DMS HIMALAYA
JOURNEY TO SCALE

A PRAGYA Initiative for community-based risk reduction and governance in remote rural geographies

Implementing organisation

PRAGYA

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Ministry of Foreign Affairs

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About this publication

Communities in the Himalayan mountains are threatened by multiple hazards and have been experiencing growing frequency and intensity of disasters over the years. These communities are typically remote and poor, have little disaster resilience and rely entirely on disaster management support from the government. But limited resources and connectivity hampers the government's ability to help these communities on time. This results in high number of preventable deaths and injuries, and loss of livelihoods and assets.

Our solution **DMS-Himalaya** is an information and capacity-building toolkit that enables communities to reduce their disaster risk and to respond effectively in disaster scenarios. It is an area-specific, decentralized system for facilitating disaster management processes that fosters a collaborative Community-State co-management of hazards.

The solution was derived based on rigorous consultative research. The DMS-Himalaya model was developed with Humanitarian Innovation Fund (HIF) support. The Citizen-led DMS Himalaya initiative was then pilot-tested for over 4 years since 2016 across 800 villages, in the state of Uttarakhand in the Central Himalayas. Since January 2021, as part of Phase II of the programme, Pragya worked towards scaling the DMS-Himalaya model to achieve a range-wide spread in the Indian Himalayan Region and test the solution in new contexts in Western and Eastern Himalayas, reaching 900,000 people by 2022. This publication captures the journey to scale and the learnings.

KEY COLLABORATORS

Pragya UK
Pragya (UK) is a non-governmental development organisation that undertakes international development projects on critical needs in South Asia and East Africa. It is registered as a Charity with the Charity Commission for England and Wales.

Pragya India
Pragya is an NGO working for the appropriate development of vulnerable communities and sensitive ecosystems since 1995. It works through its head office in Delhi NCR and 26 field offices across 10 states/UTs. Pragya is recognized as a Scientific and Industrial Research Organisation (SIRO) by the DSIR, Ministry of Science & Technology, GoI and has Special Consultative Status with UN Economic and Social Council (ECOSOC).

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DMS Himalaya is funded and supported by **Elrha**'s **Humanitarian Innovation Fund (HIF)**, a grant making programme which improves outcomes for people affected by humanitarian crises by identifying, nurturing and sharing more effective and scalable solutions.

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HYUNDAI
HYUNDAI

01

Disaster risk in the Himalayas

The Hindu Kush Himalayan region is one of the most disaster-prone in the world. The region is characterised by a multi-hazard environment, where primary hazards frequently trigger secondary hazards with cascading effects. It is frequently affected by a broad range of hydro-meteorological and geological disasters, particularly flash-flooding, landslides, avalanches and forest fires. 21% of all major disaster events globally between 1980 and 2015 occurred in the Hindu Kush Himalayas with an average of 36,000 fatalities and 178 million affected each year due to natural disasters in the region (Vaidya, et al. 2019).

Image 1: Disaster response in Chamoli, Uttarakhand

The resident communities are suffering increasing frequency and severity of disasters. There has been a steady increase in hydro-meteorological disasters in the Hindu Kush Himalayas with the highest number of reported flood disasters with the greatest spatial extent on record being in the last decade (Elalem, 2015). 46.9 million people in the Indian Himalayan region are vulnerable to these hazards, with an increasing trend of extreme rain events and high-magnitude floods (Sen Roy, 2009).

With this significant portion of the world's disasters happening in remote mountain areas, the distress of last-mile mountain communities deepens with every successive disaster, and their trauma is exacerbated by ineffective disaster management mechanisms. The challenging Himalayan terrain, remoteness and lack of infrastructure have resulted in low preparedness levels and inadequate response to disasters. Endemic poverty and low human resource capacity of the rural Himalayan communities (especially women, children, elderly, and people with disability) leave them particularly vulnerable although they often have to act as first responders. They display very low resilience to disasters. Disasters have a direct effect on the natural resource base these predominantly agro-pastoral communities depend on, increasing poverty and hunger levels as livelihood-related disaster losses grow.

21% of all **major disaster events** globally between 1980 and 2015 occurred in the Hindu Kush Himalayas.

The Hindu Kush Himalayas experienced **143% increase in disaster events** between 1990 and 2000.

Storms and floods are of maximum frequency and contribute to **69%** of **disaster events**, **63%** of **deaths, 70%** of **economic losses** in the region

Pragya's substantial research on environmental threats and top natural hazards in the Indian Himalayan Region (with support from Elrha's Humanitarian Innovation Fund and others) identified the shortfalls in existing disaster management mechanisms, and the effect of place characteristics on disaster management. The research involved consultations with communities, civil society, responder agencies, state actors, and research institutions in seven Indian Himalayan districts. The findings (Banerji et al, 2014) revealed that existing disaster management systems lack the ability to respond effectively to disasters. The study also brought out the lack of institutional mechanisms and capacity to deal with multi-hazards environments and cascading disasters, and the urgent need for building resilience through stakeholder action. A critical information gap exists between communities and government agencies, thereby weakening the current disaster management measures. The observational data gap in the mountain regions 40^{o}N to 30^{o}S, was found to impede effective disaster management in the Hindu Kush Himalayan region. While the entire

Image 2: Glimpse of destruction caused by a cloudburst event in the Central Himalayas

population in the Himalayas is affected by natural hazards, the most severely affected are the remotest settlements since deprivation and distance from information and support are higher for such settlements. Hence, specialised structures and processes for effective risk management and humanitarian response, attuned to the unique constraints of remote mountain regions, are essential. The research also led to the formulation of Pragya's innovation **DMS Himalaya**. Pragya team used extensive and open consultations with local people and institutions, in the development process for the DMS-Himalaya, drawing them in as co-creators of the innovation.

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02

DMS Himalaya Model

Pragya works to create solutions to humanitarian and development problems for those in the margins, such as the Himalayan communities or pastoral nomads, for whom the routine and traditional services and methods have not worked, because of their unique conditions and constraints. We also recognize our role as being that of catalysts and facilitators, improving an existing system, and making it more effective and capable of delivering its mandate.

The '**Disaster Management System – Himalaya (DMS Himalaya)**' is an innovation developed by Pragya to empower remote and marginalised Himalayan communities to take charge of disaster management at the local level, whilst enabling seamless community-state collaboration. The model bridges the gap between communities and government and reduces disaster risk. The team designed DMS-Himalaya as a response to increases in climate change-induced disasters in the Himalayas, a region that is multi-hazard prone and on the frontlines of climate change.

The Pragya team recognised that various capacities and capabilities of the Himalayan communities may be leveraged for effective disaster management. For example, the in-depth knowledge of the communities regarding the local ecology and hazard profiles including their traditional knowledge can help in hazard monitoring. The intra-group cohesion and inter-group affinities are also facilitative for community-based solutions. The communities possess traditional governance structures, e.g. village councils or community councils- which can be leveraged for anchoring the disaster management systems. The innovation also notes that the Himalayan youth are technology-friendly and leadership for community-based Disaster Risk Reduction (DRR) may be developed in them.

DMS-Himalaya is a model for participatory disaster risk governance and communication. It reimagines the traditional roles and responsibilities in disaster management, building capacity at every point in the disaster management chain and networking communities, responders and government for enhanced disaster risk reduction and streamlined response - saving resources, saving livelihoods, saving lives. It comprises three key components –
1. **a set of technologies for last-mile monitoring, early warning, and response**, comprising: weather monitoring tools, an app for recording and relay of information;
2. **a communication network of stakeholders**, comprising: grassroots Disaster Response Teams (DRTs), Points of Presence (POPs) – e.g., police/army outposts equipped with satellite communications, and local authorities;
3. **targeted capacity-building for relevant stakeholders**, comprising: relevant monitoring and assessment practices, awareness and evacuation drills.

Thus, the DMS Himalaya infuses appropriate technology at the local level for timely pre-disaster warning and efficient post-disaster needs assessment and information relay.

DMS Himalaya Network

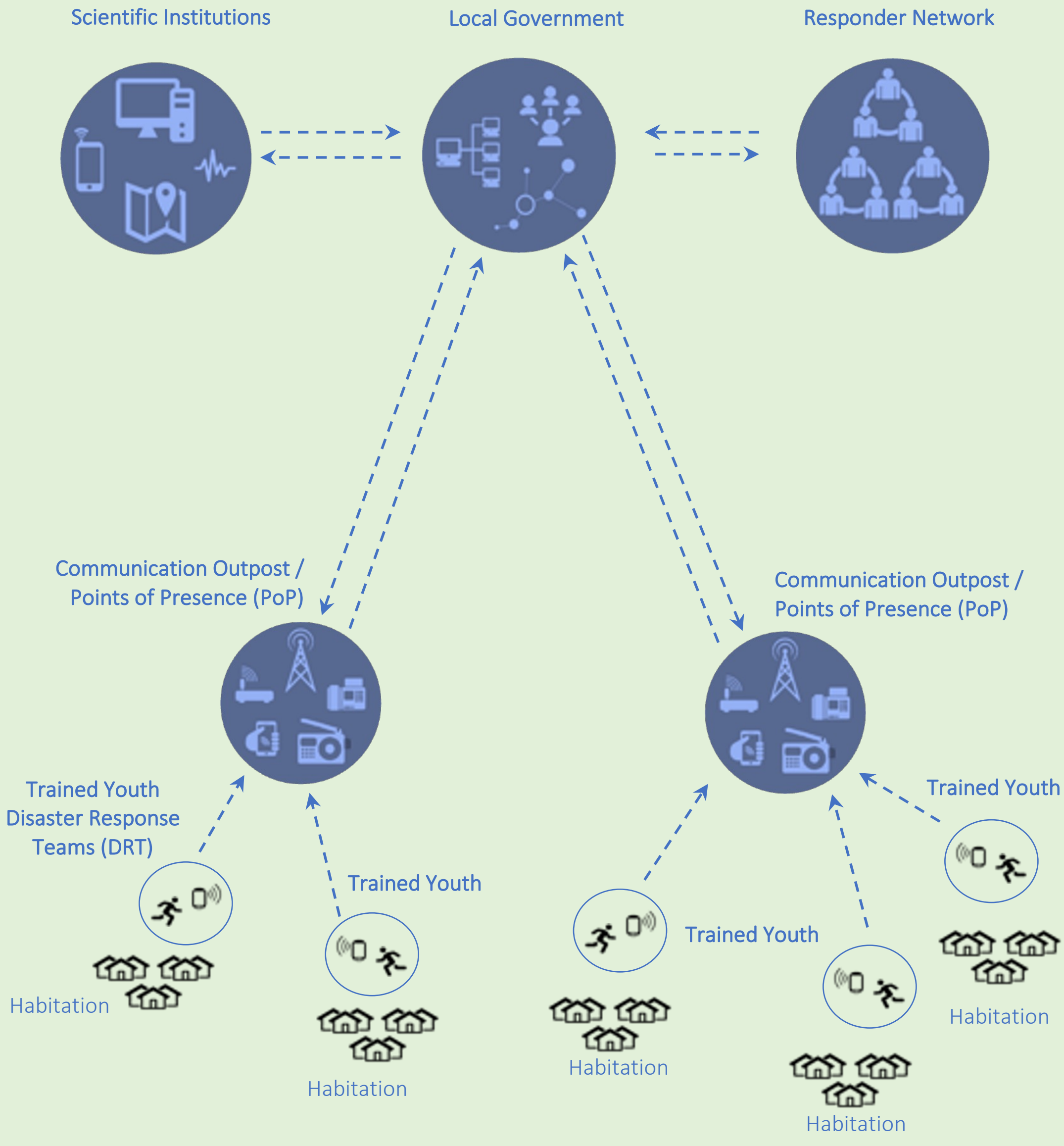


Image 3: DMS Himalaya Network and communication pathways between stakeholders

DMS Himalaya improves the preparedness of communities and reduces the risks they face. It provides early warning, enabling them to move to safety. It improves responders' understanding of relief needs and ensures that humanitarian support reaches them quickly. Together these ensure timely risk assessment, early warning and response, and relief and help build local resilience.

The stakeholders are equipped with micro-level weather data from Automated Weather Stations (AWS), a DMS-Himalaya mobile app for regular surveillance and communication. The Himalayan mountains are experiencing increased severity and intensity of disasters, with newer ones emerging, such GLOF (Glacial Lake Outburst Floods). While being characterised by certain core similarities of mountain geographies, the region has intra-regional variations with related differences in hazard profiles. Thus, early warning and response require customised surveillance tools and regular monitoring.

In order for it to be holistic and sustainable, the disaster management system needs to be anchored with those who are present locally- i.e., the government, the local communities and other grassroots actors. It also needs to be recognised as an essential service, and therefore must rest with local actors or service providers. Therefore, Pragya embeds the DMS-Himalaya model in the existing mainstream disaster management structures and processes, while making the necessary changes to the architecture to plug the crucial gaps. The DMS Himalaya model develops customised disaster communications networks that link even the remotest corners right through to Government responders. It involves trained local youth (local Disaster Response Teams, or DRTs) who function as in-community observation nodes cum responders. They are responsible for the weather and geological data monitoring, issuing early warning alerts, assisting in community evacuations, acting as first responders in an emergency, and post-disaster data collection and needs reporting. The DRTs are connected to the DMS-Himalaya network comprising village councils, the local government and responders, for timely and coordinated disaster management action, pre-disaster, during, and post-disaster.

Points of Presence (PoP) are proximal communications points, typically police or army outposts equipped with satellite communications technology for disaster information relay from the local level. Local Disaster Management Units (LDMUs) are the local government disaster management offices equipped with a DMS-Himalaya Resource Directory, and awareness information, and connected with the youth DRTs and PoPs for information relay. They are usually typically connected with scientific institutions to relay regional weather warnings to the PoPs. The Network is mapped and documented in the DMS-Himalaya Resource Directory, which has all local disaster management nodes and resources mapped out for efficient coordination in a disaster scenario.

The DMS Himalaya model has two inbuilt Pillars of Support for effective community-based disaster management –

a. Tools for Hazard Monitoring, Early Warning and Relief Needs Communication

- This comprises local hazard monitoring frameworks including weather monitoring tools for local observational data. Recording and communication of the observational data is via the DMS-Himalaya App with following tools:

- Go-Risk – A location-specific pre-disaster early-warning tool using grassroots measurement grids.
- RnR-Comm – A relief and response information-communication tool for post-disaster community use.

DMS Himalaya secures effective, composite

DMS Himalaya Tools

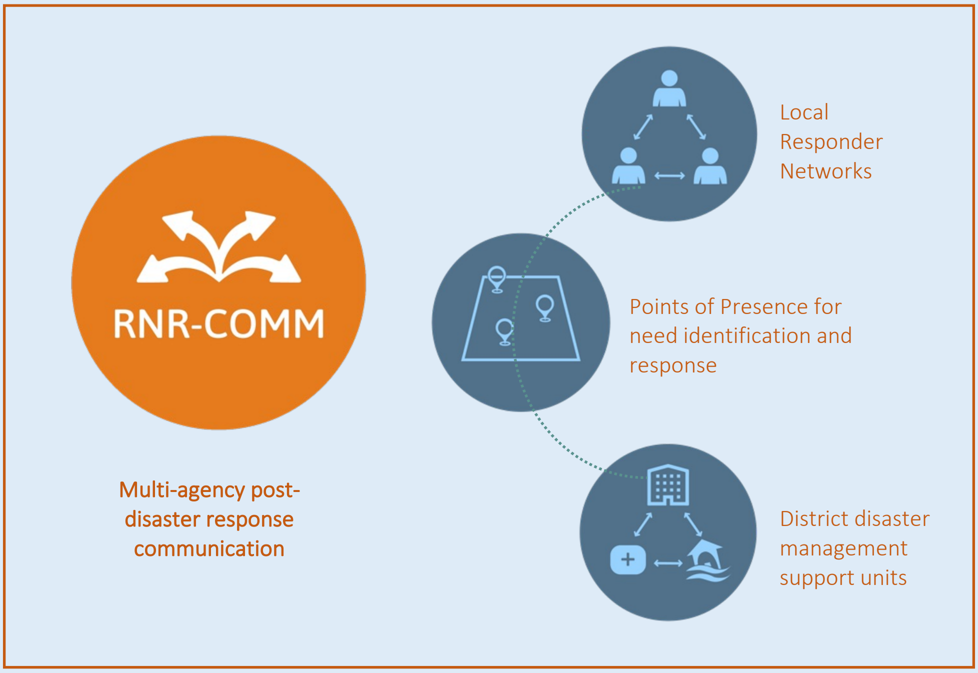


Image 4: DMS Himalaya Tools – 'Go-Risk' and 'RnR-Comm'

disaster relief and rehabilitation (DRR) at 3 windows of opportunity: pre-disaster preparedness; early warning; and immediate post-disaster relief, thereby improving risk reduction alongside enhancing the efficiency and effectiveness of the humanitarian response.

The Go-Risk and RnR-Comm tools are customised to the specific hazard profile of each zone in the Himalayan region, with pre-defined indicators and markers for the frequent natural hazards of each, to enable continual surveillance and early warning system for timely damage prevention and evacuation measures. These tools enable dynamic vulnerability mapping and hazard monitoring by utilising a community-based, citizen science approach. This enables micro-scale monitoring of hazards and response to localised hydrometeorological events which otherwise go undeclared and unsupported, and thus reduce associated human costs.

In addition to such contextualisation, hazard monitoring is a modular element, which enables a local authority adopting it to adapt it to changes in the local hazard profile, by adding newer hazards or removing any, if necessary. Given the dynamic nature of hazard profiles in the Himalayas due to the changing climate regimes, this is of particular relevance and permits a long lifespan for this innovation.

b. Capacity building of community/ responders – Training is delivered to the local communities and stakeholders (DRTs, village councils, government officers) to perform their functions, they are assisted in conducting village-level Hazards Risk Vulnerability and Capacity Assessments (HRVCA) and mapping of hazards, safe spaces and evacuation routes. They are also assisted in conducting village-level disaster awareness drives and evacuation drills. This is enabled via a DMS-Himalaya Training Toolkit comprising modules for various stakeholder groups.

- DMS Himalaya model was recognised as among the **Top 20 Innovations for Risk Award** by **UNISDR** and Munich-Re Foundation for being ‘people-centered, sustainable, innovative’ at the 3rd UN World Conference on Disaster Risk Reduction (Sendai, 2015)

- DMS Himalaya was showcased at the Global Consultation for World Humanitarian Summit (Geneva, 2015) and the Innovation Marketplace at the 1st **World Humanitarian Summit** (Istanbul, 2016)

- DMS Himalaya was recognised as one of **Top 25 Community-Based Disaster Risk Management cases** from across Asia by ADPC and GNDR (Bangkok, 2018)

DMS Himalaya is rooted in the principle of collaborative and dynamic risk governance and disaster response, in a culture of community-State co-management of hazards and involves decentralised disaster response information and communication which is particularly suited to the humanitarian response in geographically difficult, under-served last-mile, designed to overcome the disadvantages faced by their resident populations. It adopts a community-based disaster management approach which recognises and values community agency. It leverages trained local youth as in-community hazard monitors cum disaster responders, to overcome the existing observational and response gaps in the target region. DMS Himalaya integrates distributed and proximal PoPs (Points of Presence) for micro-level monitoring and timely, local-level response. As a people-state shared system, it also reduces the high cost of installing formal disaster management infrastructure in remote areas.

03

The pilot phase

Pragya began implementation of DMS Himalaya by piloting it in the **Central Indian Himalayas** (March 2016 to February 2020). It was piloted across 4 districts in Uttarakhand, India (Chamoli, Uttarkashi, Pithoragarh and Rudraprayag). It involved developing the DMS-Himalaya with a detailed manual and mobile app, and its pilot application.

The pilot phase trained 800 youth for disaster response and had an outreach to 339,000 people in 841 villages across 4 Central Himalayan districts. It engaged with 336 responders including 314 district-level and 22 state-level responders. It also helped build linkages with government and research and monitoring institutions for the state, developed capacity in local youth for hazard monitoring and disaster response, conducted thorough village-level hazard and vulnerability assessments and supported the operation of a coordinated people-state disaster management system.

The pilot phase of DMS Himalaya supported early warning and response during 12 disaster events in the state of Uttarakhand. Participatory reviews with 489 stakeholders at the end of the pilot phase indicated that the communities had 75% improved access to early warning, they had experienced 28% reduction in the number of injuries during a disaster event and 39% decrease in loss of household assets during disaster events compared to the baseline. The review also revealed 62.5% recognition of local youth responders and their role in disaster

Image 5: Community members display a hazards map with evacuation routes, safe zones and shelters

response in the communities. It increased community's ability by 37.5% to identify safe spaces for different kinds of hazards. Over the duration of the project, 4-5 times more community members had started participating in the emergency evacuation drills, resulting in an increased sense of security and community conviction in resilience. The project was selected as one of the Top 25 Community-based Disaster Risk Management (CBDRM) cases from across Asia by the Asian Disaster Preparedness Centre (ADPC) and Global Network of Civil Society Organisations for Disaster Reduction (GNDR) in 2018.

These results were attributed to capacity gain in disaster management among community responders and linkages and networks created through the project. The disaster management authorities in the pilot districts and state and national authorities as well acknowledged the value of the DMS-Himalaya approach. The Meteorological Center, at the state headquarters in Dehradun, Uttarakhand trained a selection of DRTs from the 4 districts on calibrating 80 weather stations installed under the project in keeping with Indian Meteorological Department (IMD) standards, as well as on corroborating with district Level Forecast and Warning data issued by the Indian Meteorological Department to facilitate early warning and evacuation in case of a natural calamity.

The District Disaster Management Officers (DDMOs) of the 4 pilot districts started leveraging the youth Disaster Response Teams (DRTs) for community outreach on disaster management. The officials worked alongside the Pragya team to orient 841 target communities to the Hazard Risk Vulnerability Capacity Assessment (HRVCA) maps and hazard calendars developed and to utilise them for risk mitigation. Joint drills and awareness events were conducted by the District Disaster Management Authorities and Pragya staff for school level disaster preparedness. The youth Disaster Response Teams were being integrated into the District government's disaster management training calendar, which would potentially lead to them becoming government-recognised extension workers for disaster management.

The DMS-Himalaya pilot phase supported **early warning and response** during **12 disaster events**, reaching **339,000 people** in 800 villages, and training 800 youth and over 300 responders.

Evidence from DMS Himalaya Pilot Phase (2016-2020) showed:

- **75%** improved access to early warning
- **28%** reduction in injuries
- **39%** decrease in disaster losses

An independent external evaluation at the end of the 4-year pilot phase of DMS Himalaya highlighted that the model adopts a strongly inclusive approach prioritising the needs of the most vulnerable and had successfully reached populations that are usually neglected in humanitarian programming. It also found that the model was able to enhance the capacity of a range of Himalayan stakeholders by institutionalising participatory processes for risk governance.

The evidence generated through beneficiaries and stakeholder consultations and the external evaluation was shared widely with the users, i.e., the district and state administration, as well as national authorities and technical support agencies, such as, the National Disaster Management Authority (NDMA), the National Institute of Disaster Management (NIDM).

DMS Himalaya Timeline

DECEMBER 2020
Journey to Scale begins;
12 districts – 5 states/Union Territories in the Western, Central and Eastern Himalayas

FEBRUARY 2020
Participatory external evaluation of pilot phase

APRIL 2018
Among top 25 best cases in Asia on Community based Disaster Risk Management

adpc
USAID FROM THE AMERICAN PEOPLE
GNDR

MAY 2016
Innovation showcased at World Humanitarian Summit Istanbul, Turkey

MARCH 2016
Pilot phase implementation begins; 4 districts – 1 state in Central Indian Himalayas

WORLD HUMANITARIAN SUMMIT

MARCH 2015
Top 20 Innovation - Risk Award
Third UN World Conference on DRR in Sendai, Japan

UNISDR The United Nations Office for Disaster Risk Reduction
RISK AWARD

AUGUST 2014
DMS Himalaya model developed through rigorous research

HIF humanitarian innovation fund

04

Journey to Scale

INITIATION

In the next stage of scaling, Pragya implemented DMS Himalaya in 12 districts across all 3 zones of the Indian Himalayas. Pragya functions as an 'Insider Partner'. The team is embedded in the areas and communities that it benefits, working with all local stakeholders, including government and civil society, as partners in their development efforts, being rooted in the local community and possessing deep knowledge of the local context. This helps in gaining the trust of local stakeholders.

Introductory and initiation meetings were held online and face-to-face with local authorities in 4 states/union territories (Ladakh, Himachal Pradesh in the Western Himalayas; Assam and Meghalaya in the Eastern Himalayas) and 8 districts to help elicit the required permissions for implementing the project. A document showcasing the evidence from the pilot phase in the Central Himalayan Region was presented to the local authorities. These discussions also helped in the active engagement of the local authorities in activities for the uptake of the DMS Himalaya model at both the policy and practice levels. A Memorandum of Understanding was signed with each local authority.

The COVID-19 pandemic and its associated restrictions on movement, the preoccupation of government stakeholders, frontline workers and community leaders

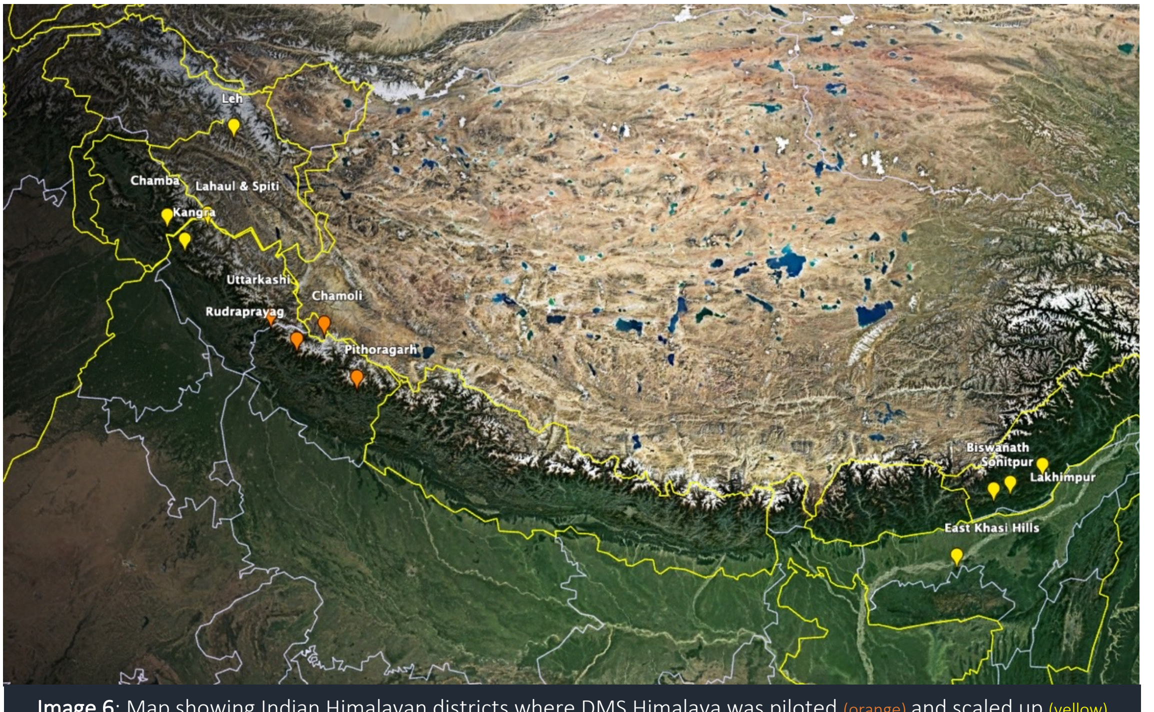


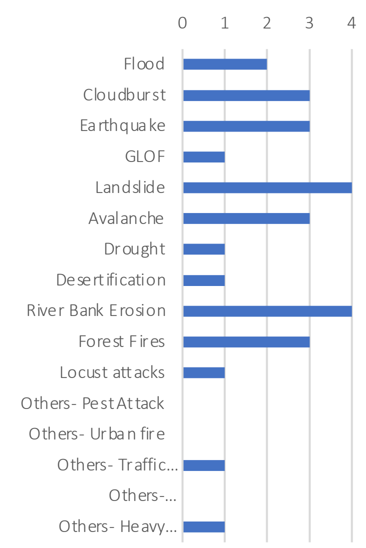
Image 6: Map showing Indian Himalayan districts where DMS Himalaya was piloted (orange) and scaled up (yellow)

with COVID-19 outbreak management, etc presented challenges in the initial stages of our scale-up. Pragya team adapted the activity schedules and modes of delivery. The organisation focused on content creation and extensive planning, during phases of lockdown and concentrated on intensive field implementation whenever movements were allowed. Pragya also adopted a hybrid approach for capacity building with some of the trainings delivered online, along with further hands-on guidance provided by the field staff.

CUSTOMISATION

For each distinct geography, Pragya recalibrates the DMS Himalaya model, consulting local stakeholders, reviewing the hazard profile, and addressing local variations, while retaining the core structure and processes. The hazard profiles for the Central Himalayas had been verified via piloting the innovation during 2016-2020. For scaling, the hazard profile of eastern and western Himalayas had to be confirmed, along with the indicators.

FREQUENCY OF OCCURENCE



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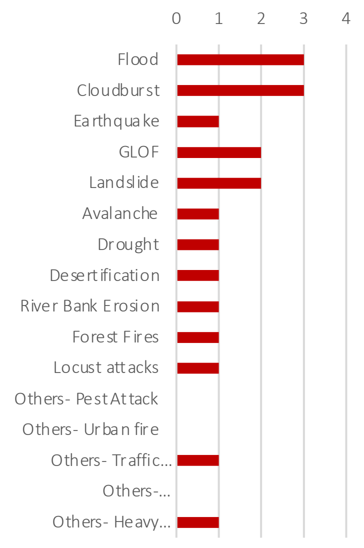
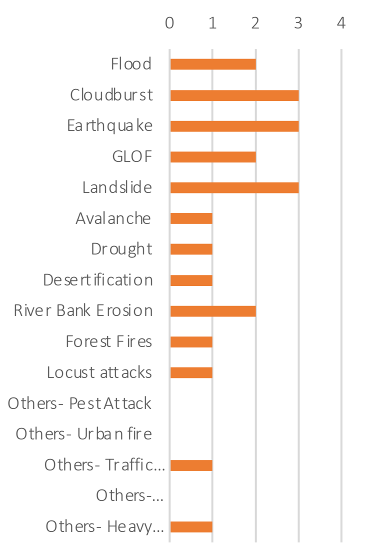


VULNERABILITY

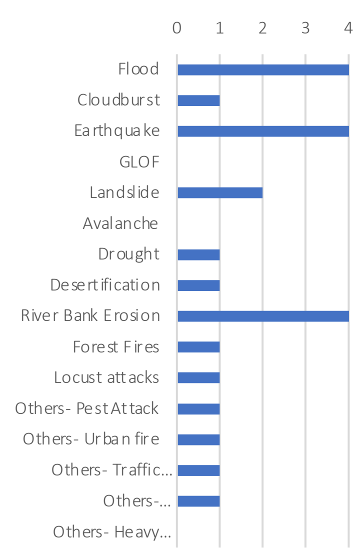


OVERALL HAZARD PROFILE

Hazards	Frequency	Impact	Vulnerability	Top Hazards
Flood	Moderate	High	Moderate	Rank 3
Cloudburst	High	High	High	Rank 1
Earthquake	High	Low	High	Rank 4
GLOF	Low	Moderate	Moderate	
Landslide	Very High	Moderate	High	Rank 2
Avalanche	High	Low	Low	
Drought	Low	Low	Low	
Desertification	Low	Low	Low	
River Bank Erosion	Very High	Low	Moderate	Rank 5
Forest Fires	High	Low	Low	
Locust attacks	Low	Low	Low	
Others- Pest Attack	Absent	Absent	Absent	
Others- Urban fire	Absent	Absent	Absent	
Others- Traffic accidents	Low	Low	Low	
Others- Thunderstorm	Absent	Absent	Absent	
Others- Heavy snowfall	Low	Low	Low	

Image 7: Hazards profile of Western Indian Himalayas

FREQUENCY OF OCCURENCE



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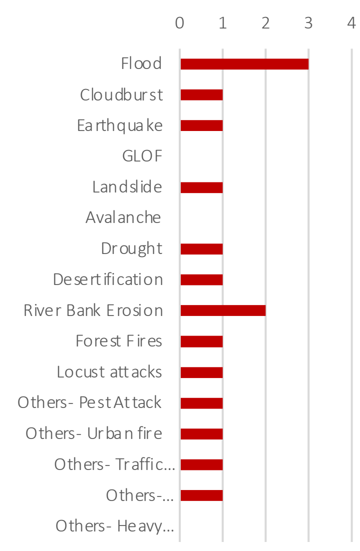

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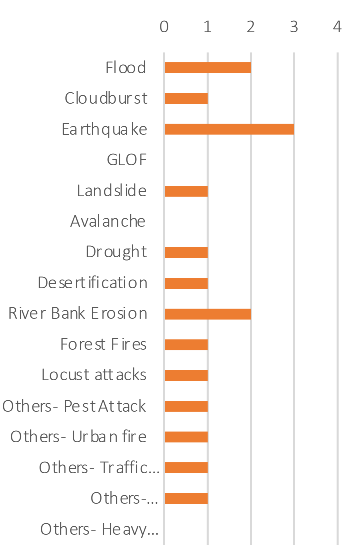


OVERALL HAZARD PROFILE

Hazards	Frequency	Impact	Vulnerability	Top Hazards
Flood	Very High	High	Moderate	Rank 1
Cloudburst	Low	Low	Low	
Earthquake	Very High	Low	High	Rank 3
GLOF	Absent	Absent	Absent	
Landslide	Moderate	Low	Low	Rank 4
Avalanche	Absent	Absent	Absent	
Drought	Low	Low	Low	
Desertification	Low	Low	Low	
River Bank Erosion	Very High	Moderate	Moderate	Rank 2
Forest Fires	Low	Low	Low	
Locust attacks	Low	Low	Low	
Others- Pest Attack	Low	Low	Low	
Others- Urban fire	Low	Low	Low	
Others- Traffic accidents	Low	Low	Low	
Others- Thunderstorm	Low	Low	Low	
Others- Heavy snowfall	Absent	Absent	Absent	

Image 8: Hazards profile of Eastern Indian Himalayas

Customisation of the Hazard Profiles of the eastern and western Himalayas was carried out involving consultations with local and regional stakeholders to validate previous research and the inputs would be incorporated for modifications to the DMS-Himalaya App. Detailed hazard profiles were prepared for the Western and Eastern Himalayan zones through extensive review of scientific literature and published statistics as well as consultations with 6 nodal agency representatives (District Disaster Management Authorities), and 19 local disaster management actors (first responders, government departments, and civil society representatives) from the target states and districts. Pragya team also consulted technical experts from the Department of Civil Engineering – Indian Institute of Technology - Mandi, Centre for Geoinformatics Research and Training - CSK Himachal Pradesh Krishi Vishwavidyalaya (agricultural university), SCA-Himalayas – Swiss Cooperation Office for their expertise in the Western Himalayas. The team sought inputs from experts based in the Centre for

Image 9: Pragya staff inspects Automated Weather Station (AWS) set up in Kangra district, Himachal Pradesh

Disaster Management -Tezpur University, Department of Environmental Science – Shillong College, Department of Civil Engineering - Indian Institute of Technology – Guwahati for the hazards profile in the Eastern Himalayas. The stakeholders and experts reviewed the frequency and impact of various natural hazards and rated the vulnerability of the communities to the specific hazards.

Based on the consultation, the top 5 hazards for the Western Himalayan region emerged to be - Cloudburst (Rank 1), Landslide, Flood, Earthquake and River Bank Erosion (Rank 5). Cloudburst scored high across all three components and thereby ranked no. 1, whereas Riverbank Erosion, in spite of having very high frequency, was ranked as no. 5 because of low impact and moderate vulnerability scores. On the other hand, the top hazards for the eastern Himalayan region emerged to be - Flood (Rank 1), River Bank Erosion, Earthquake and Landslide (Rank 4). Flood, Earthquake, River Bank Erosion - all scored very high on frequency and the ranks were thus determined by their level of impacts and degree of vulnerability to the hazards.

The environmental monitoring parameters and threshold levels for generating early warnings were updated based on review of scientific literature and validated through consultation with the experts. These indicators allow tracking basic hydro-meteorological and geological changes through grassroots monitoring, such as stream flow measurements, observable land and structure shifts and deformations, rain and snowfall measurements etc.

Following the consultation, the DMS Himalaya mobile app and web platform for regular environmental parameter monitoring and reporting post disaster needs were customised with region-specific hazards and was made operational at ground level in all new districts. User manuals were translated and made available in 3 local languages in addition to English (Hindi, Assamese, Ladakhi). Pragya team identified improved and sturdy instruments for Automated Weather Stations (Campbell-Scientific ClimaVUE50) suitable for the rugged high altitude terrains. 63 such units were installed to monitor 160 village clusters in collaboration with the district government

Image 10: Youth Disaster Response Team (DRT) members equipped with Search and Rescue kit

departments. These are important part of the early warning system and also helps in strengthening collaboration with governments and in raising visibility of the initiative. The Automated Weather Stations have no moving parts, and the design is tailored to harsh conditions including heavy winds and precipitation, and very low temperatures. The units are also calibrated to ensure the data meets the standards of the Indian Meteorological Department. Each Automated Weather Station measures a broad range of parameters, such as air temperature, relative humidity, vapour pressure, barometric pressure, wind (speed, gust, and direction), solar radiation, precipitation, and lightning strike (count and distance), thus allowing for the gathering of data appropriate to monitor local hazards. Data storage and transmission were also key considerations while selecting the units, with the unit allowing for direct and automated transmission via cellular SIM, as well as storage and cumulative transmission following a loss of signal. The data from the Automated Weather Stations is transmitted to Pragya and other government-authorised servers to provide a more detailed picture of weather patterns in these remote areas. The raw weather data from the Automated Weather Stations,the first-hand grassroots observations shared via the DMS Himalaya App, and government data can be reviewed and cross-referenced in real-time, ensuring that the threats are sufficiently validated and minimising false warnings.

CREATING COMMUNITIES OF PRACTICE

A total of 1955 youth Disaster Response Team (DRT) members have been trained by Pragya across the 12 districts in the Western, Central and Eastern Himalayas on the DMS-Himalaya model, the roles and responsibilities of the DRTs and Hazards Risk Vulnerability Capacity Assessment (HRVCA) process. Of these, 223 Disaster Response Team leaders received intensive training. The youth were also trained periodically in Early Warning, First Aid and Search & Rescue domains in collaboration with key institutions like the National Institute of Disaster Management (NIDM) and State Disaster response Force. The DRTs were equipped with kits that include search and rescue components, and personal protection components. 4437 youth and community members, elected representatives, elderly, women, PwDs, frontline health workers, and teachers were involved in HRVCA mapping in 160 village clusters in the 8 districts. The maps were then verified by local officials, digitised and printed. The 1349 HRVCA maps were displayed in prominent locations of the villages and community members were oriented by the DRTs on their usage and interpretation.

The youth DRTs have started generating **Go-Risk** alerts through the DMS Himalaya app. Regular monitoring of weather parameters is done with the help of the weather stations installed in each cluster. The DRTs also monitor the identified landslide risk sites, water level of rivers, bank erosion, etc using the related Observation tools and report these using the app. They also act swiftly to alert the communities and explain the Dos and Don'ts related to a specific hazard. In the event of a disaster occurrence, the DRTs have effectively used the **RnR-Comm** tool in the DMS-Himalaya app to communicate about the disaster effects in their respective village/cluster for accessing immediate and effective response. The DRTs also acted as 'First Responders' during the disaster events, utilising the skills and kits acquired under the DMS-Himalaya initiative.

In the 8 Western and Eastern Himalayas districts where the DMS Himalaya model is being scaled up, a total of 535 network members, including 158 Points of Presence (PoPs), responders, and district government functionaries have been trained on their roles and linkages. 1621 DRTs from these 8 districts received training on different topics related to disaster management. Resource Directories were prepared by Pragya team for 8 new districts mapping availability, location and contact details of human resources (responders, frontline workers), equipment for search and rescue, relief material, temporary shelter, vehicles, helipads, storage facilities, etc. These are available in digital format for online and offline use.

To build the capacity of elected local bodies, Pragya conducted training for 2195 village councils, reaching 3715 council members across the 12 districts in collaboration with the National Institute of Disaster Management. In addition to this, training for Village Disaster Preparedness Committees was also carried out in these districts. Disaster Management Leadership Training Module for Women was designed and 5442 women were trained. A similar Disaster Management Leadership Training module was designed for children and delivered through local schools, reaching 1578 children. To build community awareness, Pragya team developed a range of audio-visual media content which was translated in local languages and disseminated by the local youth through small group meetings as well as WhatsApp messages. Multiple rounds of radio broadcasts on awareness of various hazards and dos and don'ts at the time of disasters were run in the target districts reaching over 13,00,000 community members and stakeholders. These were supplemented by village-level campaigns run by the local youth. The community members were thus made aware of different hazards, risk assessment, mitigation measures, and preparedness actions.

Local Disaster Management Support Units (LDMUs) were set up for continual coordination between communities and related DM agencies at local level as well as liason with expert resource institutions, responder agencies. Periodic meetings are conducted with District Disaster Management Officers (DDMOs), village councils and DRTs, to ensure the smooth functioning of the network. Meetings have been conducted with district officials in all

Image 11: Meeting with District Disaster Management Authority and other officials – Chamba, Himachal Pradesh

8 Local Disaster Management Units. A total of 84 officials participated in such meetings in 8 districts. These discussions seek to elicit issues and address them, including accessing and interpreting data to assist in preparedness, and providing relief in event of disasters based on needs identified through the DMS-Himalaya. Thus 12 Communities of Practice across 2115 villages in 240 clusters were made fully operational by Pragya across the three Himalayan zones. The Pragya team carried out Monitoring Evaluation and Learning (MEL) surveys with these Communities of Practice to generate evidence on the disaster management effectiveness of the DMS Himalaya model, the sense of security in the beneficiary communities and user conviction in the model.

Image 12: Community members engaged in resources and vulnerability mapping in Leh, Ladakh

Voices from the field

"The weather machines installed under the DMS Himalaya project help people to prepare before the disaster strikes as DRTs (Disaster Response Teams) can give them an early warning. We help to place hazard maps. In past, when a disaster struck, people were scared, restless and confused. But now, after placing the maps in the area, people are not tensed because they know where the safe places are."

Pooja Shah
- Disaster Response team, Langasu, Chamoli, Uttarakhand

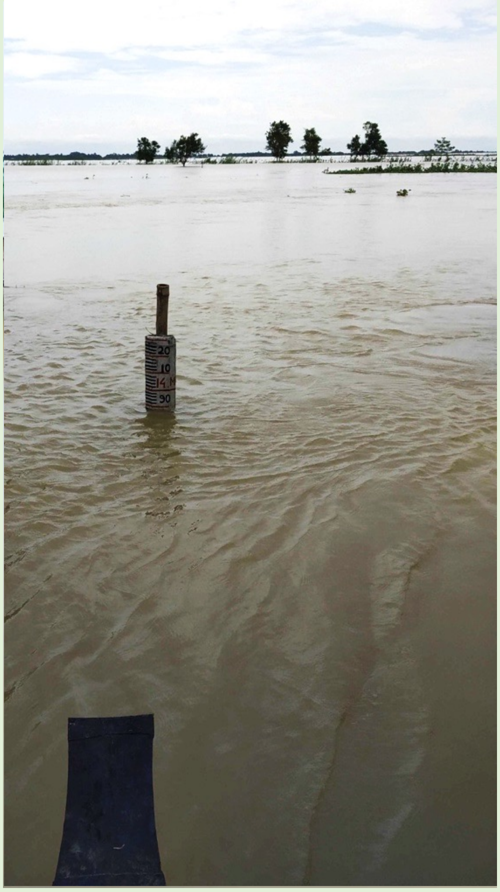
"In June 2022, intense rainfall in Lakhimpur resulted in flooding in 7 villages, with Badati Alimur village being the worst hit. After receiving the alert from DEOC (District Emergency Operation Centre), I informed the residents about early warning and the safe areas where they could seek shelter. I used my Search & Rescue kit to bring people to safe areas during the floods."

Nabakanta Das
- Disaster Response team, Kenduguri, Lakhimpur, Assam

Voices from the field

"In August 2022, we received severe weather alerts for our district. I alerted local residents and agricultural labourers who were staying in small tents near the Jhalma Nala (stream) to watch over their crops. I evacuated them to a safe area before the flood hit. Agricultural fields and some properties were damaged by this flood but not a single person was harmed."

Rohit Kumar
- Disaster Response team, Jhalma, Lahaul & Spiti, Himachal Pradesh



"In July 2022, heavy rainfall resulted in flooding along the Baira Siul river and affected Kamauta village and other surrounding areas. I guided the villagers to move to safe areas. With the help of the Search & Rescue Kit, I rescued 6 male members who were trapped by flood water. I also helped villagers rescue cattle and other assets."

Nand Lal
- Disaster Response team, Kamauta, Chamba, Himachal Pradesh

Voices from the field

"In 2021 in Boh Village of Shahpur sub-division, a landslide occurred and 15 people were trapped in the disaster. They tried to seek help from responder agencies. However, the NDRF helicopter was unable to take off due to rain. Also, the roads were blocked due to landslides. At that time a volunteer, who was trained in rescue work on collapsing structures, reached there and rescued 5 people until the NDRF and SDRF teams arrived. Pragya similarly trains volunteers in disaster management to strengthen the communities. They work on disaster management outreach in villages and panchayats."

Bhanu Sharma
- District Disaster Management Authority (DDMA), Kangra, Himachal Pradesh, India

"Pragya is doing a wonderful job in the capacity building of the local communities from villages. Pragya reaches the people whom we cannot reach. They have been working well on the early warning system for a long time."

Sonam Lotus
- Director, Indian Meteorological Department, Jammu & Kashmir, India

05

Lessons from Scale Journey

PROCESS

Evidence collected from the Journey to Scale phase will help in fine-tuning the model and sharing the learnings with stakeholders for the next phases. Monitoring Evaluation and Learning (MEL) for the DMS-Himalaya implementation during the scale-up phase has been a participatory process. The methodology for evidence collection was quasi-experimental, i.e. information collected from specific target groups (not randomised), for comparing post-implementation results against baseline surveys conducted with the same population. The baseline surveys elicited feedback from 2380 stakeholders including the youth Disaster Response Team members (DRTs), proximal Points of Presence (PoPs), first responders, government officials, women, children, the elderly, people with disabilities, frontline workers, and village councils. 1815 people from these categories participated in the end-term reviews.

Pragya staff introduced the purpose of data collection and obtained informed consent from respondents for recording the responses and profile details. The data collection was scheduled after prior intimation as per the convenience of the respondents based on their household work and livelihood-related commitments. For interviewing children, consent was obtained from the respondents as well as their guardians or caregivers and they were interviewed in presence of guardians or other responsible adults (e.g. school teachers), preferably at school or at home. For interviewing elderly persons and people with disability, interviews were held at a pre-agreed time and location in presence of caregivers as per the preference of the respondents.

The lessons learning process focused on three key parameters: (A) disaster management efficiency and effectiveness; (B) sense of security and (C) user conviction

A - Disaster management efficiency & effectiveness
Knowledge level of DRTs
Knowledge level of POPs, responders
Knowledge level of Communities
Status of DMS Himalaya operationalisation
Status of guided implementation for DMS-Himalaya
Level of interactions in the Communities of Practice
Usage of DMS Himalaya tools by DRTs
Usage of DMS Himalaya tools by POPs/responders/govt
Sense of security
Disaster management efficiency & effectiveness
B - Sense of security
Leadership capacity of Community Councils
Leadership capacity of Women
Leadership capacity of Children
Leadership capacity of Elderly
Leadership capacity of PWDs
Outreach of campaign on disaster management
Capacity level of youth DRTs
Level of disaster preparedness (PoPs, responders)
Level of disaster management related coordination
C- User conviction in DMS-Himalaya
Disaster awareness & preparedness in communities
Disaster awareness & preparedness in DRTs
Disaster awareness & preparedness in village councils
Agency and engagement in vulnerable groups
Feedback from POPs / responders / government

Image 13: Parameters used in evidence generation

in DMS-Himalaya. To understand the change in disaster management efficiency and effectiveness, the MEL survey tracked the level of knowledge related to disaster management in local youth (DRTs), network members (POPs, responders) and communities such as the evacuation routes, resources, danger zones and safe zones. The survey computed the preparedness training and drills attended by the beneficiaries and stakeholders and the retention of those learnings. It documented the status of operationalisation of DMS Himalaya data collection, relay and coordination processes, usage of the digital app and observational tools by the stakeholders, reported changes in feelings of security, efficiency in terms of receiving an early warning, the likelihood of suffering injuries, asset loss and loss of lives etc in case of a disaster. To measure the sense of security in the community and other stakeholders, the evaluation process looked into the change in leadership capacity related to disaster management in elected community council members, women, children, the elderly, and people with disability. It also assessed the ability of youth DRTs to extend support and advice to help communities in an emergency, outreach of awareness campaigns and the level of coordination and solidarity among the local actors working in disaster management. To gauge user conviction in the model, the survey focused on changes in the awareness and preparedness level of the participating communities, youth DRTs, and village councils in disaster management, their agency and engagement, and the confidence of the network members in the reliability and efficiency of the network.

FINDINGS

The findings show that a total of 7470 people were reported to have received an early warning, evacuation or post-disaster

The DMS-Himalaya Journey to Scale phase supported **early warning and response** during **466 disaster events.**
Awareness and capacity building activities reached **13,00,000 people** in 2195 villages and training **1,955 youth,** 3175 535 responders and village council representatives.

Evidence from DMS Himalaya Journey to Scale Phase (2021-2022) shows:

- Improvement of **23.8 weighted-percentage** in disaster management efficiency and effectiveness
- **30.4 weighted-percentage** enhancement in sense of security
- Increase in user conviction in DMS Himalaya by **32.6 weighted-percentage**

rescue and relief support during micro-level disasters that occurred in their villages due to the DMS-Himalaya being operational. Data from the DMS Himalaya web portal which collates data from the DMS Himalaya app shows that over the course of two years of implementation, the DMS-Himalaya has helped the DRTs raise 466 alerts for various extreme weather events. This includes 146 alerts in the Western Himalayas (for avalanches, flood/cloudburst, landslides, etc); 281 alerts in the Central Himalayas (for flood/cloudburst, landslides etc); and 39 alerts in the eastern Himalayas (for food/cloudbursts). In 39 cases, DRTs were reported to have saved people or their assets through direct intervention in the form of helping people evacuate or move to safe zones, rescuing people who were trapped or stranded, etc.

The Monitoring Evaluation and Learning survey recorded 23.8 weighted percentage improvement in Disaster Management Efficiency and Effectiveness. Western and Eastern Himalayas showed a wider margin

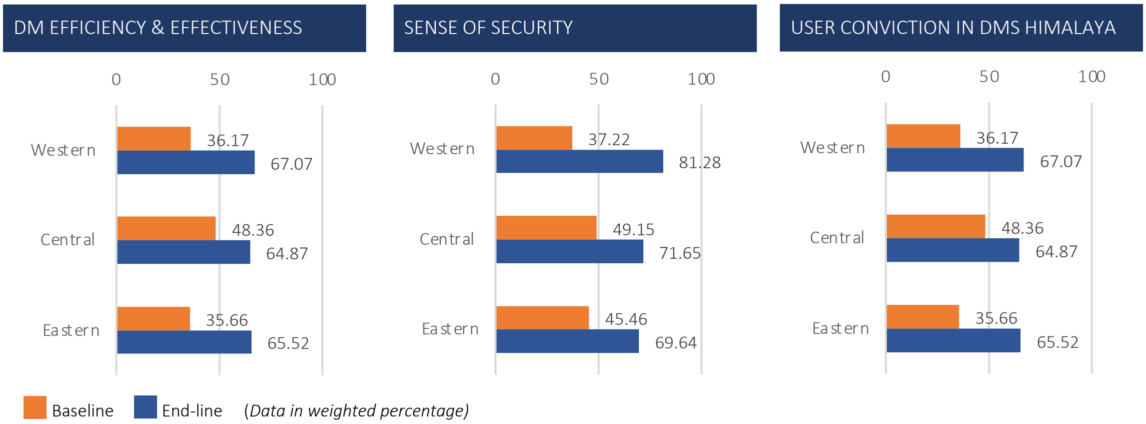


Image 14: Change in disaster management efficiency & effectiveness, sense of security and user conviction

improvement in this aspect (30.89 and 29.86 weighted percentage increase between baseline and end-line surveys respectively) compared to Central Himalayas (16.51 weighted percentage increase) where the baseline capacities were higher to start with as a result of the 4-year-long pilot phase. The comparison between baseline and end-line data brought out that the knowledge of youth DRTs regarding disaster management was enhanced by 20.5 percentage points, the knowledge of network members (POs and responders) improved by 5.1 percentage points, while the knowledge of community members showed a marked increase of 42.73 percentage points.

The MEL survey findings show that the Sense of Security among the communities affected by crises, including vulnerable groups, has increased by nearly 30.4 weighted percentage as a result of the implementation of the DMS-Himalaya, compared to the baseline figures. The rate of increase was the highest in the Western Himalayas (44.1 weighted percentage). This is attributed to the availability of: trained youth DRTs in every village with communication linkages to PoPs and district administration; access to village-level HRVCA maps delineating safe and danger zones; preparedness and training for leadership in disaster management for communities, particularly village councils and vulnerable groups; the awareness of automated weather stations and the DMS Himalaya app and monitoring tools for micro-level hazard monitoring and communication. The leadership capacity of elected village council leaders in disaster management increased by 47.1 percentage points, which would help in sustaining the momentum of disaster preparedness at the grassroots level. This has given the communities freedom from an earlier feeling of helplessness and fatalism against disasters, and a sense of confidence in the availability of immediate alerts and support in the event of disasters, as well as much enhanced knowledge of the ways to mitigate risks and protect themselves and their assets from harm during disasters.

The User Conviction in DMS Himalaya improved by 32.62 weighted percentage during the scaling phase. At the end of the scaling phase, user conviction levels remain high across all 3 Himalayan zones (82.7 weighed percentage in Western Himalayas; 85.5 weighed percentage in Central Himalayas; 88.5 weighed percentage in Eastern Himalayas). One of the major contributory factors was the improvement in disaster management awareness and preparedness in the participating communities, which showed a remarkable improvement of 65.3 percentage points. Agency and engagement in vulnerable groups (women, children, the elderly, and people with disabilities) also increased by 33.1 percentage points. These enhancements in awareness and capacity along with the positive experience of the network members (POPs and responder) agencies help shape the level of conviction.

REFLECTIONS

The implementing teams in Pragya identified the pandemic and associated challenges as one of the key hurdles that they had to overcome at the scaling stage. The pandemic disrupted physical outreach to communities for hands-on training on search & rescue, first-aid etc, HRVCA mapping and display of maps, reaching participation of marginalised groups within the community i.e. women, PwDs, elderly, and others who have limited ICT access. The preoccupation of government officials and frontline workers with pandemic control also delayed initial meetings. The team also struggled with delays related to formal permissions in one of the target districts, due to changes in government and conflict.

Pragya team members reflected that the partners (government, responders, community) identified are critical for the success of the adoption and scaling DMS Himalaya, and the value they bring to the project must be recognised by every member of the organisation, to ensure due regard to all partners by all organisational members. The strategic value of each partner was identified prior to the project initiation, and as particular new partners were identified, and this was disseminated to those involved in the project, which helped to ensure alignment of all to the associated requirements. The team was quick to spot the enthusiastic early adopters and key users and worked with them as early allies and leveraged those relations for getting others on board. It also identified key influencers and credibility builders (e.g. for scientific instruments, and capacity building) and engaged with them to strengthen the delivery of DMS Himalaya. The Pragya team recognised that the partners and network members need to have an in-depth orientation to the DMS Himalaya innovation, its expected benefits, prior evidence, the scaling process being followed as well as their prospective role in it. This enables them to perceive the value of the innovation and the contribution that they could make towards the functioning of the DMS Himalaya model. It emerged that their perceptions and contributions often went beyond those conceived by the project team. The team also highlighted the need to nurture all relationships along the DMS Himalaya network with regular interactions, feedback, etc.

KEY TAKEAWAYS

3 key changes are brought about by the DMS-Himalaya model:

1: A change in participants and attitudes: Creating and capacitating the disaster management Network:

DMS-Himalaya is rooted in the principle of collaborative risk governance and disaster response, and all-around participation among government, responders and communities in disaster management. To effect this change, the model works with the existing disaster management architecture to break down the attitudinal barriers to participation, creates supportive structures and processes for collaboration, and also provides intensive training to all stakeholders. This includes local youth trained as Disaster Response Team members (DRTs) and linked with the District Disaster Management Authorities; village councils trained in leadership for community-based disaster risk reduction; proximal Communication Points or Points of Presence (PoPs) identified for relaying disaster and relief information. Thus, it creates multi-stakeholder local disaster management networks geared for

Image 15: Meeting with DMS Himalaya Network members in Kangra, Himachal Pradesh

collaboration and coordination.

2: A change to a proactive approach: Focusing attention on all aspects of disaster management, including pre-disaster risk-reduction

As a first step, DMS Himalaya focuses on participatory Hazard Vulnerability assessments, and village-level disaster management plans based on these. Automated weather stations are set up in areas with observational data gaps, and data generated by these flows to the governments and through the trained DRTs to communities. The regular Network meetings bring together all stakeholders to discuss mitigation and preparedness needs and to take required action.
Processes for early warning communications are delineated, shelter sites are identified & marked, and evacuation routes are defined. These help improve the risk reduction efforts.

3: Emphasising disaster information and communication: Retrofitting structured tools for documentation and communication

The DMS-Himalaya app helps to document and relay information on environmental parameters, and in turn, helps the mainstream disaster management structures to identify and relay timely alerts on micro-level hazards. It also aids in the assessment of relief needs and communicating these to responders, thus enabling timely and coordinated emergency response to the affected areas.

06

Next Steps

For the Journey to Scale phase (2021-2022), Pragya aimed to achieve a *Range-wide spread*, making DMS-Himalaya operational in 12 districts across 3 Himalayan zones (Central, Western, Eastern). Upon successful completion of this phase, as part of the next stage (2022-2030), Pragya planned to achieve *Critical Mass* and implement the model *Beyond the Borders* in 2 new Hindu Kush Himalayan countries through partnerships with local CSOs and technical support to local authorities. The next phase (2031-2035) aimed for *Embedding in the Himalayas* with dissemination to 8 Hindu Kush Himalayan countries.

However, we are happy to note that the scaling of the DMS Himalaya model has already progressed over the past years in two different ways. Pragya team has already built networks and started piloting the innovation in the neighbouring Himalayan country of Nepal. The team has also started implementing the model across coastal Bangladesh and India which is another hotspot for climate change-induced disasters. Thus, Pragya is making suitable adaptations to make the innovation to be effective in different ecosystems, namely the coastal and delta regions. The adapted model is named) DRRIS (Disaster Risk Reduction Information System for the last mile).

Pragya is also exploring changes in its approach to resourcing and scaling.

- Leveraging development grants for Participatory Climate Action: Following the initial development stage of the innovation, Pragya accessed innovation or humanitarian grant funding, for maturing and implementing the innovation. To implement at scale, the team has moved to a hybrid model, sourcing support from multiple sources, and piggybacking the humanitarian innovation on environmental or climate change initiatives. Thus, it is being scaled as part of Pragya's ongoing Participatory Climate Action Initiative which adopts a three-pronged approach comprising Community-based Disaster Risk management (CBDRM), Climate Smart Agriculture and Nature-based Solutions.
- Implementing through extended partnerships and alliances: As we move to different geographies, Pragya is working through other carefully selected local humanitarian/ development NGOs embedded in those specific geographies, building their capacity, providing them technical support and handholding them as they take the lead in the guided implementation of the model. Pragya is also forming multi-actor alliances in these new geographies comprising development or environmental donors and partners, country-level disaster management institutions, and grassroots NGOs in vulnerable areas to scale up the innovation.
- Package of Practices and Consultative Role for Newer Ecosystems: Pragya is developing its set of tools into a Package of Practices for disaster risk reduction in last-mile communities and developing variations to suit diverse ecosystems and mainstream response structures. The team may adopt the role of Consultants, building capacity in networks of practitioners, who see in DRRIS the value of safety for the last mile.

iii

Acronyms

- ADPC - Asian Disaster Preparedness Center
- AWS –Automated Weather Stations
- CBDRM - Community-based Disaster Risk Management
- CSOs – Civil Society Organisations
- DDMO - District Disaster Management Officers
- DEOC - District Emergency Operation Centre
- DMS – Disaster Management System
- DRR – Disaster risk Reduction
- DRRIS - Disaster Risk Reduction Information System for the last mile
- DRT – Disaster Response Team
- GLOF - Glacial Lake Outburst Floods
- GNDR - Global Network of Civil Society Organisations for Disaster Reduction
- HIF - Humanitarian Innovation Fund
- HRVCA - Hazards Risk Vulnerability and Capacity Assessment
- ICT - Information and Communications Technology
- IMD - Indian Meteorological Department
- LDMUs - Local Disaster Management Units
- MEL - Monitoring Evaluation and Learning
- NDMA - National Disaster Management Authority
- NGO – Non-governmental Organisation
- NIDM - National Institute of Disaster Management
- PoPs – Points of Presence
- PwDs – People with Disabilities
- UNISDR - United Nations Office for Disaster Risk Reduction
- UT – Union Territory

Pragya works towards the Sustainable Development Goals

PRAGYA

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