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BUILDING RESILIENCE: STORIES OF REGIONAL INTEGRATION FOR DISASTER RISK MANAGEMENT IN SOUTH ASIA

EMPOWERING COUNTRIES AND COMMUNITIES, ENHANCING PREPAREDNESS

The European Union - South Asia Capacity Building for Disaster Risk Management Program

Results and Achievements



Funded by
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LIST OF ACRONYMS

ADSS	Agromet Decision Support System
AWOS	Automatic Weather Observation Systems
CDRI	Coalition for Disaster Resilient Infrastructure
DRM	Disaster Risk Management
EU	European Union
EU-SAR Program	European Union South Asia Capacity Building for Disaster Risk Management DRM Program
FForum	Forecaster's Forum
GFDRR	Global Facility for Disaster Reduction and Recovery
ICAP	India Cooling Action Plan
NCHM	The National Center for Hydrology and Meteorology
NDRRMA	National Disaster Risk Reduction and Management Authority
NMHS	National Meteorological and Hydrological Services
RIMES	Regional Integrated Multi-Hazard Early Warning System for Africa and Asia
SAHF	South Asia Hydromet Forum
SAHF-KH	SAHF Knowledge Hub
SAR	South Asia Region
WB	World Bank

BACKGROUND

South Asia, a region of immense cultural and geographical diversity and economic vitality, is also confronted with significant disaster risk management (DRM) challenges. The most densely populated region in the world, it is particularly vulnerable to climate change-related hazards such as floods, landslides, and tropical cyclones – threats which transcend borders and wreak havoc on communities, infrastructure, and economies. Rapid urbanization, environmental degradation, population growth, and socio-economic disparities further compound these challenges, emphasizing the need for urgent, coordinated action. Over 750 million people have been impacted in the last two decades alone. Regional collaboration is seen as crucial not only for overcoming these obstacles, but also for maximizing South Asia's potential to excel in providing

quality services and mitigating climate-related threats, ultimately strengthening communities' resilience to withstand future shocks.

Launched in 2015, the European Union-South Asia Capacity Building for Disaster Risk Management Program (EU-SAR DRM Program) supported countries and institutions to improve preparedness, contingency planning, and service delivery to mitigate the impacts of disasters. By enhancing the capacity of organizations operating at national, sub-national, and regional levels tasked with disaster preparedness, response, and early warning, the Program actively supported the implementation of the South Asia Regional Integration Strategy. This strategic framework underscores the critical importance of enhancing hydro-meteorological

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River erosion in Bangladesh due to heavy rain. © MD MARUF HASSAN

services, disaster preparedness, and climate resilience as pivotal components to facilitate regional integration. The program's multi-year work program of activities focused on:

1. DRM Institutional Capacity Development: to improve preparedness and service delivery by addressing capacity gaps at various levels by providing technical assistance to enhance contingency planning and integrate DRM into broader policy frameworks.
2. Hydrometeorological Institutional Capacity Development: to strengthen weather forecasting and collaboration among regional meteorological agencies on hydrometeorology, DRM, and climate services.

The Program effectively implemented 16 grants, each contributing significantly to the overarching goal of enhancing resilience in the region. The achievements

stemming from these grants are numerous and diverse, reflecting the multifaceted nature of DRM. This booklet offers a selection of activities to showcase the program's breadth and impact. From regional knowledge sharing and institutional capacity building in hydromet and climate services to national applications of landslide risk screening using remote sensing, these actions highlight the significant progress made in strengthening the resilience of South Asian nations and communities to weather- and climate-related disasters and underscore the impact of collaborative efforts in DRM.

The EUR 10 million Program was funded by the European Union and managed by the Global Facility for Disaster Reduction and Recovery (GFDRR), while activities were implemented by the World Bank South Asia Disaster Risk Management and Climate Change Unit. The Program closed in September 2023.

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Enhancing Capacity of Regional Disaster Risk Management and Hydromet Institutions and Last-Mile Connectivity

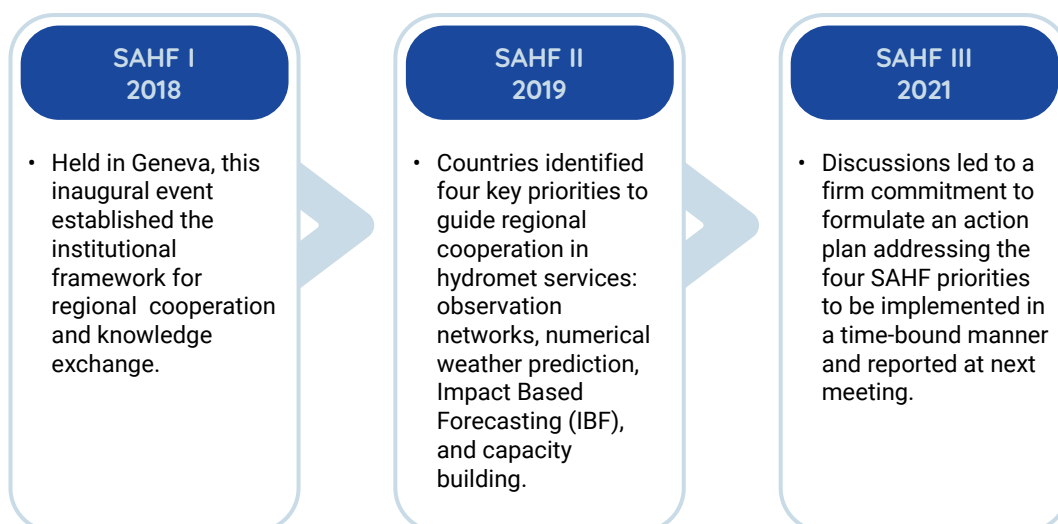
Recognizing the need for a regional platform for South Asian countries to address and coordinate efforts on hydromet and climate services, as well as to underscore their shared challenges and potential for collaborative solutions, the World Bank, in partnership with the World Meteorological Organization and with the critical support of the European Union, organized the South Asia Hydromet Forum (SAHF) in 2018. Envisioned as the first

in a series of consultations, this milestone event marked the beginning of a concerted effort to bring together stakeholders from governments, academic institutions, the private sector, and international organizations. SAHF emerged as a crucial platform for fostering dialogue, sharing knowledge, and forging partnerships aimed at enhancing meteorological and hydrological services across the region.

To anchor SAHF institutionally, the SAHF Executive Council (EC) was formed in 2019, comprising heads of National Meteorological and Hydrological Services (NMHSs) from eight South Asia countries. The EC leads decision-making and strategic planning, while technical working groups, representing all member countries, focus on the four regional priority areas: observation networks, weather prediction, impact-based forecasting, and capacity enhancement. The Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) serves as the Secretariat and provides technical input to SAHF.

SAHF's primary objective is to convene weather service providers and user sectors to enhance effectiveness and maximize impact. Alongside establishing essential institutional and governance frameworks, significant

efforts have been dedicated to building technological infrastructure and promoting coordination among participating countries.

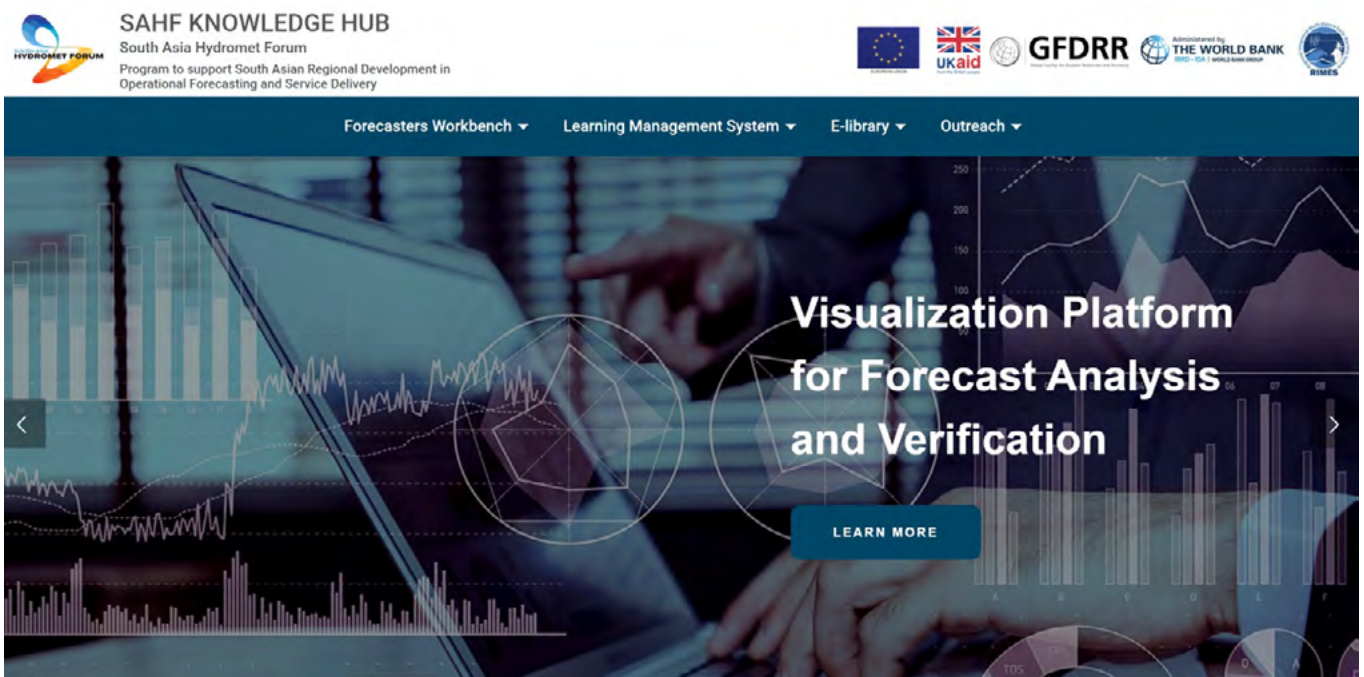


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SAHF has also conducted regional assessments through working papers to assess the regional hydromet supply chain and define strategic approaches to meet present and future needs. The Forecasters’ Forum (FForum) holds weekly meetings to discuss complex weather situations and share information among operational weather forecasters. Joint learning visits (JLVs) brought together government agencies and academic institutions to exchange knowledge on topics including agromet, coastal, and urban resilience and disaster risk management. Moreover, SAHF organized online and in-person training programs on Impact-Based Forecasting for Disaster Risk Reduction (DRR), agriculture and other sectors, benefiting 125 staff, including 63 women from

national hydromet organizations and user agencies across South Asia.

Another key offering launched in September 2022, the [SAHF Knowledge Hub](#) (SAHF-KH) serves as a centralized platform to facilitate sharing of real-time meteorological data from nearly 3,000 global and regional weather stations through the Data Exchange Platform (DataEx), and for accessing a range of resources such as training webinars, working papers, and conference proceedings. Additionally, it offers access to socio-economic data and facilitates intra-regional communication. The SAHF-KH is regularly updated based on user feedback.



KEY FINDING

Synergy between national and regional interventions. Regional collaboration offers a complementary approach to national-level interventions and enhances the sustainability of investments in hydromet services across South Asian countries. Joint learning visits and information sharing among participating nations amplify the overall impact of interventions, while aligning support for national projects with regional goals increases the potential for positive spillover effects throughout the region.

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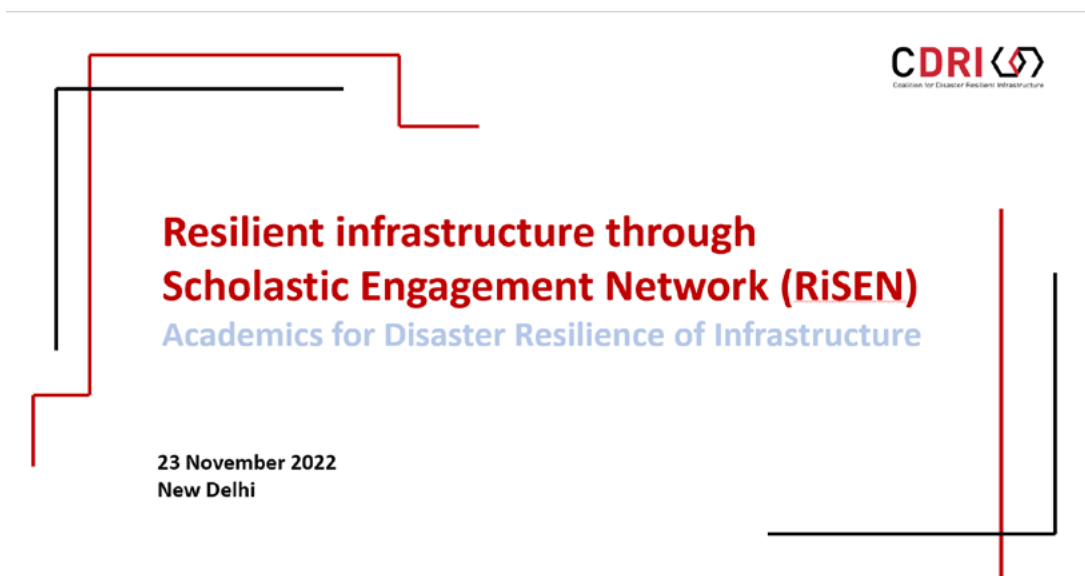
Supporting the Operationalization of the Coalition for Disaster Resilient Infrastructure (CDRI) in India

The Program provided crucial support to the Coalition for Disaster Resilient Infrastructure (CDRI) during its operationalization phase. CDRI, led by India, serves as a global partnership for bolstering resilient infrastructure systems, with members comprising national governments, UN agencies, multilateral banks, the private sector, and academia.

The Program supported CDRI and member countries' governments in defining their mandate for resilient infrastructure. Collaborative efforts with the government of India focused on providing technical assistance, including developing guidelines, by-laws, and concept notes to inform CDRI's agenda-setting, establishing institutional arrangements, and fostering partnerships, particularly with international financial

institutions (IFIs) to support strategic priorities such as India's National Infrastructure Pipeline and enhance technical capabilities in urban and transport resilience. Additionally, the team developed a strategy paper for an urban resilience program.

The World Bank engaged various task teams to bolster infrastructure resilience across sectors, including DRM, transport, urban, and more recently health and education, through improved design, operation, and maintenance practices. As an example, activities supported CDRI with preparing a blueprint for a network of universities and associated stakeholders from academic institutions, developing a plan of action (Approach and Work Plan for RiSEN - Resilient Infrastructure through Scholastic Engagement Network).



Support for CDRI via this project facilitated their conduct of national risk and resilience assessments in the region, along with initiatives in risk financing and resilient recovery, while also guiding the execution of the 2019-2023 work plan. The findings of these studies are important for member countries, shaping planning,

functioning and maintenance of infrastructure assets, including by updating building codes and standards to reflect increasing climate hazards. The project also assisted CDRI in preparing its second work plan for the period 2023-2026 through consultations and workshops aimed at updating objectives to reflect climate change

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considerations and recent initiatives, particularly those showcased at COP26 and COP27.

Additional efforts under this project facilitated a partnership between CDRI and key government bodies such as India’s Department of Economic Affairs and the Ministry of Finance, leading discussions on adopting voluntary resilience standards and modifying

concessionaire agreements under the National Infrastructure Pipeline. In response to requests from the Department of Economic Affairs, CDRI has delivered outputs including reviewing Model Concession Agreements for Public Private Partnership projects in priority sectors and developing “G20 Principles for building livable, sustainable, and resilient cities of the future”, aligning with India’s G20 Presidency.

The EU-SAR DRM Program was an active participant in the International Conference on Disaster Resilient Infrastructure (ICDRI) held in 2021, amidst the pandemic’s challenges that have significantly affected infrastructure sectors. ICDRI 2021 sought to redefine the concept of resilient infrastructure within the framework of the Sustainable Development Goals and the Sendai Framework for Disaster Risk Reduction, considering the current global circumstances. The Program’s involvement had 85 participants and established 10 new contacts in the DRM space, furthering its impact and outreach in the field.



Additionally, activities funded by the Program included capacity building within the CDRI Secretariat and support for events like the 2022 International Workshop on Disaster Resilient Infrastructure (IWDRI). Overall, the activities significantly contributed to driving critical

actions of CDRI, strengthening institutional resilience, supporting planned and ad hoc activities, and facilitating collaboration with key stakeholders towards building disaster-resilient infrastructure.

KEY FINDING

Fostering stakeholder dialogue and collaboration with research institutions, developing an active marketplace and prioritizing financing solution is essential. Leveraging the expertise of multilateral development banks (MDBs) in program implementation and creating safe, resilient assets across various infrastructure groups should be considered.

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India: Sub-National Action on Climate Change and Support to the Cooling Action Plan

India is grappling with increasingly frequent and intense heat waves, endangering the lives and livelihoods of millions. Recent events, such as the severe heat wave in April 2022, underscore the need for urgent action and the growing concern that India could become one of the first places globally to experience heat waves surpassing human survivability limits. As temperatures climb, the demand for cooling solutions rises, but many, especially the poor and marginalized, lack access to affordable options. This vulnerability to extreme heat contributes to hundreds of thousands of excess fatalities annually and jeopardizes economic productivity especially for those engaged in heat-exposed labor, potentially impacting India's GDP by up to 4.5 percent by the end of the decade.

Additionally, inadequate refrigeration infrastructure challenges India's ability to maintain a reliable cold chain network for food and pharmaceutical transport. Addressing these challenges presents opportunities for post-COVID recovery, including investment promotion, job creation, emissions reduction, and supply chain security.¹ Transitioning to energy-efficient, climate-resilient cooling solutions is vital for sustainable growth, health, security, and productivity in India.

Novel financing tools like cooling bonds and carbon markets are introduced to support sustainable cold chain initiatives.

The EU-SAR Program collaborated with a range of stakeholders and partnered with IORA – Ecological Solutions to craft an actionable roadmap for India, specifically targeting environmental challenges highlighted in the India Cooling Action Plan (ICAP). This involved analyzing existing policies, identifying weaknesses, and prioritizing actions to reduce cooling demand and enhance sustainability. In December 2022, the “Climate Investment Opportunities in India's Cooling Sector” report was launched, supported by the EU-SAR Program, marking a groundbreaking initiative to drive climate action across South Asia.

The report outlines critical investment areas to mitigate heat stress, reduce greenhouse gas emissions, and position India as a leader in green cooling manufacturing. Strategies presented in the report have the potential to cut 300 million tons of CO₂ yearly by 2040 and generate 3.7 million jobs, highlighting a significant market potential of \$1.6 trillion in the cooling sector by 2040.



¹ World Bank. *Climate Investment Opportunities in India's Cooling Sector (English)*. Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/099920011222212474/P15743300f4cc10380b9f6051f8e7ed1147>

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“The report identifies what are the key investment areas, what are the key policy areas, the institutional shifts that would be required. That could have a huge impact on India’s energy footprint and thereby carbon emissions in the long run.”

**Mehul Jain, Climate Change Specialist,
World Bank²**

The report has spurred engagement in India, leading to discussions with the government to accelerate the cooling agenda. The report’s impact extends globally, with interest from various stakeholders and its presentation at events like MOP34 and COP27. Additionally, the initiative has prompted regional and national strategy developments in South Asia, with plans to enhance cooling action plans in neighboring countries like Bangladesh, Sri Lanka, and Pakistan. Efforts are underway to establish a regional platform for knowledge exchange and collaboration among stakeholders.



Female electrician checking power. © Preeti M

KEY FINDING

Institutions such as the World bank have the capacity to leverage creative financing strategies, including partial risk guarantees, equity financing, and mezzanine financing, to maximize the impact of cooling solutions. Moreover, well-crafted public policies can create a market atmosphere where limited public funds stimulate private investment.

² <https://www.youtube.com/watch?v=oxtnTV1H7dl>

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Building Resilience to Landslide and Geo-Hazard Risk in the South Asia Region

The Building Resilience to Landslide and Geo-Hazard Risk in the South Asia Region project aimed to address the increased threat to lives and livelihoods in mountainous areas of South Asia due to climate change and inadequate rural infrastructure planning. The project focused on the vulnerability of mountains to environmental hazards like floods, landslides, and avalanches, exacerbated by factors such as earthquakes and glacier melting. The Hindu Kush Himalayan mountains, spanning Afghanistan, Bangladesh, Bhutan, India, Nepal, and Pakistan, play a crucial role in the region, with 10 major river systems supporting over 1.4 billion people. Unsustainable land use practices, including historical clearance for tea plantations, have led to soil erosion, heightening landslide risks. Many mountain communities in South Asia rely on poorly maintained roads for connectivity, often leading to isolation during disasters, particularly in areas prone to seasonal heavy rainfall that renders roads inaccessible. A significant challenge lies in the fragmented approach to infrastructure planning, with various departments handling transport infrastructure, public buildings, and river management independently. This disjointed approach frequently leads to infrastructure development without adequate consideration of geo-hazard risks, resulting in constructions in hazardous zones lacking mitigation measures against floods and landslides.

To address these challenges, the project facilitated collaboration among stakeholders to comprehensively assess geo-hazard risks and formulate integrated master plans for rural infrastructure. By considering the entire landscape and potential risks such as glacial lake outburst floods, flash floods, and river erosion, the project aimed to bolster mountain communities' resilience against climate change and natural calamities.

The project produced a range of innovative tools and resources, notably the [Road Geo-Hazard Risk Management Handbook](#) and accompanying [e-learning course](#), and a comprehensive report on [Landslide Risk Screening using Remote Sensing in South Asia](#), which provided crucial insights into identifying and mitigating landslide risks. In Pakistan's Chitral District, studies on multiple geohazards identified vulnerabilities and reduced risks from climate and earthquakes. In Bhutan, an online mapping system was developed for road geohazard risks, aiding real-time updates and maintenance capacity. Activities supported various initiatives, including drone and satellite surveys in Nepal, field validation in Pakistan, and training in Bhutan.

The Road Geo-Hazard Risk Management Handbook provides guidance on effectively managing the risks associated with geohazards on roads and their impact on road users and nearby communities. It emphasizes the following key points: awareness of geohazard risks throughout the road infrastructure lifecycle; proactive measures to avoid risks, such as proper alignment of new roads or realignment of existing roads to minimize construction and maintenance costs, as well as losses from geohazard-related disruptions to traffic road user safety though preparedness measures, including early warning systems, precautionary road closures, and ensuring access to emergency services and evacuation routes; and rapid recovery and sustainable reconstruction efforts following geohazard events.³

Developed in collaboration with GFDRR, the "Road Geo-Hazard Risk Management E-Learning" course on geohazard risk management for the transport sector was made available on the Open Learning Campus (OLC) platform as a response to challenges posed by COVID-19 restrictions, which limited in-person training opportunities. The course covers various aspects

³ Global Facility for Disaster Reduction and Recovery, 2020. "Road Geohazard Risk Management Handbook," World Bank Publications - Reports 34677, The World Bank Group. <https://www.gfdr.org/sites/default/files/publication/road-geohazard-risk-management-handbook.pdf>

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including institutional capacity, coordination, systems planning, engineering and design, operations and maintenance, and contingency planning. Additionally, the module includes five case studies to provide users

with practical examples and enhance their learning experience. To date, 99 participants have completed the training, and 385 participants are currently registered.



Another innovative resource, this one targeting landslides, is the Landslide Risk Screening Using Remote Sensing in South Asia report which serves as a critical reference point for hazard planning agencies and policymakers seeking to mitigate the risks associated with landslides.

Recent advancements, such as Satellite-based interferometric synthetic aperture radar (InSAR), offer promising tools for hazard assessment. InSAR enables precise measurement of ground displacement at a millimeter scale and provides time series data through advanced image stacking techniques. Synthetic aperture radar data is especially valuable when on-site measurements are hindered by cost or accessibility challenges.⁴

⁴ Takamatsu, Masatsugu; Oommen, Thomas. *Landslide Risk Screening Using Remote Sensing South Asia (English)*. Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/099042623104033330/P160578188c0d50c12b2614c0b18ce217826d482febe>



Landslide on a highway in Yellapur, Karnataka, India. © Anwar Attar

The report leverages the outcomes of employing the InSAR method in landslide-prone areas of India, Bhutan, and Nepal. Through this study, landslide hazards across various sites are characterized and ranked using displacement and velocity data obtained from InSAR analysis. Using SAR satellite data in conjunction with land displacement analysis emphasizes two main points: the effectiveness of SAR technology for DRM and the need to integrate it into existing protocols.⁵

The report evaluates the vulnerability of populations and roads, considering them as proxies for exposure, and ranks them accordingly for each site. By integrating hazard and exposure rankings, the report produces a comprehensive risk assessment for each study area. This facilitates the prioritization of areas requiring intervention or mitigation efforts. The report ensures transparency by detailing the methodologies used for ranking, including the assignment of weights to each category. This transparency enables users to tailor the criteria and adjust weighting values according to their specific needs and preferences, enhancing the relevance and applicability of the findings to diverse contexts. Through these comprehensive insights and customizable approaches, stakeholders can effectively address landslide risks and enhance the resilience of communities and infrastructure in landslide-prone regions.⁶

Melamchi Post Flood Risk Assessment and Planning Support

The practical application of these tools was demonstrated in the aftermath of a devastating flood in Melamchi, Nepal in June 2021, when severe flooding of the Melamchi River caused massive debris flow and caused at least 17 casualties and extensive infrastructure damage. Three simultaneous studies were conducted with the National Disaster Risk Reduction and Management Authority (NDRRMA). The risk screening and assessment conducted by the World Bank Task Team relied on drone surveys, flood modeling, satellite-based land displacement analysis, and field observations to ensure accurate damage and risk assessment for improved disaster response and planning. The flood modeling team utilized drone-derived topographic data to refine their models, while the satellite team integrated multimedia and field observations to enhance their analysis. Additionally, the World Bank and NDRRMA organized workshops to share study results with over 71 participants from various agencies and stakeholders. These activities were instrumental in comprehensively assessing hazards and risks in the Melamchi Watershed, with the drone survey providing timely documentation for model calibration, ensuring sustainable mitigation measures.⁷

⁵ Ibid.

⁶ <https://www.worldbank.org/en/news/feature/2023/07/26/drones-reaching-new-heights-in-nepals-fight-against-climate-change>

⁷ Takamatsu, Masatsugu; Karelia, Hemang D.; Oommen, Thomas; Dahal, Ranjan Kumar. *Melamchi Flood Disaster in Nepal: Damage and Risk Quantification with Drone Survey, Satellite-Based Land Displacement Analysis, and 2D Flood Modeling (English)*. Washington, D.C.: World Bank Group. <http://documents.worldbank.org/curated/en/099600006212237293/P16057809e269a0cf096ab044bc77400259>

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Public Disaster Authority

Melamchi Flood Disaster in Nepal

Damage and Risk Quantification with Drone Survey, Satellite-Based Land Displacement Analysis, and 2D Flood Modeling

Insights from the studies enabled stakeholders to successfully implement targeted strategies to tackle the immediate challenges presented by the flood while establishing a foundation for long-term resilience-building initiatives. These collaborative efforts empowered stakeholders with essential knowledge and resources to address geo-hazard risks and showcased the tangible benefits of proactive risk management in protecting vulnerable communities from the impacts of natural disasters.

“Working alongside the World Bank, the quick and focused data collection and analysis in an area that was primarily inaccessible and unstable allowed us to identify the houses that were damaged, prioritize resource allocation and understand residual flood and landslide risks. The other alternatives, such as using helicopters, would have been very expensive, and satellite imagery was beyond our capacity.”

Anil Pokhrel, Chief Executive of the NDRRMA

Ultimately, the swift support provided to NDRRMA through the studies proved instrumental in enhancing understanding of the disaster among government

agencies, partners, and stakeholders, laying the groundwork for effective risk mitigation planning within the Melamchi watershed.

KEY FINDING

Leveraging local expertise and insights is crucial for tailoring interventions to specific country contexts. The use of e-learning modules and online mapping systems enhances stakeholder engagement by providing accesible tools for visualizing and understanding risks, ultimately improving decision-making and participation in risk reduction efforts.

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Bhutan Hydromet Services and Disaster Resilience Regional Project

The Bhutan Hydromet Services and Disaster Resilience Regional project has been instrumental in transforming Bhutan's [meteorological and disaster resilience capabilities](#). Prior to implementation of the project, Bhutan's institutions faced significant challenges in providing reliable hydrometeorological information and forecasts. The National Center for Hydrology and Meteorology (NCHM), tasked with delivering such services, lacked the necessary technical, institutional, and infrastructural capacities to meet the needs of key economic sectors. Moreover, the Department of Disaster Management (DDM), responsible for coordinating disaster preparedness and response, struggled with coordination issues and insufficient capacity to handle severe weather events effectively. These shortcomings

highlighted the urgent need for interventions to strengthen Bhutan's capacity for weather forecasting and disaster management.

The project focused on enhancing various aspects of Bhutan's hydrometeorological services and disaster preparedness. One major initiative was the introduction of the SMART-Met system at NCHM, which revolutionized weather forecasting by providing a common operating platform for automated hydromet service delivery. Prior to implementing the SMART-Met system, forecasters had to navigate through separate screens displaying incoming data, which was a laborious process and compromised accuracy, especially when integrating different data layers. The SMART-Met



Karma Dupchu
Director, National Center for
Hydrology and Meteorology, Bhutan

“The project has not only built the capacity for flood forecasting but also the professional capacity of flood modeling centers and the design of the flood forecasting system.”

- Karma Dupchu, Director National Centre for Hydrology and Meteorology of Bhutan⁸

⁸ <https://www.youtube.com/watch?v=oxtnTV1H7dI>

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system streamlined data access and analysis, improved the accuracy and efficiency of daily weather forecasts, reducing preparation time from four hours to two hours. Such enhancements were crucial for providing timely and reliable weather information to support decision-making across sectors.

Another key area of improvement was aviation meteorology, where upgrades were made to the weather observation systems at major airports like Paro International Airport. The installation of advanced equipment such as Automatic Weather Observation Systems (AWOS) and ceilometers improved aviation safety by providing pilots with more accurate and timely weather information, especially critical given the airport's position in challenging mountain terrain. These upgrades not only improved flight operations but also laid the groundwork for strengthening aviation meteorology services under NCHM's mandate.

Furthermore, the project addressed the agricultural sector's resilience to climate variability through the development of the Agromet Decision Support System

(ADSS). This system, operated by the Department of Agriculture (DOA), utilizes weather forecasts to provide tailored agromet services to farming communities. Featuring a dedicated web portal and employing machine learning algorithms, the ADSS has empowered farmers with precise, location-specific crop advisories. By enabling informed decision-making amidst varying weather patterns, the project significantly enhances agricultural resilience. By improving coordination between NCHM and DOA and enhancing the dissemination of agromet advisories, the project has strengthened the agricultural sector's ability to cope with climate-related challenges.

Overall, the project played a pivotal role in strengthening Bhutan's institutional capacity for disaster preparedness and hydrometeorological services. By addressing critical infrastructure needs, enhancing forecasting capabilities, and fostering collaboration between key agencies, the project laid the foundation for a more resilient and responsive approach to climate and disaster risks in Bhutan.

KEY FINDING

A clear understanding of project outcomes, detailed terms of references, and regular consultations are important for smooth implementation. Understanding long-term visions of key agencies, ensuring value addition from the World Bank, and incorporating innovative technologies were also important for effective implementation.

OUTCOMES

The EU SAR DRM Program embarked on a journey in 2015 to support countries and institutions in enhancing their preparedness, contingency planning, and service delivery to mitigate the impacts of disasters. Through strategic interventions focusing on DRM, institutional and hydrometeorological capacity development, the Program worked to strengthen the resilience of South Asian nations and communities.

Regional collaboration emerged as a cornerstone, with initiatives like the South Asia Hydromet Forum and Knowledge Hub demonstrating the synergy between national and regional interventions. By fostering dialogue, sharing knowledge, and forging partnerships, these platforms have significantly advanced cooperation and coordination for hydromet and early warning services, amplifying the impact of interventions across borders. EU assistance has extended to supporting allied Bank investments in hydromet projects, demonstrating a comprehensive commitment to bolstering resilience and cooperation in South Asia.

In parallel, initiatives such as supporting the operationalization of the Coalition for Disaster Resilient Infrastructure (CDRI) in India underscored the importance of multi-stakeholder engagement and forward-thinking financing approaches to promote infrastructure resilience. Lessons learned emphasize the critical role of collaboration with research institutions and multilateral development banks, leveraging their respective expertise and highlighting opportunities to harness the unique strengths of different stakeholders for more effective outcomes.

Moreover, efforts to address climate-related challenges at the sub-national level in India, Bhutan, and Nepal underscored the potential of well-crafted public policies to drive climate action. By exploring creative financing mechanisms and integrating cutting-edge technologies such as remote sensing for assessing disaster risk

impacts and response planning, these initiatives showcased the transformative impact of strategic investments in disaster resilience.

Despite challenges posed by the COVID-19 pandemic, these projects persisted, underscoring the importance of a clear understanding of project priorities, detailed terms of references, and regular consultations for smooth implementation. E-learning modules and online mapping systems emerged as effective tools for engaging stakeholders, visualizing risk assessments, and maintaining project momentum.

The achievements explored in this publication offer just a selection of the impacts of the 16 grants implemented under the Program, each contributing significantly to the overarching goal of enhancing resilience in the region. The combined outcomes stemming from these grants are numerous and impressive, 80 disaster management agencies and other government entities were provided with targeted technical assistance and over 100 detail knowledge products. The data generated, skills gained, and lessons learned were embedded via training sessions throughout the Program that have contributed to the long-term realization of strengthened DRM capabilities and regional hydromet knowledge production and cooperation.

As South Asia navigates the complex terrain of DRM, these initiatives offer valuable insights and lessons for the road ahead. By continuing to prioritize regional collaboration, stakeholder engagement, and innovative financing, South Asia can build upon the achievements made to strengthen disaster resilience, safeguard communities, and promote sustainable development across the region. In the face of mounting climate-related threats, unity, innovation, and adaptability stand as powerful drivers to propel South Asia toward a safer, more resilient future.

European Union

The European Union (EU) is the leading donor of development aid and climate finance. The EU is at the forefront of the international agenda on climate resilience, supporting developing countries in preparing for, withstanding and recovering from disaster events. The EU is fully engaged in supporting the implementation of the Agenda 2030 and the Sustainable Development Goals, the Paris Agreement and the Sendai Framework for Disaster Risk Reduction.

For more information: www.europa.eu

World Bank

With 189 member countries, staff from more than 170 countries, and offices in over 130 locations, the World Bank Group is a unique global partnership: five institutions working for sustainable solutions that reduce poverty and build shared prosperity in developing countries.

The World Bank's Disaster Risk Financing and Insurance Program (DRFIP) helps countries ensure that their populations are financially protected in the event of a disaster. Through funding and expertise, DRFIP supports countries to develop and implement tailored financial protection strategies that increase the ability of national and local governments, homeowners, businesses, agricultural producers, and low-income populations to respond more quickly and resiliently to disasters.

For more information: www.worldbank.org

Global Facility for Disaster Reduction and Recovery

The Global Facility for Disaster Reduction and Recovery (GFDRR) is a global partnership that helps developing countries better understand and reduce their vulnerabilities to natural hazards and adapt to climate change. Working with over 400 local, national, regional, and international partners, GFDRR provides grant financing, technical assistance, training and knowledge sharing activities to mainstream disaster and climate risk management in national and regional policies, strategies, and investment plans. Managed by the World Bank, GFDRR is supported and directed by a Consultative Group that has 17 members and 14 observers.

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