepening

Being from one of the marginalised communities, Santram and others like him struggle to get their voice heard at the *Gram Sabha* (village assembly), where the village elite mostly control the decision making. Even though families from Scheduled Tribe communities have the right to demand water harvesting and land development assets be built on their private farmland, their requests are not considered. For the last three years, Santram has asked for a well to be dug on his land, without success (see image 2). Because his community is under-represented in village committees and often is not aware of their rights, he also struggles to access basic services or participate in development programmes such as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), which provides paid employment while building water and soil conservation structures to address climate change.

With such difficulty accessing water, Santram has also fallen victim to exploitative practices such as labour in exchange for water, also known as the barter practice. Santram said: "I never got a well approved from MGNREGS near my field but others got it. To get water from them to irrigate my farm, I have to work in their field. I have to work harder to grow the same crop which has taken a toll on my health." Santram's son Chotu Adivasi added: "If we don't labour in nearby fields our crop won't have enough water to even reach fruiting stage, good production is not even in our minds."

Information is power

The Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) is a web-based tool that aims to support farmers like Santram to overcome these challenges, by equipping them with much-needed information about how they can adapt to climate change. Once a Climate *Saathi* ('friend' in Hindi) — a grassroots volunteer tasked with educating the community on CRISP-M and MGNREGS) — showed Santram how to use the tool, he and others from his community could understand the risks associated with climate change and collectively plan how to manage them. Using the climate risk impact information it provides, Santram can identify

the type of structures he needs to be built and where, to ensure he has enough water year round, thereby preventing crop failure (see image 3).

With this newfound knowledge, and backed up by data from the tool, Santram and other members of the community now feel more confident raising their demands in the *Gram Sabha* meetings — and confronted with solid evidence, the *Gram Sabha* responds more positively.

Taking control of their future

By explaining how the tool works, the Climate Saathi helped Santram to use CRISP-M to understand how he can adapt to climate change, giving him the confidence to speak out at the *Gram Sabha*.

Santram said: "Climate Saathi took me to my field and showed how the tool works. He showed how much water was flowing through my land during rains and what structure will be most appropriate to help me better grow my crop. He also explained to me that being from Scheduled Tribe community, I could demand for a water structure on my private farmland. All this information helped me raise a strong demand in *Gram Sabha* meeting. Previously they always rejected my request but this time they could not. This time I said it was my right and showed them the data." (see image 4)

Image 3: a Climate Saathi visits Santram at home, using CRISP-M to collect household data

Image 4: CRISP-M and the data it provides has given Santram the confidence to speak up at village meetings

With the help of the Climate Saathi, Santram is now submitting a written request to the *Gram Sabha* for a renovation to an existing well on his farmland. This will reduce his dependence on erratic rains and allow him to plan his future with a lot more certainty. During this process, Santram and his family also learnt how to get the best use of the water harvesting structures, to enhance and increase the productivity of their land and grow double crops instead of a single crop.

"He also explained to me that being from Scheduled Tribe community, I could demand for a water structure on my private farmland. All this information helped me raise a strong demand in *Gram Sabha* meeting. Previously they always rejected my request but this time they could not. This time I said it was my right and showed them the data."

With the support of project teams working on the ground with communities, CRISP-M is helping marginalised communities take control of their own futures, leaving them less vulnerable to climate change. Instead of being forced to migrate in search of exploitative mployment, having access to such critical data is allowing those like Santram to take life-changing informed decisions to prevent crop failure, freeing them from a life of poverty and exclusion.

1 https://ruralindiaonline.org/en/library/resource/scheduled-tribes-in-india-as-revealed-in-census-2011

2 www.censusindia2011.com/madhya-pradesh-population.html

5. Supporting the farmers standing up to corruption

A lack of transparency at village committees has prevented farmers from accessing the government support they are entitled to. This sometimes forces them into debt, with many having no other choice but to migrate to find paid work. Thanks to a new mobile technology and a team of climate advocates, they now have the information they need to play a role in natural resource management — pulling themselves out of poverty.

Image 1: CRISP-M is offering hope to Dinesh Kumar Purvi (right), who has struggled to support his large family after erratic rainfall caused his crops to fail

Dinesh Kumar Purvi, 32, lives with his family of 15 in the remote village of Hinotiya in Madhya Pradesh (see image 1). Dependent on subsistence agriculture, Dinesh is no stranger to poverty, having to provide for his family with a limited crop of rice, corn, wheat and gram grown on his small parcel of ancestral land. With a large family to feed, there is seldom any spare produce to sell for a profit. When limited rainfall causes his crops to fail or a member of his family falls ill, he has little choice but to borrow money from a local lender. And when he is unable to repay the debt from farmland income, Dinesh is forced to migrate to urban centres to look for work.

The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) offered a ray of hope for farmers like Dinesh. The scheme promises 100 days of paid employment every year to rural households by commissioning structures to solve irrigation and land development issues brought about by climate change. But the scheme faces several challenges, with a lack of transparency and accountability in the system leading to widespread disillusionment among rural households.

Corruption and inaction at the *Gram Panchayat* (decentralised elected village body) prevents families in poverty from accessing its benefits. Some elected officials have shown bias towards certain communities, worked for personal benefits or favoured certain contractors. A few villagers, who wished to remain anonymous, said: "Many structures are constructed by machines instead of wage labour and illegal payments are made on the job card of the family members and friends of the *Panchayat* representatives." They also mentioned that "most of the water structures are made for the benefit of large farmers; we never benefit from them."

In places where the work is available, payments are also often delayed or suspended indefinitely. And some farmers report being asked to shell out money to enroll for various projects initiated under the scheme. As a result, individuals like Dinesh — supposedly the direct beneficiaries of the scheme — do not benefit. MGNREGS is failing to act as a viable safety net.

Dinesh said: "If NREGA [MGNREGS] provided us wage employment in time, we would not have to go out of the village in search of work. Even those who get work are not paid for many months. These government schemes don't benefit us all."

Giving power back to the people

When the Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) was launched in his village, Dinesh volunteered to become a Climate *Saathi* ('friend' in Hindi) — a role aimed at promoting awareness of climate change — to help himself and others like him in the community. The web and mobile phone-based tool provides rural populations with real-time information about future projects being considered — all potential work opportunities. The tool not only gives them a voice, but also gives them confidence to hold the authorities accountable for the work being generated.

Image 2: Climate Saathis take a look at Dinesh's farm pond, which broke after heavy rainfall

As part of his role as Climate Saathi, Dinesh was given training and mentorship in how to use the tool. Recognising the kind of change the scheme was capable of making in the lives of others like him, he started helping villagers to fill out job applications, and apply for the unemployment benefits they're entitled to.

Dinesh also encouraged those in the Scheduled Castes and Scheduled Tribes communities, and small and marginal farmers, to come forward and demand individual structures on their

farmland, as per the provisions of the scheme (see image 2). Using CRISP-M they could identify the types of structures most suited to their farmlands based on topography, soil type and other conditions. Backed up with real data, these households could then speak up at *Gram Sabha* (village assembly) meetings and demand for these assets to be built on their farmland, helping them to prepare for dry spells and improve crop yields (see image 3 and 4).

Image 3: Dinesh (second from left) puts in a demand for repairs to his pond at a village meeting

Dinesh said: "Earlier the individual and community work were finalised at the *Panchayat* level without ascertaining the needs of community, but now we can choose an area based on contour lines, soil type, average rainfall, etc. suggesting us possible structures beneficial for that particular area. We now challenge *Panchayat's* decision."

Greater transparency, greater power

One of the biggest benefits of CRISP-M — enabled by the work of Climate Saathis like Dinesh — is its role in improving transparency and accountability in the system. Previously, Dinesh was unable to access any information about MGNREGS. Now he and every household can verify the claims on the progress of work, report the actual status of the works undertaken and highlight any structure needing repair or maintenance. This puts the power of monitoring and reporting in the hands of everyone in the community, making it much more democratic. Dinesh said: "I can now report without directly confronting the powerful men in the village. I can also raise complaints anonymously. Earlier I used to feel helpless. We did not have any voice or power."

Today, Dinesh is an initiator and motivator in his community. With the help of CRISP-M, he continues to work to improve the implementation of MGNREGS and change lives for the better.

"I can now report without directly confronting the powerful men in the village. I can also raise complaints anonymously. Earlier I used to feel helpless. We did not have any voice or power."

Image 4: Dinesh (right) now uses data from CRISP-M to challenge decisions made by the *Gram Panchayat*

6. Working with leaders to restore trust in government

For elected officials, ensuring the needs of all sections of the community are met is a challenge, especially when faced with inequality and corruption. Climate supporters are helping leaders to access the information they need to enable villagers to claim what's rightfully theirs, benefit from land resource management projects and restore trust.

Image 1: as *Sarpanch*, Bhagwan Singh (right) works hard to listen to the needs of everyone in the community

Villages in rural India are governed by *Gram Panchayats*, decentralised elected village bodies led by the decision-making head, called a *Sarpanch*. He or she, along with other members of the *Panchayat*, are responsible for the governance and administration of the village. Bhagwan Singh Vishwakarma, 45, was the *Sarpanch* of Gundrai *Gram Panchayat* in Raisen district, Madhya Pradesh, for seven years until recent elections in 2022 (see image 1).

The people of his village considered Bhagwan Singh's tenure as *Sarpanch* to be fair and efficient. While he was at the helm, he oversaw the construction of several structures vital for the progress of the village and its adaptation to climate change, including concrete and gravel roads, stop dams, a community lake, NADEP pit (to make organic manure), and field bunding (for water conservation). Farm ponds as large as 40ft^2 were also built. As *Sarpanch*, Bhagwan Singh strived to cater to the needs of everyone — not an easy task considering the myriad requirements of villagers. Changing rainfall patterns and deficit monsoons mean that without the correct climate change mitigation measures, many small farmers are vulnerable to crop failure. He explained: "When there are almost 3,000 individuals under your administration, there is often a conflict of interest. As *Sarpanch*, you try to do whatever is best for the larger good."

While Bhagwan Singh endeavoured to give everyone in the community equal opportunities and make development inclusive and accessible for all, village *Panchayats* are not immune to political and social influences. This is no different for the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), which aims to provide wage employment to all rural households by building water and soil conservation structures. Unfortunately, participatory processes are sometimes not followed, meaning structures built by marginalised communities are often not properly accounted for. This can lead to situations where half-finished projects are tagged as completed, but marginalised farmers never receive the payment they were promised. This lack of transparency and accountability has had a major impact on the lives of villagers in Madhya Pradesh.

The situation is further complicated by the fact that many villagers are illiterate and therefore do not have access to information about their rights or the government's policies. This makes it very difficult for them to stand up for themselves and hold the authorities accountable.

Bhagwan Singh, now a member of the *Gram Sabha* (village assembly), faces numerous hurdles to keep track of the multitude of schemes and programmes that are meant to benefit his constituents. Firstly, there is a lack of coordination between different government departments. He also finds it difficult to get accurate information about what money has been spent on specific programmes, thanks to a complex accounting system. Finally, the lack of inclusiveness in the *Gram Panchayat* processes and decision making contributes to the unequal distribution of benefits from development schemes like MGNREGS.

Promoting transparency

Climate *Saathis* ('friend' in Hindi) — on-the-ground supporters helping to raise awareness of climate change issues — have been working with *Gram Panchayat* representatives in Bhagwan Singh's village, such as the *Sarpanch*, Secretary and *Gram Sabha* members to help implement and scale up the Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M). CRISP-M is a web-based app, developed to support the planning, implementation and monitoring of MGNREGS.

When Bhagwan Singh learnt about CRISP-M he soon realised how it could help him to carry out his duties much more easily (see image 2). The 'two-way system' of using geographic information system (GIS)

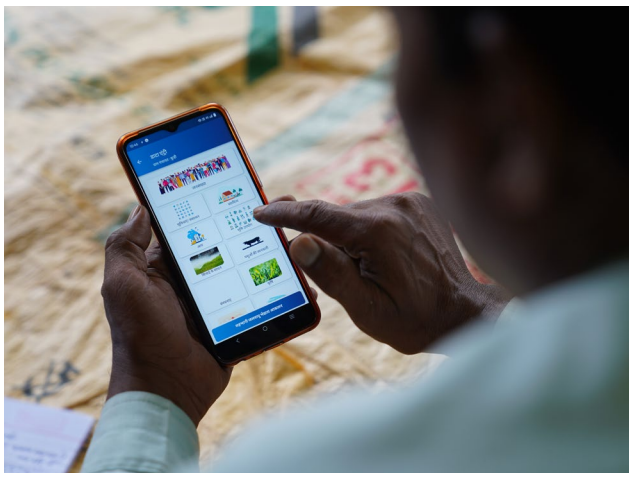

Image 2: CRISP-M offers Bhagwan Singh an efficient and user-friendly tool to support his work

mapping, climate forecasting and stakeholder involvement allows both planners and community users to monitor and report the actual status of construction projects. This not only facilitates better planning, execution and overall management of MGNREGS projects, but also provides updates on the progress of the work to everyone who has access to the tool. This gives communities more transparency and ensures individuals are paid on time.

Scientific approach

Climate Saathis worked with Bhagwan Singh to inform community members of their rights and entitlements under the schemes, as well as what kind of water conservation, land development and water harvesting structures could be built to help them manage climate change impacts, such as erratic rainfall and dry spells. He was also able to convince villagers of the need to plan the structures more scientifically, so they could conserve all the rainwater during the monsoon for use during the dry spells.

Image 3: Bhagwan (second from right) has been using CRISP-M on field visits to help find the best locations for future projects

With the active support of Climate Saathis, Bhagwan Singh has been regularly using CRISP-M to help plan natural resource management works like check dams, trenches, ponds and field bunds. The data it provides on the topology of the area and the parameters involved in identifying suitable locations for structures has helped him to make informed decisions about future projects (see image 3). Prior to CRISP-M it was difficult for Bhagwan Singh to convince villagers to build structures at a specific location. However, armed with concrete data from the tool, he feels he is in a much better position to persuade them. This is strengthened further by the fact farmers and others in the community can also input their own information into the tool.

Building trust

Schemes like MGNREGS have the potential to make a real difference to the lives of those living in poverty. But they can only succeed if they are trusted by communities at all levels. With the help of Climate Saathis raising awareness of the benefits of CRISP-M, the tool addresses this gap in transparency and accountability.

With the active support of Climate Saathis, Bhagwan Singh has been regularly using CRISP-M to help plan natural resource management works.

Those in government like Bhagwan Singh can feed in the necessary data to update villagers on the progress of climate change adaptation projects, enabling all members of the community to stay informed about the latest programmes and available work under the MGNREGS scheme. This will give those living in poverty and in marginalised groups a chance to demand what is rightfully theirs.

7. Real-time data helps farmers prepare for drought

Without access to reliable weather predictions and water resource management data, marginal farmers are at the mercy of erratic rainfall and droughts. As climate change causes an increase in deficit monsoons, they are becoming victims of crop failure and distress migration. By enabling farmers to access real-time information, climate champions are helping to secure the future for them and their families.

Image 1: a Climate Saathi (left) inputs Gulab Singh's household data into CRISP-M

Gulab Singh, 40 years old and a father to four children, lives in one of five houses in the scenic hamlet of Narayanpur in Madhya Pradesh (see image 1). His primary source of income is farming on the small parcel of land he owns. Throughout his life, he has juggled tending to his land and working as a labourer during the off season — doing menial jobs or working as a daily wager under the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). This social protection scheme offers paid work to rural households, and helps to build water and land management structures to support agriculture and fight climate change.

The impact of climate change on the annual monsoon season is a constant worry for farmers like Gulab, who rely on seasonal rains to irrigate their land. A decrease in rainfall and increasingly uncertain monsoons are causing crops to fail, putting marginal farmers' livelihoods at risk (see Box 1). This causes stress migration, when farmers are forced to move to urban areas in search of paid work. Farmers have also been facing losses due to the increased intensity and unpredictability of rainfall.

Box 1. Uncertain monsoons, worsening droughts

The recent droughts in Madhya Pradesh have caused considerable damage to crops and property. In 2016, the state experienced its worst drought in nearly 40 years, leading to widespread crop failures and immense hardship for farmers. That year, 46 out of 52 districts were officially drought affected. After a brief reprieve in 2017, when there was a regular monsoon, the state endured another four years of drought. In 2019, 36 districts were severely affected by drought and water scarcity. These events have had a devastating impact on agriculture in the state, with crop yields plummeting and farmers facing huge losses.[1]

In 2020, Gulab recalls sowing a crop of Arhar (pigeon pea), which was then lost due to frost. Another year he remembers the late arrival of monsoons causing his paddy crop to wilt away. While large-scale farmers with sufficient resources can sow another crop, marginal farmers like Gulab must resort to migrating or working on other's fields to make ends meet.

The absence of a warning system leaves farmers waiting for timely rainfall until it's too late. A lack of information and awareness about climate change and its effects on agriculture has had a significant impact on farmers, since the majority don't know how to adapt to the changing conditions. As climate change continues to cause more extreme weather events, it is becoming increasingly difficult for farmers like Gulab to make a living.

Information is a game changer

MGNREGS aims to combat the impacts of climate change by offering paid employment when crops fail, and helping to build structures to protect crops from drought and intense rainfall. However, the lack of information about climate change projections, coupled with a limited understanding of geographic features, can lead to the wrong structures being built in the wrong place.

This is where the Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) comes in. This web-based platform uses mobile phone technology to provide farmers with an early warning of impending drought conditions, as well as information on agriculture and water availability that could adversely affect crops.

Gulab first heard about CRISP-M at a community meeting organised by programme team members, referred to as Climate *Saathis* ('friend' in Hindi).

Image 2: a Climate Saathi meets with Gulab (right) and other community members to demonstrate how CRISP-M can provide data on the village landscape

These climate advocates spread awareness about climate change and how to mitigate its impacts (see image 2). Until now, he and other farmers in the region had been relying on the limited traditional weather forecast predictions or on the Agromet advisory broadcast through the All India Radio channel. But these were unreliable. Instead, CRISP-M provides real-time information on various drought indicators, which can tell users about future rainfall patterns and moisture indicators, informing the community about the various stages and situations of water stress.

> "I was amazed that I could get such information in advance and make decisions about crop selection and harvesting accordingly."

This is a game changer for farmers like Gulab. He said: "I was amazed that I could get such information in advance and make decisions about crop selection and harvesting accordingly."

The Climate Saathis organised group meetings in the village with small and marginal farmers to explain how the drought early warning system works. Gulab and other farmers like him then approached the Climate Saathis to further understand how they could use this information to help them plan ahead — for example, planning their crop selection, irrigation water management, and soil and moisture conservation work, as well as whether they needed to migrate to find alternative work. Gulab is confident that once he's adept at deciphering the indicators, he will be in a much better position to properly prepare for the next monsoon.

Planning for the future

Having an advance drought warning system in place will have a significant impact on farmers like Gulab. Instead of undertaking distress migration to cities in search of work, he and others in his village can take pre-emptive decisions to protect their crops or explore alternative work opportunities in nearby areas (see image 3).

Having training from Climate Saathis to better access the climate data provided by CRISP-M is also giving farmers like Gulab the confidence to build a better future for their families. They can consider choosing crops that are more resistant to drought, and can manage the available water resources more effectively, ensuring food and water security for years to come.

Image 3: a Climate Saathi supports Gulab (centre) to geo-tag a local check dam using CRISP-M. With an accurate picture of existing infrastructure — and any repairs needed — communities can plan effective preemptive action

1 Prajapati, S (2 December 2020) Madhya Pradesh's recurring droughts: Measuring, responding and reducing the vulnerabilities. www.indiawaterportal.org/articles/madhya-pradeshs-recurring-droughts-measuring-responding-and-reducing-vulnerabilities

8. Using technology for collective climate action

Without access to critical climate information, farmers have suffered years of lost crops and forced migration. By using their own personal experiences of using new technology, peer-to-peer outreach is building on existing trust to help farmers access and understand data, and demonstrate how it can contribute to planning for short- and long-term climate resilience.

Image 1: Brajlal Baribal (right) volunteered to be a Climate Saathi to help his community mitigate the impacts of climate change

Brajlal Baribal, 27, lives in Pratapgadh village of Silwani Block, Madhya Pradesh, one of the most drought-prone states in India.[1] As a farmer growing soya bean, pigeon pea and maize on a small piece of land shared with his brother and cousin, Brajlal has first-hand experience of the increasingly devastating impacts of climate change (see image 1).

Many farmers in the state, and across India, depend on rains to irrigate their land. This means that escalating unpredictable weather events — particularly dry spells, heatwaves[2] and erratic rainfall[3] — pose an increasing threat to their livelihoods. Farmers are forced to rely on guesswork and intuition to decide when to sow their crops or how to allocate scarce water resources. This results in widespread crop failure and distress migration (when adult male members and sometimes whole families are forced to leave their homes and schools). The knock-on effects can be felt for years afterwards.

Acting for the community

Having lost entire crops to unexpected droughts, now a regular feature in the region, Brajlal wanted to do something to improve the situation, for himself and other local farmers. He began participating in the management of India's Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS). This nationwide scheme aims to provide guaranteed wage employment to every household in rural India when crops fail, and builds structures to counter the effects of climate change and support agriculture. The scheme acts as a safety net for people who do not have any other source of income.

However, the success of MGNREGS depends on the participation of the whole community, particularly those who are marginalised, to ensure the scheme's benefits reach every individual, including the most vulnerable. Brajlal was trusted in the community as he often spoke up for villagers at *Gram Sabha* (village assembly) meetings to ensure they could access their entitlements. He also helped them to apply for jobs under MGNREGS, as well as demand water harvesting or land development structures be built on their land. As a small farmer from the same village, Brajlal understood the plight and the needs of farmers like him. He said: "I help out people in my village because I know that no one else will. If I don't help out others like me, our villages will never be able to prosper. We will always remain poor."

Becoming a climate 'friend'

Brajlal's passionate concern about the impacts of climate change made him an ideal candidate for the village's role of Climate *Saathi* ('friend' in Hindi), tasked with raising awareness of climate change issues and people's rights under MGNREGS. He used his confidence with technology and strong relationships with local farmers to champion a new web-based tool. The Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) is an online tool that provides much-needed information to rural communities about how they can adapt to a changing climate. Weather predictions and drought warnings can help them to plan ahead and protect their crops. As a digital native and a farmer who has struggled with unpredictable rains, Brajlal immediately recognised the potential of CRISP-M to help his community.

Image 2: Brajlal explains how CRISP-M works at a community meeting

In his role as Climate Saathi, he organises meetings in different hamlets and talks to influential community members to explain how they can use CRISP-M, dispelling concerns that some farmers might have about using

or accessing new technology (see image 2). This activity is vital to ensure no one is left behind. Brajlal's own experience and understanding of their reservations and concerns allows him to offer reassurance and persuade them of the tool's benefits (see image 3).

After using CRISP-M for several months, Brajlal said: "I have seen and heard of droughts and floods destroying our crops many times. My father used to tell me stories of farmers committing suicide due to being unable to bear the brunt of extreme weather conditions. The information available on CRISP-M has not only helped me take better care of my crops but has also given me hope that things can change for the better if we all work together."

Image 3: Brajlal uses CRISP-M to geotag a dugwell on his land

This is not a top-down process, but a conversation. With the help of Climate Saathis like Brajlal, CRISP-M can work alongside and support communities' strong traditional knowledge, practices and skills in climate risk management — not replace them.

Early action for long-term benefit

By providing a friendly and recognisable face for CRISP-M, Brajlal has placed himself at the forefront of enabling change.

As a Climate Saathi, he uses information from the tool to spread awareness about climate change and inform other community members about the drought situation so they can take collective action to protect their crops and ensure food and water security. By referring to the tool, Brajlal can also help them to plan their migration in advance, so they don't need to move in desperation when conditions become intolerable (see image 4).

"I have seen and heard of droughts and floods destroying our crops many times. My father used to tell me stories of farmers committing suicide due to being unable to bear the brunt of extreme weather conditions. The information available on CRISP-M has not only helped me take better care of my crops but has also given me hope that things can change for the better if we all work together."

This long-term management approach is having a significant impact on agriculture and water availability in the region. Brajlal has mobilised residents from six villages of the *Gram Panchayat* (decentralised elected village body) to lead plantation drives across the area. This is where villagers work together to plant saplings to help restore the ecological balance of the land, while conserving water.

CRISP-M has also been used as a channel to provide information about crop insurance and the procedure for claiming it, as well as information on government schemes that can help rural communities deal with the impacts of climate change.

Brajlal firmly believes that taking planned collective action can drastically reduce the impacts of climate change, and that with the help of technological interventions such as CRISP-M, it is possible to build a more resilient future for farmers in his village and the wider state.

Image 4: Brajlal is working with the community to take collective action against climate change

1 Prajapati, S (2 December 2020) Madhya Pradesh's recurring droughts: Measuring, responding and reducing the vulnerabilities. www.indiawaterportal.org/articles/madhya-pradeshs-recurring-droughts-measuring-responding-and-reducing-vulnerabilities

2 TWC India (26 April 2022) At 25, Rajasthan and Madhya Pradesh Have Suffered The Most Heatwaves So Far This Summer: IMD. weather.com/en-IN/india/news/news/2022-04-26-rajasthan-and-madhya-pradesh-suffered-the-most-this-summer

3 Sarkar, S (1 October 2021) Madhya Pradesh gets highly uneven rainfall as 2021 rainy season ends. www.theweek.in/news/india/2021/10/01/madhya-pradesh-gets-highly-uneven-rainfall-as-2021-rainy-season-ends.html

9. Holistic approach helps farmers combat climate change

Erratic rainfall and forest degradation is having a devastating impact on small farmers from marginal communities. By working with climate champions and multiple government programmes, they can gain access to vital water and land management structures, giving them hope for a brighter future.

Image 1: Rameshwar (left) works with Climate Saathis and government departments to understand the climate change risks he faces

A farmer by profession, 27-year-old Rameshwar[1] lives in Narayanpur village in Madhya Pradesh. With little education, he has few choices to earn a living for him and his large family of 11 (see image 1). The small ancestral land he tills is barely sufficient — and this is made worse by the unavailability of water for irrigation. Rameshwar therefore relies solely on rains to irrigate his land. However, increasingly erratic rainfall caused by climate change often leads to crop failure, making it difficult for him to sustain his family. Other pressures he faces include declining land productivity and soil fertility, and increasing pests and diseases.

Rameshwar said: "It is so difficult to feed your family through farming. It was different earlier. We used to have water stress earlier too, but we knew how to manage it. Now it is different. Sometimes it rains continuously for several days and washes away everything including the good soil and later it does not rain for many days, destroying the crop. We buy seeds and inputs on credit from shops. If our crops get destroyed, we can't pay for it. We just don't know what to do."

Box 1. Agriculture and forestry in Madhya Pradesh

The agricultural sector is the backbone of the economy in Madhya Pradesh, accounting for nearly 16% of the state's gross domestic product (GDP) and half of its land under cultivation. More than 72% of the state's rural workforce is employed in agriculture and the allied sector.[2]

After agriculture, forestry is the next important livelihood source for the rural community, particularly the tribal communities in Madhya Pradesh. Forestry provides livelihoods to nearly 2 million tribal people, as well as ecological services. Nearly 25.14% of the state's land area is covered by forests, which also acts as an important source of revenue for the government.[3] The state produces timber, and other forest products worth INR12,000 crores (US$1.8 billion).

As a member of the Gond tribal community, Rameshwar is also dependent on forest resources to make a living during the non-farming season (see Box 1). He and his family collect non-timber forest products — such as Beedi leaves (used for making local cigarettes), Mahua flowers, Harra, Baheda, Gums, Aonla and other medicinal plants — and sell them in the village market or to middlemen. However, in recent years, degradation, encroachment, illegal logging, overgrazing, deforestation and other anthropogenic activities have reduced his earnings from forest products. Forest cover in Madhya Pradesh has declined by around 4% over the last decade.

Subsistence livelihoods reliant on natural resources like agriculture and forestry make people like Rameshwar vulnerable to poverty, and this is exacerbated by climate change. It often causes distress migration to urban areas. When he is not farming, Rameshwar leaves the village to work as a construction worker, building roads or even working at brick kilns to earn a living for his family, where the working conditions are exploitative and inhumane. Rameshwar said: "I developed persistent cough after constant inhaling of dust and fumes in brick kilns and road construction work. But we don't have an option. We still have to go and work there."

Nothing in isolation

The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) guarantees wage employment to rural workers, alongside the construction of water management and land development structures, to help communities adapt to climate change. However, people like Rameshwar often don't benefit from the scheme because of delays in accessing employment and receiving payment, or by the simple fact they are unaware of their rights.

Small and marginal farmers need a range of support to protect them from climate impacts. Building a water harvesting structure under MGNREGS to irrigate crops alone is not enough. Farmers also need advice and support on what changes they must make to their farming practices — for example, delaying the cropping cycle to match rainfall patterns, switching to drought-resistant seeds, or using fertiliser to protect crops from intense rain or dry spells. Therefore, MGNREGS investments must be integrated with support from agriculture and forest departments so that together they can help farmers like Rameshwar manage different vulnerabilities and generate sustainable employment.

Image 2: Rameshwar becomes familiar with how CRISP-M works at a community meeting

So, when the Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) was introduced to Rameshwar's village, it was done with the view to bring about holistic development (see image 2). The web-based tool uses real-time weather predictions and geographic information system (GIS) mapping to help communities manage the adverse effects of climate change. Using integrated village-level planning, this was brought together with investments from other schemes, so villagers could make the best use of assets built through MGNREGS — for example, by providing technical support and advice from other government departments to ensure water harvesting structures are used efficiently, and the right kind of seeds and farming practices are selected.

Farmers like Rameshwar also needed support and training to make the best use of the tool. Climate *Saathis* ('friend' in Hindi) — volunteers raising awareness of climate change issues — and youth volunteers conducted village-level meetings and provided peer-to-peer learning support to explain how the community can benefit from MGNREGS. Rameshwar worked with the volunteers to understand the climate risks he faced and used the tool to identify the most suitable structure to build near his fields (see image 3). He also learnt what should be done at the village level to stop the degradation of forests near the village. For example, he understood that constructing trenches near the forest could stop soil erosion and enable groundwater recharge. He, together with other volunteers, demanded those structures be built in *Gram Sabha* (village assembly) meetings.

Image 3: a Climate Saathi works with Rameshwar to input agricultural site data on his farm

Finding his voice

This then encouraged Rameshwar to start mobilising others in the village to use the tool. With this newfound information at his fingertips, he was now confident voicing his concerns at *Gram Sabha* meetings, to demand the creation of assets that can lead to long-term drought proofing, such as the construction of a water body near his field.

As well as helping with MGNREGS planning, CRISP-M makes the community aware of other development schemes planned in the village. The MGNREGS process integrated planning with the irrigation and agriculture department, so that small and marginal framers from tribal communities could receive irrigation infrastructure and climate-resilient seeds.

Today, with the approval of a water harvesting pond and irrigation pump under way, Rameshwar feels more confident about a greater yield and more prosperous times ahead for him and his family (see image 4). He has also been able to motivate others in the village to undertake soil and moisture conservation so forest areas are rejuvenated and groundwater is improved.

Skills development will also play a crucial role in helping individuals like Rameshwar out of poverty. Climate Saathis made him and others in his village aware of the training available through MGNREGS, offering greater possibilities for better paid work.

[Rameshwar] has been able to motivate others in the village to undertake soil and moisture conservation so forest areas are rejuvenated and groundwater is improved.

Creating sustainable livelihoods

As well as a pond, Rameshwar is set to benefit from irrigation facilities to deliver the water to his crops, and access to better climate-resilient varieties of crops from the agriculture department. CRISP-M is therefore ensuring sustainable livelihoods for Rameshwar and others like him. The tool is helping to make the most of scarce resources and the effective use of government schemes.

Thanks to Climate Saathis working on the ground, communities and leaders can use the tool and its data effectively to improve planning and decision making. Increased irrigation installed thanks to CRISP-M and its convergence with various government departments will improve crop yields and protect people from drought, securing the future for many marginal farmers.

Image 4: Climate Saathi site visits enable Rameshwar to identify what structures can help him to irrigate his land

1 Rameshwar is a member of a tribal group which does not commonly use a family name

2 Department of Planning Economics and Statistics, Government of Madhya Pradesh (2016) Madhya Pradesh Agriculture Economic Survey 2016 http://des.mp.gov.in/Uploads/2/11%20AGRICULTURE%20SURVEY%20ENGLISH.pdf

3 Madhya Pradesh Forest Survey of India https://fsi.nic.in/isfr19/vol2/isfr-2019-vol-ii-madhya-pradesh.pdf

10. Training helps communities secure their own futures

Many people in the Scheduled Tribes community lack access to education and skills training, leaving them at the mercy of water shortages and threatening their livelihoods. Climate volunteers are creating opportunities for skills training, while equipping communities with the knowledge to better prepare and adapt to climate change.

Image 1: CRISP-M has allowed Ram Bhajan (third from left) to develop his own skills and contribute to the village community

Ram Bhajan,[1] a 48-year-old resident of Hinotiya *Gram Panchayat*, Sanchi Block, Madhya Pradesh is a member of the marginalised Scheduled Tribe community. Like many others from his community, Ram Bhajan, a father of four, dropped out of school at the age of 14 and now relies solely on farming to feed his family (see image 1).

Despite the government's consistent efforts, India's 2011 census revealed there is a 14% difference between the literacy rates of the Scheduled Tribes and the rest of India's population. A staggering 50% of students from this community leave school during the transition from primary to secondary grade, with just 20% completing their examinations in the 10th grade.[2] Things are no different in Madhya Pradesh, India's fourth poorest state, which is also home to the largest population of Scheduled Tribes in the country (21.09% as per the 2011 census).[3]

With only increasingly erratic rainfall to irrigate his crops and a steady decline in the water table, Ram Bhajan struggled to fetch water for the irrigation of his small piece of land on which he grows rice, wheat and gram. He said: "When I can't farm due to the lack of water, I wish I could take up a job. That would mean a stable income even when farming isn't possible." But without a formal education and specific skills training, finding a job is not easy for Ram Bhajan, who is often forced to take up menial jobs to ensure the survival of his family.

Developing skills

While government schemes such as the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), which promises 100 days of guaranteed employment, bring some relief to Ram Bhajan, he feels the need to develop specific skills that can help him ensure his own livelihood security. "I don't want to rely upon government schemes alone for my survival," he said. "I want to be able to learn new things and to earn with my own skills."

Along with skills development, which is essential for providing individuals like Ram Bhajan with better employment opportunities, forestry and agriculture must also be developed to bring about a tangible improvement in their lives. As the three are interrelated, they must be developed accordingly, to create transformative resilience at the local level. Convergence between agriculture, forestry and skills development will help to create jobs and reduce poverty in rural areas, while protecting the environment.

Learning the ropes

When Ram Bhajan learnt about the Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) — mobile technology to help communities to plan and implement MGNREGS — from Climate *Saathis* ('friend' in Hindi), it opened new opportunities for him. These peer-to-peer volunteers are tasked with raising awareness of climate change and the adaptation support that communities can access. Ram Bhajan recognised how the tool could equip him with a better understanding of the region's geography and climate forecast information. This could then help him and the villagers to identify the right course of action to mitigate the effects of climate change.

Image 2: CRISP-M is used as part of integrated climate change planning at a village meeting. Ram Bhajan (left of presenter) joins a village meeting to hear how CRISP-M can be used as part of integrated climate resilience planning

Ram Bhajan began regularly attending meetings on climate resilience and CRISP-M organised by the Climate Saathis. He is proactively familiarising

himself with the tool and working with the team to explore ways to link with different development schemes from the irrigation department, agriculture department, and other agencies, so that farmers in his village can benefit from integrated planning (see image 2).

Image 3: with the help of Climate Saathis, CRISP-M enabled Ram Bhajan and others to identify that levelling their fields can help overcome water shortages

CRISP-M's project team has also been supporting and training Ram Bhajan to familiarise him with all the tool's features, so he can make the most of the technology. The team's support has helped Ram Bhajan to not just understand CRISP-M better but to also overcome his hesitancy towards operating technology by himself.

As a result, Ram Bhajan identified that levelling his field can help with his land's low water table issues. Equipped with this knowledge, he raised his voice in the *Gram Panchayat* (decentralised elected village body), demanding the involvement of the agriculture department to help with this task. This is a great example of how CRISP-M can help converge various departments to maximise the benefits for rural people (see image 3).

Speaking up for the greater good

To address the village's limited water availability, the government had plans to build a dam in the area. But the construction ran the risk of submerging a major area of the village, including Ram Bhajan's home. Although in such cases the government ensures that displacement relief funds and alternative land is provided, for a man of limited means like Ram Bhajan, displacement could result in the permanent loss of his livelihood.

With the support of the CRISP-M project team, Ram Bhajan and his fellow villagers identified a different location for the dam. Although Ram Bhajan will still lose a small portion of his land, he is willing to sacrifice that for the greater good and to save his village. He said: "If losing some part of my land will provide irrigation to the whole village throughout the year, I am willing to make that sacrifice."

Building a better future

While it's still early days for CRISP-M implementation, the potential impact it can have on the village communities is clear. Today, Ram Bhajan is actively engaging with the community to plan the development and management of the area's natural resources, using the information available on CRISP-M, so they can be used in the best way possible.

With an enhanced understanding of soil and water conservation, and access to climate-resilient asset planning information, Ram Bhajan has taken the lead on creating a pond in his village under MGNREGS.

With an enhanced understanding of soil and water conservation, and access to climate-resilient asset planning information via the tool, Ram Bhajan has taken the lead on creating a pond in his village under MGNREGS. This will help to tackle the water scarcity issue faced by the farmers in the region. He is leading the conversations

with government officials about the plans for a dam and is hopeful that, together, they will find the best possible solution to the community's problems (see image 4).

Having left school at a very young age, the training for CRISP-M has been an enriching experience for Ram Bhajan. For the first time in his life, he feels that he can upskill himself and make actual contributions towards his community. As his hesitancy towards technology dissolves, Ram Bhajan is willing to learn and know more.

With the help of on-the-ground project teams and Climate Saathis who are training those like Ram Bhajan, CRISP-M can play a huge role in supporting vulnerable groups by giving them access to crucial information. As CRISP-M reaches more and more people, many like Ram Bhajan will be equipped to build a better future, not just for themselves, but for countless others like them.

Image 4: Ram Bhajan (centre) is prepared to lose some of his land to build a dam to help his village

1 Family name withheld

2 Santhakumar, V and Das, A (2018) Schooling of the Scheduled Tribes in India. Azim Premji University. https://practiceconnect.azimpremjiuniversity.edu.in/schooling-of-scheduled-tribes-in-india/

3 The Pioneer (13 November 2021) MP largest Tribal population State. https://www.dailypioneer.com/2021/state-editions/mp-largest-tribal-population-state.html

11. Community stands together against drought

Climatic changes are making it harder for marginal farmers to grow enough to feed their families. Thanks to on-the-ground advisers and committed community members, they now have the data they need to better prepare for erratic rainfall and drought.

Image 1: villagers in Puddar work together to use data from CRISP-M to overcome groundwater issues

In the village of Puddar, Madhya Pradesh, climate change is having a big impact on agricultural production. Changing rainfall patterns, more frequent periods of high-intensity rainfall, long dry spells and changing temperatures are causing crops to fail. This is particularly detrimental for small and marginal farmers, who buy agriculture input on credit. Crop failure means they can't repay the loans and struggle to feed their families.

At a village meeting in Puddar, farmers expressed concern that after prolonged dry spells the soils did not have the capacity to hold rainwater, which is then lost as runoff. Groundwater is also not recharged by heavy rain, compared to the earlier moderate rain. At the same time, the rise in temperature dries up the soil and means crops need more water. All this is severely diminishing agricultural productivity in the village.

To adapt to the impacts of climate change, residents realised they needed a combination of farm- and landscape-level natural resource management to deal with these issues. This would minimise runoff and maximise rainfall infiltration into the soil; enhance groundwater and surface storage capacities for use during droughts and dry periods; and increase soil moisture available for plant growth, as well as recharging the groundwater tables.

Data at your fingertips

Residents in Puddar knew that the Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS), the world's biggest public works-based social protection scheme, could help them create water conservation and harvesting structures to provide long-term drought protection. But they lacked the scientific and technical knowledge to identify which structures were most appropriate for water conservation, soil conservation, water harvesting and land development, as well as where they should go. They needed information on existing land use, soil type, drainage characteristics, geomorphology, slope, groundwater conditions and so on. This is where the Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) came in. The web-based technology provides all this data at their fingertips. So when it was first introduced to the Puddar community, four villagers — Jagdish, Raghuvir, Tula and Mahesh[1] — began to mobilise the community to use the tool (image 1).

Image 2: Climate Saathis show the four villagers how different features can help them identify the kind of structure they need

Frontline climate champions aiming to raise awareness of climate change issues, known as Climate *Saathis* ('friend' in Hindi), worked with the four villagers to explain how to use CRISP-M for landscape-based planning. They also showed them how to use a do-it-yourself water balance tool to assess the water yield at particular locations in the village. Jagdish, Raghuvir, Tula and Mahesh recognised how this feature could help the community to identify the most suitable structure at any location (see image 2). They also liked the fact they could select the structure they wanted from a drop-down menu, and if they wished — based on their local knowledge — they could modify it. Jagdish said: "This is the first time a tool has been developed to help us and gives us power to use technology for our benefit. Until now, officers would come to our village and use different types of tool to do their survey or planning. They never involved us. But CRISP-M tool has been specifically developed for us. This is a big change."

Working together

Jagdish, Raghuvir, Tula and Mahesh then worked with the Climate Saathis to organise village-level meetings to present the structures suggested by the tool to the community. Using CRISP-M they could explain the type and location of their proposed structures with geographic information system (GIS) maps, based on geomorphological, biophysical and climate risks factors.

Image 3: villagers in Puddar village using the CRISP-M tool

They then encouraged community members in the meeting to organise themselves into groups based on the smaller hamlets they belonged to, to understand the problems they faced related to soil, water and biomass degradation and their causes. They also tasked each group to articulate the needs and requirements of the most vulnerable households. Using this information, they used CRISP-M to develop location-specific watershed management activities.

Jagdish, Raghuvir, Tula and Mahesh also encouraged the villagers to build a pond after the tool identified it could transform the fate of large areas of farmlands that were currently lying uncultivated in the village — due to a lack of irrigation water. The pond would enable the village to store excess water during the rainy season, that would otherwise be lost as runoff, and use it to irrigate crops (see image 3). The pond will also help to improve aquaculture (breeding, rearing and harvesting of fish) in the village. Raghuvir said: "These types of structure will benefit both small farmers like me as well as landless to earn a living. We could never think like this before. Now we are able to plan for everyone."

Reaping the benefits

CRISP-M and this people-centred approach to natural resource planning has provided an opportunity for the marginalised and more vulnerable sections of the rural community to have a better say in what happens to their own farms and crops. It has ensured equitable access to the assets, resources and benefits created through MGNREGS, giving communities a greater chance of weathering future erratic rains and feeding their families.

> "This is the first time a tool has been developed to help us and gives us power to use technology for our benefit. Until now, officers would come to our village and use different types of tool to do their survey or planning. They never involved us. But CRISP-M tool has been specifically developed for us. This is a big change."

By identifying the need for a pond, CRISP-M — helped by the Climate Saathis and down to the work of Jagdish, Raghuvir, Tula and Mahesh — will bring previously unused land under cultivation, increasing the area's productivity. The tool is also helping the villagers to prepare a drought-proof plan for the entire area by creating sufficient water recharge, water impounding and storage capacity in the village.

By working together for the benefit of Puddar's most vulnerable, the whole community is much better prepared for the future.

1 Jagdish, Raghuvir, Tula and Mahesh are members of a tribal group which does not commonly use a family name

12. Helping communities adapt to dry seasons

Changes in rainfall patterns are making it difficult for many rural communities in Madhya Pradesh to access water for drinking and irrigation. This means farmers struggle to grow crops, forcing them into seasonal migration in the search for work. Access to geographical data and weather forecasting is helping villagers build collective action plans to overcome the water crisis and adapt to climate change.

Image 1: a Climate Saathi helps villagers in Bisanjpur Tandi identify a suitable location to build trenches to improve groundwater levels

Madhya Pradesh is one of the driest states in India,[1] with an average annual rainfall of just 700mm — declining 23% over the last 20 years. The region struggles with a low water table, and the situation is getting worse, with rivers running dry at an alarming rate.[2] This is having a severe impact on the lives of those living in Bisanjpur Tandi village, Narsullaganj Block. The village in Madhya Pradesh has approximately 300 households, and is dominated by the Barela tribe, followed by the Banjare and Gond tribes.

Many rural communities like this are now struggling to access clean water for their daily needs, with households having to spend hours queuing for water, or relying on dirty water from ponds and streams, causing health problems such as diarrhoea and stomach infections. This also has a major impact on agriculture, causing crops to fail and livestock to die.[3]

In addition to the water crisis, deforestation has become a major issue in the region.[4,5] Community seasonal activities include the collection of non-timber forest products such as Tendu leaves, Chironji seeds, Mahua leaves, gum resin and so on. Due to the high demand for timber, forests in Madhya Pradesh are being degraded at a rapid pace. This is not only causing ecological damage but is also contributing to the water crisis, as trees play an important role in the recharge of groundwater.

Some 90% of families in Bisanjpur Tandi are living below the poverty line, with each owning an average of 2-3 acres of land — a mix of forest and farmland.[6] Though they depend on agriculture as their main source of livelihood, water shortages force many into seasonal migration, with only 50% of households able to cultivate crops year-round.[6] The villagers wanted to do something to retain the soil moisture on their farmlands but they lacked the necessary knowledge to devise a plan.

Collective action

The Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is the world's biggest social protection programme. It offers paid work to all rural households through the construction of natural resource management structures to tackle climate change. However, for MGNREGS projects to be more effective, there must be a better understanding of geographical features, more participation from all members of the community and greater access to information on climate forecasts. The Climate Resilience Information System and Planning Tool for MGNREGS (CRISP-M) uses geographic information system (GIS) mapping and climate forecasting to provide community members with this information, helping communities to choose the right structures to tackle water shortages. Villagers can then modify the plan based on their local and traditional knowledge and experiences.

Image 2: continuous contour trenches collect water flowing downhill to be used in irrigation

Four years ago, the *Gram Panchayat* (decentralised elected village body) treated a big patch of land with continuous contour trenches (CCT) to help increase the groundwater level in Bisanjpur Tandi. This encouraged a Climate *Saathi* ('friend' in Hindi) — a grassroots volunteer working to raise awareness of climate change issues — to hold meetings with community members to motivate them to do something similar using CRISP-M (see image 1). Their job was made easier because villagers could see from the earlier project how the proper treatment of land and water resources could help solve their water problems in the long run.

Image 3: the proposed location of a new trench, which would protect villagers in Bisanjpur Tandi from erratic rainfall and prolonged dry spells

The residents in Bisanjpur Tandi were then inspired to use the information provided by CRISP-M to identify a piece of barren land that was not being used by the community. They are now proposing that a CCT structure be built on this ten-hectare site in the next year's village developmental plan. The trenches are designed to collect rainwater flowing downhill. The soil excavated from digging the trench is used to plant grass and legumes, helping to trap sediment that would otherwise overflow from the trench during heavy rainfall. The water then provides soil moisture for crops cultivated after rainfall, perhaps even extending to the dry season, and potentially making a big difference to farm crops in the village (see images 2 and 3).

Sardar Singh Barela, a resident from the village, said: "Engineers had come to our village to plan out everything when the CCT was made earlier. With CRISP-M tool we are all technical experts now. We choose the land and where and what type of structure to build. We are no longer dependent on outsiders. This is better because we know what is best for us."

The community is also using CRISP-M to collectively explore the construction of possible soil and water conservation-related works in the area that consider the impact of current and future climate risks, using a range of data provided by the tool. This holistic approach to landscaping is helping village councils to better understand and manage the risks posed by climate change.

Image 4: a Climate Saathi gives local farmers the information they need to take action against climate change

Weathering the storm

Today, CRISP-M is helping village communities like that of Bisanjpur Tandi to create more informed and integrated landscape-based plans that consider the impacts of climate change. It is helping to ensure that the benefits of planning are shared equitably among all stakeholders, so even those in marginalised households can be better protected from prolonged dry seasons and intense rains.

The tool is also helping to bring the village community together by using participatory vulnerability assessments to identify those most in need. The new trenches bring hope to farmers who have suffered years of extreme poverty because of drought and erratic weather patterns (see image 4).

> "With CRISP-M tool we are all technical experts now. We choose the land and where and what type of structure to build. We are no longer dependent on outsiders. This is better because we know what is best for us."

One resident, Veena Bai Barela, said: "If the CCT is developed in this area it will transform the lives of farmers like us who have land at the bottom of the forest hill. The water moisture in my farm land will go up and I will be able to take two crops instead of one. This will have a profound impact on my family income." Another villager, Heeralaal Barela, added: "I have seen the benefit of the CCT constructed earlier. If these works get taken up the rainwater that now washes away all the top soil will get into the land and recharge groundwater. Our wells will have water again and we will get clean drinking water."

Now these farmers' crops stand a chance of surviving and providing much-needed income, while their ability to access clean water will change their lives for the better.

1 Prajapati, S (2 December 2020) Madhya Pradesh's recurring droughts: Measuring, responding and reducing the vulnerabilities. www.indiawaterportal.org/articles/madhya-pradeshs-recurring-droughts-measuring-responding-and-reducing-vulnerabilities

2 Kumar Das, A (26 April 2022) How Heat Waves Are Impacting Health And Agriculture In India. swarajyamag.com/news-brief/how-heat-waves-are-impacting-health-and-agriculture-in-india

3 Jain Parichha, M (25 May 2022) Belly Of The Beast: How Climate Change Is Affecting India's Farmers. www.outlookindia.com/magazine/national/belly-of-the-beast-how-climate-change-is-affecting-india-s-farmers-magazine-196237

4 Kumari, R, Banerjee, A, Kumar, R, Kumar, A, Saikia, P and Latif Khan, M (2019) Deforestation in India: Consequences and Sustainable Solutions. In: *Forest Degradation Around the World*. IntechOpen. www.intechopen.com/chapters/66710

5 Kakvi, K (20 June 2019) Climate Change: Bhopal Loses 5 Lakh Trees in the Last Decade, Forest Cover Down by 26%, Reveals Report. www.newsclick.in/climate-change-bhopal-loses-5-lakh-trees-last-decade-forest-cover-down-26%25%2C-reveals-report

6 Information gathered at focus group discussions with village residents.

Annex: key elements of the implementation approach of CRISP-M at the village level

1. Digitally aided participatory vulnerability assessment

The mobile application provides the community with information about geophysical and biophysical characteristics, and potential climate risks, and sets out a process that helps the community to use it as an input for carrying out a participatory vulnerability assessment as follows:

- High-resolution geographic information system (GIS) maps help the community visualise the village landscape on the map — identifying locations of farmlands, forest areas, residential space and so on. The community facilitator explains the topography, hydro-geomorphology and other characteristics based on the GIS maps and explains the possible climate risks such as change in rainfall, droughts, floods, groundwater recharge and water yield.
- The mobile app has a series of questions that are used as prompts to facilitate the community carrying out a participatory vulnerability assessment, whereby different parameters around the five types of livelihood capital, namely natural, social, human, physical and financial, are discussed and assessed by the community. This assessment helps in identifying areas that need attention and prioritisation in the planning process, for example, a forest area identified as being degraded prompting the need for a plantation to meet the timber or fuelwood requirements; lack of fodder for livestock prompting the need for pasture development; high number of landless migrants prompting the need for skill enhancement, and so on. The village-level facilitators (known as *Rozgar Sahayaks*) capture the key discussion points in the app. This process is also used to prioritise the most vulnerable households who are tagged and digitised.

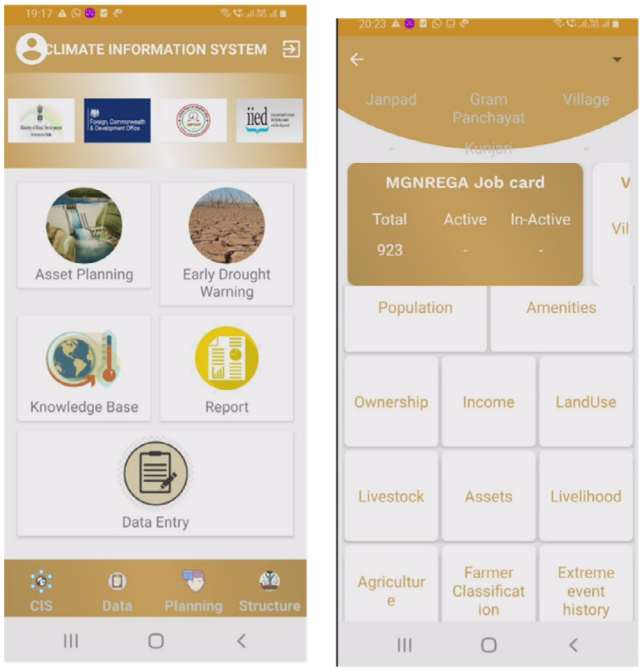

Figure 1: mobile app dashboard

2. Updating/modifying GIS plans based on local needs and priorities

In this process the community is provided with an explanation on the type and location of the structures proposed though the GIS maps, based on geomorphological, biophysical and climate risks factors. The individual households can then raise their concerns regarding the proposed plans/structures. The community is encouraged to organise themselves into groups to understand problems related to soil, water and biomass degradation and their causes, and is simultaneously encouraged to articulate the needs and requirements of vulnerable households to deal with them. Community members are facilitated to reflect on the rationality of their demands and aspirations.

Based on the identified problems and the requirements of the community, location-specific watershed management activities are identified in the zone of recharge, transition and discharge of the watershed. Skill enhancement activities are identified on the basis of the status of local resources and socioeconomic conditions. While selecting

the activities, the ideas, experiences and Indigenous technical knowledge available within community are also used. The planning process identifies a five-year shelf of projects,[1] keeping in view the concept of the ridge-to-valley approach for watershed management and the prioritisation of benefits for the most vulnerable households.

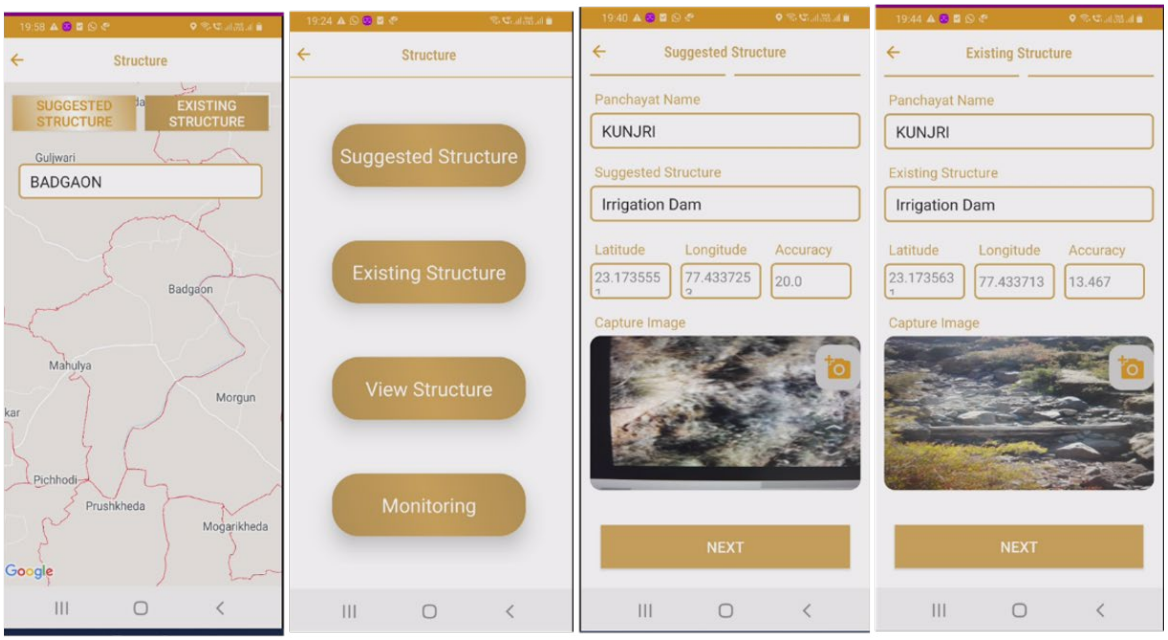

Figure 2: community asset validation and monitoring through mobile app

During this process the structures or the activities proposed in the top-down GIS maps may differ from what gets proposed through the community-led process. To ensure that the decisions of the community are captured, digitised and updated in the GIS maps, the mobile app has the functionality to:

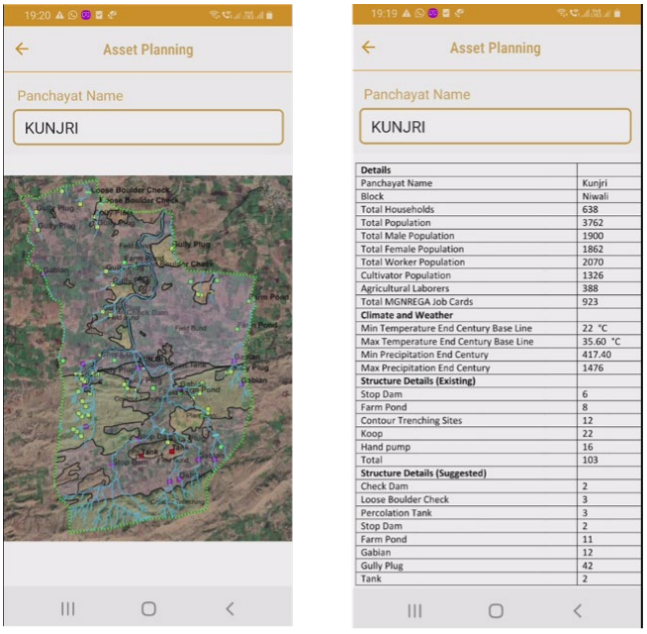

Figure 3: final village map after community-level planning

- Go to the location of each structure and, based on the decision of the community in the *Gram Sabha*, validate the structure proposed if the decision is not to change it or suggest a different structure if they decide that another structure better meets the needs/requirements of the household or community
- Take a photograph for ground truthing and capturing the conditions of the surroundings of the proposed site, and ensure its georeference is on the map
- Tag the household/s benefiting from the asset/structure/activity based on their unique job card number.

Once the information for all structures have been validated or updated, the community can view the community-level plan on the GIS map.

To assist in approval of the plan created through this process, the village *Panchayat* can print a shelf of project and a map, which can be used by them for approval.

This process leads to the preparation of a technically sound action plan with people's participation, through a top-down and bottom-up approach where techno-scientific and climate impact information is combined with local/traditional knowledge for climate risk management.

3. Water balance tool to facilitate planning for long-term drought proofing

Long-term drought proofing requires a reduction in runoff, an increase in groundwater recharge, surface water harvesting, and soil and moisture conservation, with a view to harness maximum rainfall during the short monsoon season within the micro-watershed boundary. This can help ensure water availability throughout the year and support the community to increase their cropped area, harvest a double instead of a single crop, increase their crop productivity and diversify their livelihoods. To plan structures with an optimum design and location to meet this objective, the community typically has to rely on watershed experts or civil engineers to plan water conservation structures and catchment treatment plans suitable in different locations.

The mobile app integrates a do-it-yourself water balance tool based on digital elevation modelling technology and climate information, through which the community can go to a location and use the tool to assess the water yield at that particular point based on its distance from the drainage line, slope, runoff and other parameters. The tool also allows the community to assess insights on past and future hydrological changes due to climate change impacts in terms of historical runoff, and current and projected future runoff. Based on these inputs the tool suggests structures most suitable in that location, which the community, if they prefer to, can change based on their local knowledge, and modify and update the plan. The tool helps the villagers develop a map of a complete shelf of natural resource management (NRM) activities, which can be used in preparing a long-term plan for the treatment of the entire area following the strategy of zero leak, thereby creating sufficient water recharge, water impounding and storage capacity in every village as a measure towards drought proofing.

4. Creating transparency and accountability by crowdsourcing data on MGNREGS asset status and beneficiaries

In order to bring in two-way accountability, move beyond conventional top-down approaches for monitoring and impact assessment that are orientated solely to the needs of policymakers, and supplement the existing MGNREGS monitoring information system, the CRISP-M tool helps build an information system crowdsourced from the community by enabling them to: (i) verify the claims on the progress of work by the authorities; (ii) report the actual status of the NRM assets; (iii) highlight structures needing repair or maintenance; (iv) create resource awareness among the community; and (v) ensure more equitable sharing of benefits.

The mobile app allows community members, village institutions and beneficiary households to add in information about existing structures and beneficiary job card details, and include photos uploaded with location codes and time/date stamps to show the status of assets created.

Such a system will allow MGNREGS functionaries to look beyond the data or information collected through the *Gram Panchayats* and *Rozgar Sahayaks* and provide a transparent mechanism for information generation and sharing; creating accountability at both ends to verify claims on what has been accomplished and who has benefited from it.

In the long run this system will improve the quality of monitoring, create a step change from the existing approach, and improve measurability of climate resilience impacts. The driving force behind this approach is not the accountability of MGNREGS functionaries, but climate-resilient development and poverty reduction at the local level. It will create a process for enabling the community to join the planning and monitoring process, create a space for shared learning between those who monitor and those who implement, and ensure democratisation of the complete implementation process of MGNREGS through joint decision making and co-ownership. This will empower village institutions and lead to more effective resilience plans and actions for vulnerable communities. Once scaled up, this could go a long way towards establishing a system of mutual accountability and building trust to create resilience in the places where it is most needed.

1 Shelf of project is the list of approved works to be carried out under MGNREGS at village *Panchayat* level

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India's rural economy, largely dependent on rainfed agriculture, is increasingly vulnerable to climate change. More frequent, intense heatwaves and unpredictable rains undermine farmers' efforts to protect crops and sustain their families. In 2021, to support communities to cope with crises, 'CRISP-M' was launched: an accessible online tool that helps communities predict, prepare for and manage climate impacts. This case study collection illustrates a key learning from the pilot phase: for best impact with marginalised and rural communities, climate technology must be accompanied by inclusive community engagement.

These 12 case studies demonstrate how our 'tech plus people' approach is supporting bottom-up, village-level climate resilience planning that includes the most marginalised groups. Together, these examples offer emerging lessons and trends that can inform plans to scale up climate tech in India and beyond. They are arranged by area of impact: gender and intersectionality; marginalised and Indigenous groups; transparency and accountability; early warning and early action; supporting integrated planning (agriculture, forestry and skills development); and landscape-based planning for long-term drought proofing.

Knowledge Products

Case study collection

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Climate change; Policy and planning

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