RIMES

Regional Integrated Multi-Hazard Early Warning System

ANNUAL REPORT

2024

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Director General

This Annual Report captures RIMES' commitment to the operationalization of all the five distinct but interconnected pillars of the climate information/early warning information value chain – 1) Enhancing data availability and accessibility, 2) Modelling and Forecasting, 3) Transforming data into actionable information, 4) Tailor-Made Services for integrating information into user stakeholder institutions, and 5) Societal Outreach and feedback - in the Asia Pacific and Africa region.

RIMES's partnerships with global and regional/national centers of excellence enabled RIMES to leverage products from global/regional/national centers, customize these products to meet country-specific requirements, facilitate NMHS and user institution to   pilot-test forecast in user environments and refine and transfer them to national institutions for integration into operations.

In the last 15 years[1], RIMES incrementally built the **Regional Multi-hazard, Multi-scale, and Multi-purpose Early Warning Center and operationalized it in full scale in 2024**[2] via the World Bank-supported Climate Adaptation and Resilience (CARE) for South Asia Project. Thus, in 2024 RIMES demonstrated the functioning of Triple M and Triple Dividend System as detailed below.

Multi-hazard system ensures that early warnings that account for diverse and interconnected risks – from hydro-meteorological events like storms and floods to geo-hazards, such as earthquakes and tsunamis that could be scaled up to meet all potential threats such as biohazards etc.

Multi-scale system draws from and contribute to global, regional, and national systems through partnerships. Through these partnerships, it provides services across **different space and temporal scales** – from immediate/short-term alerts to monthly/seasonal outlooks, and long-term projections for national/sub-national/ local applications.

Multi-purpose system expands the scope of early warnings beyond

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1   From RIMES inception in 2009; leveraging predominantly India contributions and various project opportunities with support from UNESCAP, UNEP (GCF), USAID, FCDO/UKMET, and World Bank (through SAHF and CARE projects)
2   demonstrated through CARE's 3rd Regional Workshop from 24 to 27 February 2025.

disaster response, supporting broader and forward-looking societal and economic resilience. By generating tailored climate services, it empowers diverse sectors to undertake proactive decisions to:

· anticipate and manage extreme weather events (weather scale; Dividend 1)

· harness potential resource associated with favorable weather/climate resources (weather/sub-seasonal/seasonal climate scales; Dividend 2)

· design and implement risk-informed development planning (multi-seasonal/decadal scales; Dividend 3)

In 2024, RIMES, through its Triple M and Triple Dividend **Regional Early Warning Center**, demonstrates value in **Regional Cooperation** through:

1. Economies of Scale

Countries, particularly SIDS, LDCs, LLDCs, draw from/contribute to RIMES Regional Early Warning system to achieve economies of scale by sharing resources, expertise, tools, and infrastructure.

2. Access to Technologies

Draw outputs generated from RIMES Regional Early Warning Center to deliver specialized, value-added services such as impact-based forecasting at marginal additional costs.

3. Connectivity of All the Components of the Climate/Early Warning Information Value Chain

While scientific and technical investments in upstream components (e.g., observation and modeling) are critical, additional marginal investments facilitate integration of downstream components of transforming data into tailor-made climate services, to outreach actionable climate/early warning information to end user institutions/communities to fully reap benefits the from EWS.

4. Delivery of Common but Differentiated Services

Offer a portfolio of services tailored to the needs/requirements of countries at different stages of capacities and development.

5. Sustained Back Up Support

Provide sustained back up support to national systems in specialized domains such as data generation and analysis, software enhancements, refinements of models, integration of new technologies, human resources development (through peer-to-peer handholding etc.), per needs and demands.

6. Intergovernmental Mandate and Ownership

The RIMES Council, through its intergovernmental governance structure, ensures collaborative data and expertise sharing, and co-production and customization of services that are responsive to differential needs and demands of Member States.

With technical and financial support from the World Bank-supported CARE project, RIMES has developed its Institutional Development Plan (IDP) 2024 – 2030. This Strategic Plan aims to address gaps in RIMES' current administration and programmatic framework, aligning its structure and operations to meet international quality assurance standards and effectively respond to existing and emerging challenges.

The RIMES Annual Report 2024 elaborates the processes and outcomes, as above, through logically organized chapters.

I extend my sincere gratitude to RIMES Member and Collaborating States, partners, and stakeholders for their continued support. Together, RIMES built a Regional Muti-hazard, Multi-scale and Multi-purpose early warning/climate services delivery facility that offers common but differentiated services to cater to the needs and demands of its countries.
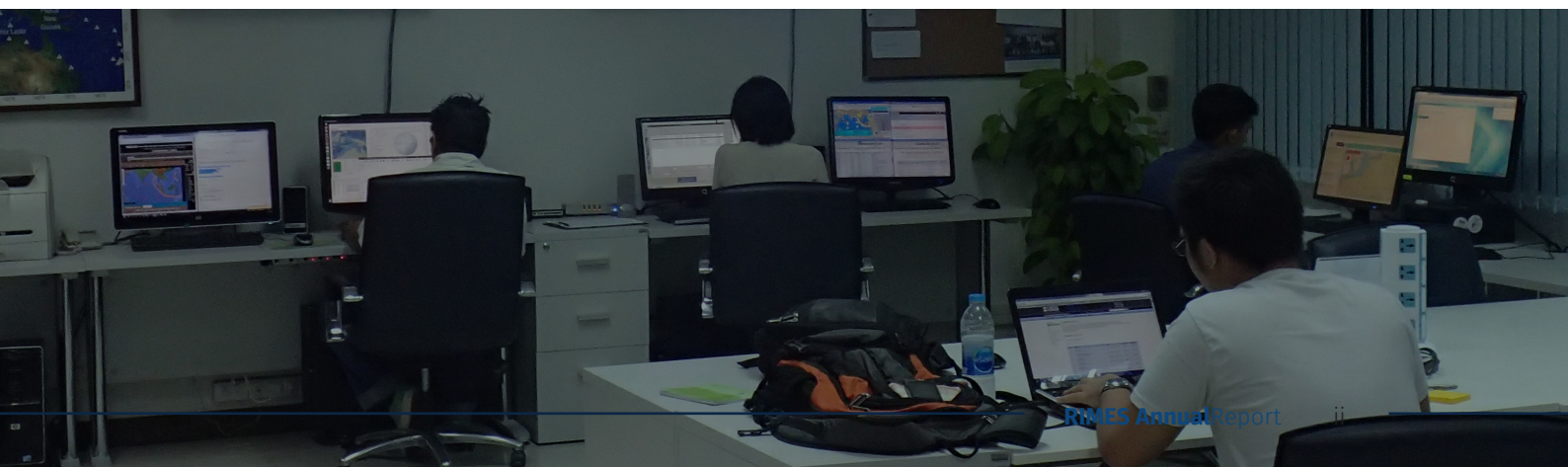
Table of
CONTENT

ABBREVIATIONS

ALGIS	Agricultural Land Use Geographic Information Systems
AA	Anticipatory Actions
ACF	Action Contre la Faim France
ADSS	Agromet Decision Support System
AgroDSS	Agro-Meteorological Decision Support System
ANATL	Air Navigation Timor-Leste
ANLA	National Authority of the Environmental License
APC	Civil Protection Authority
APMCDRR	Asia-Pacific Ministerial Conference on Disaster Risk Reduction
AWS	Automatic Weather Station
BAU	Bihar Agriculture University
BICAS	Bihar Integrated Knowledge System for Climate Resilient Agricultural Services
BMD	Bangladesh Meteorological Department
BWCSRP	Bangladesh Weather and Climate Services Regional Project
BWDB	Bangladesh Water Development Board
CAF	Climate Application Forum
CARE	Climate Adaptation and Resilience
CDIS	Climate Database Informatics System
CERF	Central Emergency Response Fund
CoP	Community of Practice
CPP	Cyclone Preparedness Programme
CRA	Community Risk Assessment
CRISH	Climate Risk Information System for Public Health
CSR	corporate social responsibility
DAE	Department of Agricultural Extension
DDM	Department of Disaster Management
DDPM	Department of Disaster Prevention and Mitigation
DEM	Digital Elevation Models
DHM	Department of Hydrology and Meteorology-Nepal
DHRW	Department of Hydrology and River Works
DMC	Disaster Management Center
DMH	Department of Meteorology and Hydrology
DNCP	National Directorate for Pollution Control
DNMG	Timor-Leste's National Directorate of

DNRAS	Meteorology and Geophysics
DNRE	National Directorate for Water and Sanitation
DoI	National Directorate of Electricity
DoM	Department of Irrigation-Sri Lanka
DREF	Department of Meteorology
DRR	Disaster Response Emergency Fund
DSS	Disaster Risk Reduction
e-CRA	Decision Support System
EAP	e-Community Risk Assessment
EC	Early Action Protocol
ENSO	Executive Council
EPS	El Niño-Southern Oscillation
EW4All	Ensemble Prediction Systems
EW4All	Early Warning for All
EWS	Early Warning for All
F-FDRL	Early Warning System
FAO	National Directorate of Maritime Transport and Port Administration, Navy
FbA/F	Food and Agriculture Organization
FFGS	Forecast-based Action and Financing
FFWC	Flash Flood Guidance System
FGD	Flood Forecasting and Warning Centre
Flocast	Focus Group Discussion
GBON	Flood Forecasting Tool
GDD	Global Basic Observing Network
GFFO-SC	Growing Degree Days
GN	Save the Children - Global Fund for Funding Organizations
HEVC	Grama Niladhari (Sri Lanka)
HEVCA	hazard, vulnerability, exposure, and capacity
I-FLOWS	hazard, exposure, vulnerability, and capacity assessments
IBF	Integrated Flood Warning System
ICC	Impact-Based Forecasting
IDP	International Coastal Cleanup
IEC	Institutional Development Plan
IFAD	Information, Education, and Communication
IOM	International Fund for Agricultural Development

IFRC	International Organization of Migration	PyCPT	Paura Nirbahi Officers (Bangladesh)
IIT	Internation Federation of Red Crescent	RCC	Python Climate Predictability Tool
INCOIS	Indian Institute of Technology	RDAS	Regional Climate Centre
IOC	Indian National Centre for Ocean Information Services	RMC	Regional Data Analytics System
IOM	Intergovernmental Oceanographic Commission	RMC	Regional Meteorological Center
IoT	International Organization of Migration	ROMS	Regional Meteorological Centre
iRAINS	Internet of Things	SAR	Regional Ocean Modelling System
IRC	IMD Rainfall Information System	SAR	South Asian Region
KII	International Red Cross	SATARK	Search and Rescue
KP	Key Informant Interview	SHEWS	Operational systems for Integrated Disaster Risk Management
Ksa	Khyber Pakhtunkhwa	SimEx	Strengthening Hydrological Services and Early Warning System
LCS	Knowledge, Skills, and Abilities	SLMC	Simulation Exercise
LGED	Labor Contracting Society	SMA	Strengthening Last Mile Communication
MCRA2	Local Government Engineering Department	SMART	Seychelles Meteorological Institute
MHEWS	Marine and Coastal Resources Administration Office 2	SOFF	System for Multi-Hazard Potential Impact Assessment and Emergency Response Tracking
MoDMR	Multi-Hazard Early Warning System	SOP	Systematic Observations Financing Facility
MOH	Ministry of Disaster Management and Relief	SST	Standard Operating Procedure
MTA	Ministry of Health-Timor-Leste	SUFAL	Sea Surface Temperature
NBRO	Ministry of Tourism and Environment	THI	Supporting flood forecast action and learning in Bangladesh
NCCR	National Building Regulations Organization	TRIGRS	Temperature Heat Index
NCMRWF	National Center for Coastal Research	UCAR	Transient Rainfall Infiltration and Grid-Based Regional Slope
NCS	National Centre for Medium Range Weather Forecasting (NCMRWF)	UDMC	University Corporation for Atmospheric Research
NDA	National Center for Seismology	UNDP	Union Disaster Management Committee
NDCC	National Designated Authority-Timor-Leste	UNEP-GCF	United Nations Development Programme
NDRRMA	National Directorate of Climate Change	UNESCO	UN Environment Programme - Green Climate Fund
NDWC	National Disaster Risk Reduction and Management Authority	UPS	United Nations Educational, Scientific and Cultural Organization
NEAP	National Disaster Warning Center	UR24	Uninterruptible Power Supply
NIOT	National Early Action Protocol	USAID	Understanding Risk 2024
NMHS	National Institute of Ocean Technology	UTCI	US Agency for International Development
OSDMA	National Meteorological and Hydrological Services	VMB	Universal Thermal Climate Index
OSFAS	Odisha State Disaster Management Authority	WASH	Voice Messaged-based
P&D	Ocean State Forecast and Advisory System	WCIS	Water, Sanitation, and Hygiene
PDMA	Planning and Development	WDSS	weather and climate information services
PDMA	Provincial Disaster Management Authority	WFP	Weather Decision Support System
PDU	Pakistan Disaster Management Authority	WHH	World Food Programme
PFZ	Power Distribution Unit	WMO	Welthungerhilfe
PGI	Potential Fishing Zone	WW3	World Meteorological Organization
PIO	protection, gender, and inclusion		WaveWatch3
PMD	Project Implementation officers		
PNO	Pakistan Meteorological Department		

RIMES
OVERVIEW

REGIONAL INTEGRATED MULTI-HAZARD EARLY WARNING SYSTEMS

RIMES is an international and inter-governmental institution, owned and managed by its Member States, that provides need-based early warning services for enhanced preparedness for, responses to, and mitigation of natural hazards.

Established on 30 April 2009, RIMES aims to provide regional expertise in building end-to-end multi-hazard early warning capacities for enhanced preparedness among target communities and authorities, with an overarching goal to support climate and disaster-resilient development.

RIMES is governed by a Council of national agency heads responsible for multi-hazard early warning. This Council sets policies, while a Secretariat implements decisions and manages the regional early warning facility. The Government of India currently chairs the Council, and Maldives hosts the Secretariat. The RIMES Ministerial Conference supports policy and resource mobilization.

The Program Unit, co-located with the facility, handles daily operations and program implementation, with financial and administrative autonomy delegated by the Council.

16
No. of Projects

Active projects implemented by RIMES as of 31 December 2024

22
Member Countries

Countries that have signed the Cooperation Agreement with RIMES*

26
Collaborating Countries

Countries at different stages of Agreement and Approval**
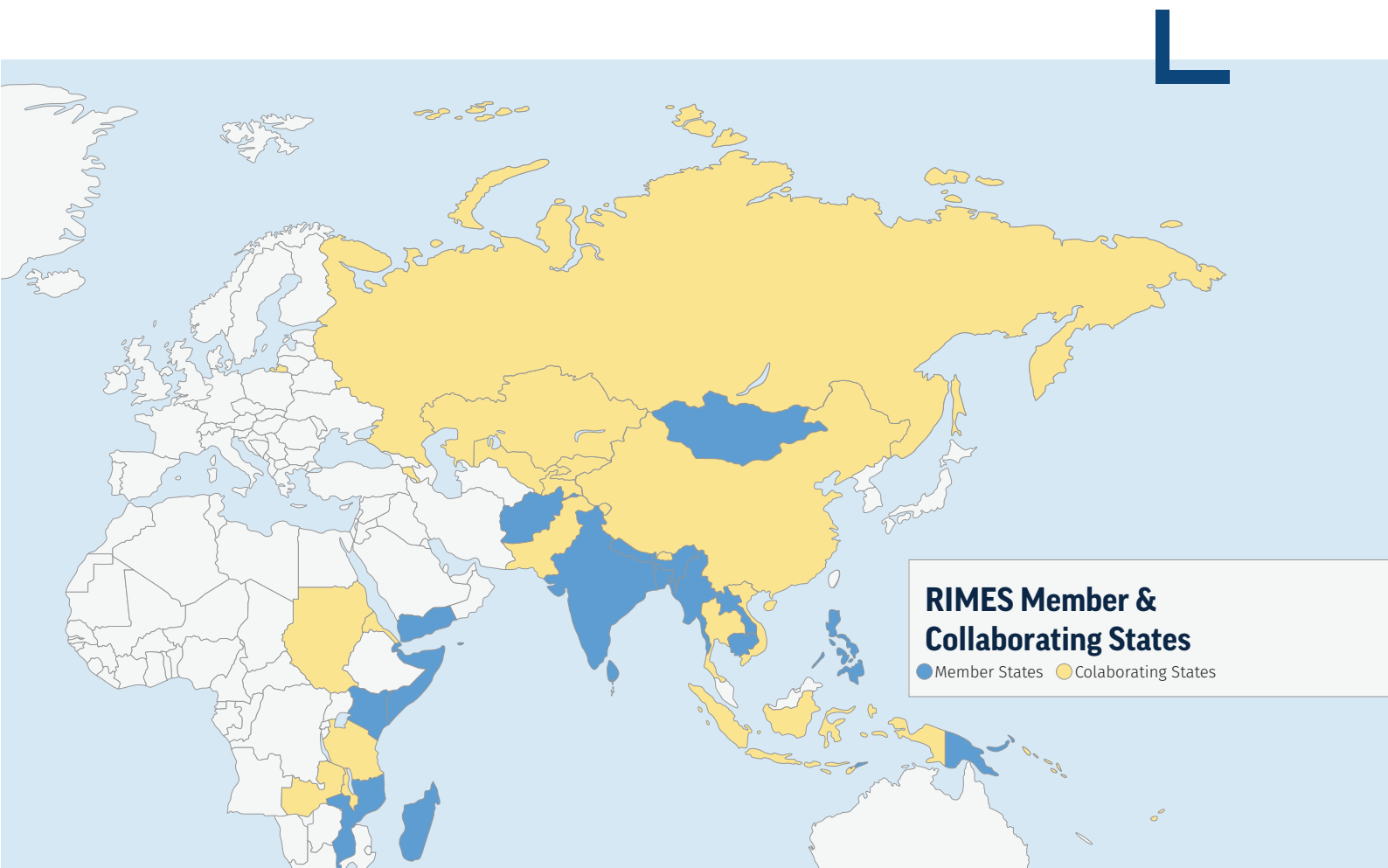
VISION & MISSION

Vision

Forearmed, forewarned, and resilient communities

Mission

Building climate and disaster risk management capacities for climate and disaster-resilient development

RIMES Member & Collaborating States

● Member States   ○ Colaborating States

* RIMES's **22 member countries** include Afghanistan, Bangladesh, Cambodia, Comoros, Djibou@, India, Kenya, Lao PDR, Madagascar, Maldives, Mongolia, Mozambique, Myanmar, Nepal, Papua New Guinea, Philippines, Seychelles, Somalia, Sri Lanka, Timor-Leste, Tonga, and Yemen.

** The **26 collaborating countries** are Armenia, Bhutan, Chad, China, Cook Islands, Eritrea, Fiji, Federated States of Micronesia, Indonesia, Kazakhstan, Kyrgyz Republic, Malawi, Marshall Islands, Mauritius, Pakistan, Russian Federation, Solomon Islands, Sudan, Tanzania, Thailand, Tajikistan, Tuvalu, Uzbekistan, Vanuatu, Vietnam and Zambia.

EXECUTIVE SUMMARY

The 2024 Annual Report

In the last 15 years, the Regional Integrated Multi-Hazard Early Warning System (RIMES) have played a pivotal role in enhancing climate resilience and disaster preparedness across its Member and Collaborating States.

RIMES anchors its services on the five distinct – but inter-connected – pillars of the early warning information value chain viz.: 1) enhancing data availability; 2) modelling and forecasting; 3) translating data into actionable information; 4) tailor-made services; and 5) societal engagement and feedback. The details of these early warning information value chain are provided in the following figure and elaborated thereafter.
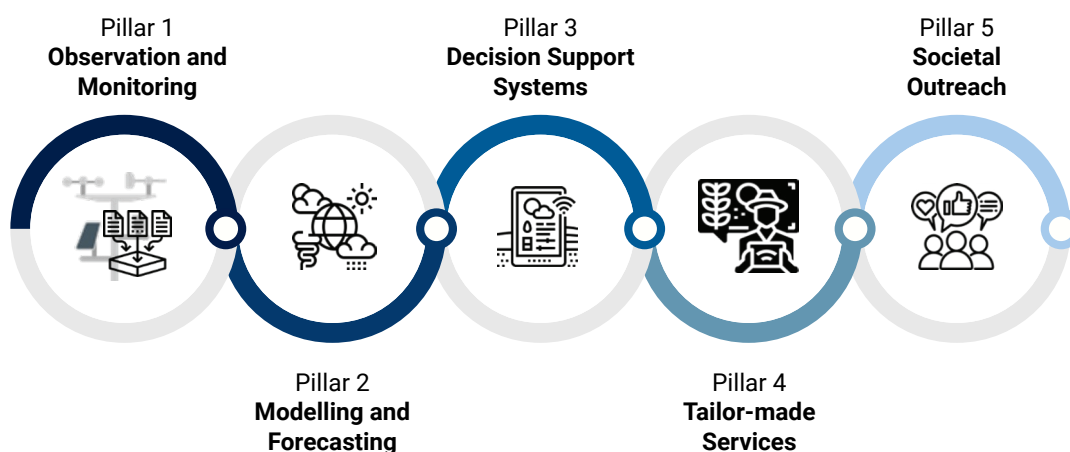
Pillar 1 Observation and Monitoring	Pillar 3 Decision Support Systems	Pillar 5 Societal Outreach

Pillar 2 Modelling and Forecasting	Pillar 4 Tailor-made Services

Figure 1. The five pillars of the climate information and early warning systems value chain

Pillar 1 – Enhancing Data Availability and Accessibility

a) Data Availability

To maximize data availability for its Member States and Collaborating Countries, RIMES's focus is two-pronged: a) facilitating establishment/upgrading of observation stations[1]; and b) development and upkeep of a global/regional digital platforms for cross-country multi-hazard observation data sharing.

b) Data Accessibility

Non-Global Telecommunication System (GTS) data sharing among participating NMHSs is pursued via the Data Exchange (DataEx) platform, a digital hub for sharing/accessing,

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1   These include telemetered seismic, sea level, deep ocean, weather, water level, and agro-meteorological observation stations/systems.

curating, and visualizing observation and forecast data. Weather/climate observation data are utilized to enhance early warning/forecast accuracy/resolution through the collaboration with the European Center for Medium-Range Forecasts (ECMWF), and the Government of India's National Center for Medium Range Weather Forecast (NCMRWF). High resolution forecast data, from ECMWF and NCMRWF, are provided to NMHSs for their reference/use.

For geo-hazards hazards, RIMES leverages real-time earthquake and water level observation data from its established seismic and sea level monitoring stations, with real-time observation data from regional/global centers, to improve the estimation/validation of earthquake and tsunami events.

Pillar 2 – Modelling and Forecasting

RIMES leverages weather/climate forecast data availability from various global and regional centers (including ECMWF) and assists NMHSs to tailor/downscale/enhance these for their country contexts through trainings, customized models/tools, and platforms for collective capacity building.

To enhance collaborative engagements among NMHSs to address weather/climate forecast accuracy/customization, RIMES facilitates the South Asian Climate Outcook Forum (SASCOF)[2], the Association of Southeast Asian Nations Climate Outlook Forum (ASEANCOF)[3], and the South Asia Hydromet Forum (SAHF)[4]. SAHF established the Weekly Forecasters' Forum to leverage regional and national capacities for collective sharing of

expertise, learning, and enhancement of weather forecasts.

Tsunami early warnings, on the other hand, are generated and disseminated through the Portal for Regional Estimation of Coastal Tsunami Impacts using Sea level and Earthquake information (PRECISE), which estimates tsunami arrival times, directivity, amplitudes, and inundation.

Pillar 3 – Translating Data into Actionable Information – Decision Support Systems

RIMES established the National Seasonal/Monsoon/Climate Forums as a first-generation platform for co-production of early warning-informed decision guidance products between NMHSs and sectoral institutions (including agriculture, water resources, disaster risk management, etc.). These forums evolved as technological advancements become more accessible and established sector-specific digital decision support systems (DSSs)[5] to assess sectoral opportunities and risks per evolving early warning information. A number of these Forums upgraded, through formal arrangements, to become Climate Application Centers which are nuclei national institutions for co-production of climate-informed sectoral early warning. These centers – including the IMD-RIMES Unit (IRU) for impact forecasting in India, the Sri Lanka National Climate Application Center (SLNCCA), and the Bangladesh National Climate Information Application Center (BANCCA) – are hubs for the integration of NMHSs and sectoral/user institutions that culminate to the development of digital DSSs.

Earthquake and tsunami preparedness actions are integrated into National Seasonal/Monsoon/Climate Forums for a sustainable, multi-hazard approach.

Bringing together NMHSs/NTWCs/NECs and sectoral institutions and communities, RIMES co-develops and operationalizes user-demanded digital DSSs. Venturing primarily in disaster risk management, agriculture, and water resources DSSs, this co-production

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2 South Asian nations, supported by the WMO, came together to establish the SASCOF in 2010. Since then, SASCOF sessions are organized every year before the summer monsoon season, while winter sessions are organized from 2015 per stakeholders' demand.

3 The ASEANCOF, established in 2013, provides a regular platform for collaborative development, among Southeast Asian nations, of seasonal climate outlooks and related information for the region.

4 SAHF – involving the 8 countries in South Asia and Myanmar and with Support from the World Bank and WMO – was established in 2018 to strengthen regional collaboration to address common and differentiated needs of NHMHSs. In 2019, the SAHF Executive Council (EC), via SAHF II, was established to define the strategic direction of SAHF. The SAHF EC is comprised of the Heads of NMHSs in the region; RIMES is the SAHF Secretariat.

5 As with any system, the DSSs require life-long work to constantly fine-tune them to evolving advances in science and technologies, risks and opportunities profile, and user requirements.

work has been expanded to health, livestock, planning, and transport. These digital systems translate different timescales of weather/climate information into actionable insights for sector-specific decision-making. Appendix 2 elaborates RIMES co-developed DSSs.

Pillar 4 – Tailor-made Services

Majorly leveraging outputs from DSS snd undertaking further research and development, RIMES co-develops tools/ services with users to ensure best-fit solutions to generate decision guidance products that address information requirements of different users, communicate uncertainties, and disseminate decision guidance/ information to drive decisions/actions by end user institutions/communities.

Pillar 5 – Societal Engagements and Feedback

RIMES enhances capacities of institutions and communities in using multi-hazard early warning-informed decision guidance products of various timescales (in Figure 2).

These institutional and community engagements also serve as a robust feedback loop platform, for experience-based evaluation of decision guidance products by institutional/end users and driving the next work iterations per the key takeaways of such product evaluation by users.

Through continuous feedback, RIMES, in collaboration stakeholder user institutions, facilitates dynamic updating/refining/ upgrading of proceeds/products of all 4 pillars.
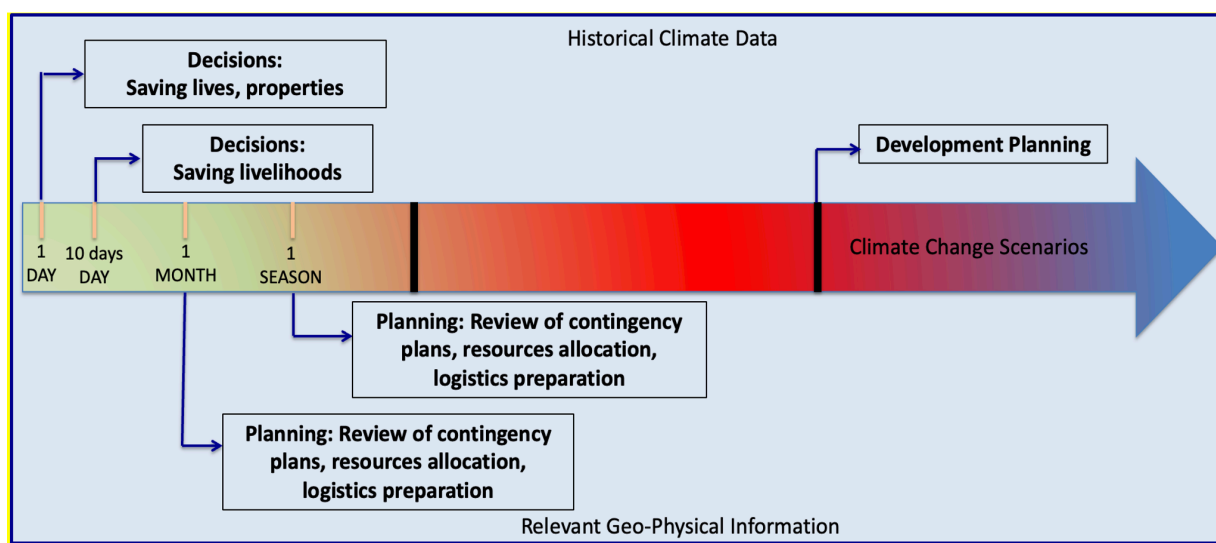

Figure 2. Societal engagements capacitate sectoral institutions/end users in nuanced application of multi-hazard decision guidance products, ranging from decisions that need to be undertaken most immediately to long-term development planning. These societal engagements also serve as an effective feedback loop, to regularly steer RIMES products and services to dynamic stakeholder's requirements.

Key Milestones and Initiatives

In 2024, RIMES prioritized strengthening early warning systems, expanding data-driven decision-making, and fostering partnerships with global institutions. This report highlights key achievements in data availability, modeling and forecasting, decision-support systems, community engagement, user empowerment, and institutional development.

- **<u>Enhancing Data Availability and Accessibility</u>**: RIMES improved observing and monitoring systems by deploying marine buoys in Seychelles and Timor-Leste, installing low-cost Early Warning Systems (EWS) and communication equipment in Pakistan and Sri Lanka, setting up discharge and gauge stations in Bangladesh, and providing technical expertise to Thailand's sensor network. Data collection was modernized using mobile apps for real-time water level data in Bangladesh, alongside collecting crucial flood shelter and volunteer data.

- **<u>Modelling and Forecasting</u>**: Significant advancements were made in localized hydro-meteorological forecasts:

  - Enhanced Flash Flood Guidance Systems in Bangladesh, providing warnings further in advance.
  - Launched a Lightning Nowcast System in Bangladesh for alerts 30-45 minutes before hazardous events.
  - Piloted a Heatwave Portal in Bangladesh to improve response to extreme heat.
  - Supported Timor-Leste by establishing a National Forecasting Center and customizing a Climate Database System (CDIS) for better local forecasts.
  - Developed specialized ocean models (ROMS, WW3, TMD3) and used satellite data for Timor-Leste to predict ocean conditions, track coral bleaching risks, and identify potential fishing zones.
  - Refined flood forecasting models for Nepal's Babai River and Sri Lanka's Kalu Ganga Basin.
  - Created localized flood impact forecasts and hazard maps for Thailand.
  - Developed landslide risk models for Sri Lanka and started work on health models in Timor-Leste to predict outbreaks of climate-sensitive diseases like dengue.

  Capacity building activities such as the SAHF Forecast Interpretation and Verification Training helps operational forecasters and technical officers of NMHSs enhance their forecast and early warning products and services.

- **<u>Transforming Data into Actionable Information</u>**: RIMES advanced various Decision Support Systems (DSS) across sectors. The Regional Data Analytics System (RDAS) for South Asia saw significant progress, enhancing access to climate and sectoral data. Institutional mechanisms were strengthened, including the approval and testing of the National Early Action Protocol (NEAP) for floods in Bangladesh and developing sustainable early warning dissemination roadmaps.

Numerous sector-specific DSS were developed or enhanced to help different sectors manage climate risks:

O Agriculture/Livestock:

» BAMIS (Bangladesh): Supports agromet information dissemination via portals, kiosks, and apps

» NLAS (Bangladesh): Provides climate-smart advisories for the livestock sector

» BICAS Chatbot (India): Offers farmers access to location-specific weather updates and agricultural advisories

» ADVISE (Nepal & Pakistan): Delivers real-time data and crop advisories for climate-resilient agriculture

» SESAME (Timor-Leste): Provides alerts and advisories for priority crops based on weather parameters

O Water:

» FFWC Web Portal Enhancement (Bangladesh): Transforms the existing portal into a DSS with improved flood forecasting and visualization tools

O Transport:

» NAVIGATE (Nepal): Aids climate-resilient road operations and maintenance planning

O Ocean:

» OSFAS (Timor-Leste): Delivers alerts for safe sea navigation and sustainable fishing

» Tsunami DSS (Thailand): Integrates various data sources for enhanced tsunami warning generation

O Health:

· CRISH (Timor-Leste): An advisory system based on forecasts for climate-sensitive diseases.

O Planning:

· CLIM-PLANNeD (Pakistan): Provides data-driven insights for strategic planning across sectors, including agriculture and transport

O Disaster Management:

· RAPID (Bangladesh): Integrates flood vulnerability, impact maps, and early action plans for Forecast-based Action (FbA)

· INSTANT (Bangladesh, Nepal, Pakistan, Sri Lanka): An integrated platform for disseminating forecasts and alerts for multiple hazards

· SATARK (Nepal & India): A system for assessing, tracking, and alerting disaster risk information based on dynamic risk knowledge

· TNSMART (India): A Web-GIS based system for multi-hazard preparedness, response, and tracking in Tamil Nadu

- **Tailor-Made Services**: Efforts to strengthen last-mile early warning communication have been a major focus in 2024. User engagement was fostered through National and Sub-National Climate Application Forums (CAFs) in Nepal and Timor-Leste. RIMES has successfully piloted community-based early warning initiatives, including the Strengthening Last Mile Communication (SLMC) project in Bangladesh, which integrates digital and voice-based dissemination systems. More early warning communication mechanisms were enhanced through simulation exercises, Agromet FARRM Schools, and targeted awareness campaigns. Stakeholder consultations and baseline surveys were conducted across Nepal, Sri Lanka, Bangladesh, and Pakistan to gather feedback and tailor systems like the INSTANT Portal.

- **Societal Outreach and Feedback**: Extensive capacity-building activities trained user institutions and end-users on topics like risk management, forecast interpretation, EWS operation, and safety measures. Programs such as the Forecast-Based Early Action Simulation Exercises have strengthened institutional capacities to interpret forecasts and implement anticipatory actions effectively.

- **Institutional Development**: The RIMES Council has made significant strides in strengthening governance and institutional frameworks to support long-term sustainability. The adoption of the Institutional Development Plan (IDP) 2024–2030 marks a strategic roadmap for enhancing operational efficiency, resource mobilization, and policy integration across RIMES Member States.

  Knowledge sharing occurred through workshops and participation in international forums like UR24 and APMCDRR. The 16th RIMES Council Meeting advanced the Institutional Development Plan (IDP) 2024–2030, focusing on governance, financial stability, and operational efficiency. The IMD-RIMES Unit continued developing specialized tools (iRAINS, WDSS, AgroDSS) for the India Meteorological Department.

RIMES aims to solidify its role as a regional center of excellence for end-to-end climate information and EWS. In the coming years, RIMES will continue to refine its service delivery along the climate information and early warning services value chain.

RIMES remains committed to building a more resilient future by equipping countries with the necessary tools, knowledge, and support to mitigate the impacts of climate change and natural disasters. The achievements outlined in this report reflect RIMES' unwavering dedication to safeguarding lives and livelihoods through science-based, user-driven early warning solutions.

> This 2024 Annual Report presents these key accomplishments in detail according to the five pillars of the climate information and early warning systems value chain.

ENHANCING DATA AVAILABILITY AND ACCESSIBILITY

Reliable and timely data is the foundation of effective early warning systems. In 2024, RIMES strengthened observing and monitoring infrastructure by deploying new technologies, improving data collection methodologies, and integrating real-time forecasting capabilities.

Key initiatives include the installation of marine buoys, low-cost early warning systems, and automated data-sharing platforms to support disaster preparedness.

OBSERVING & MONITORING SYSTEMS

Development and Deployment of Marine Buoys

RIMES ensures the continuous availability of real-time data for swift validation of tsunamigenic earthquake events and ocean-related hazards through the monitoring of seismic stations, sea level stations, and wave rider buoys.

Following maintenance and calibration in India, the Seychelles Meteorological Authority (SMA), in collaboration with RIMES and the Indian National Centre for Ocean Information Services (INCOIS), successfully redeployed a wave rider buoy on 9 May 2024. This buoy provides crucial data for wave and swell activity monitoring in the region.

Meanwhile in Timor-Leste, a marine buoy is being fabricated which is expected to be delivered and deployed by the first quarter of 2025. This marine buoy will be deployed along with the installation of two (2) tide gauges to improve the country's early detection of coastal inundation and monitor sea-level trends in the following locations:

- Dili: One tide gauge and the marine buoy will be installed along the coast of the capital, which houses 20% of the population and critical infrastructure.

- Oecusse: A second tide gauge will be deployed to monitor sea-level trends and mitigate coastal flooding risks.
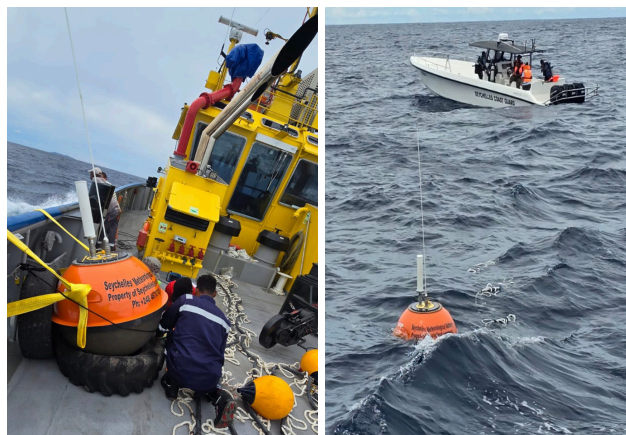
Re-deployment of wave rider buoy in Seychelles, Maldives

Training on buoy operation and maintenance will accompany its deployment. The tide gauge procurement process is nearly complete, with contract awarded in December 2024.

Deployment sites of marine bouy and tide gauges to monitor ocean parameters.

Procurement and Installation of Low-Cost Early Warning Systems (EWS) and Communication Equipment

Under the SLMC project implementation in Pakistan, an automatic weather station (AWS) is being procured for installation in the catchment area of Aorit Gol Stream, Shogore, Chitral. This complements the observation network of the Pakistan Meteorology Department (PMD) to improve forecast accuracy. RIMES and PMD jointly conducted community and site visits to determine the most suitable installation location. Specifications were defined by PMD, and the request for quotations was locally advertised in November 2024. Once procured, PMD will lead the installation and its technical integration into the Department's existing observation System.

Meanwhile, the SLMC team in Sri Lanka has been working closely with the Department of Irrigation (DoI) to facilitate the procurement and installation of river gauge posts along the Kalu River. This initiative aims to enhance and expand DoI's observation network within the river basin, where the SLMC project sites are located. As part of this effort, a field visit was conducted to assess and finalize installation locations within the catchment area. Based on suitability and coverage considerations, eight (8) rain gauge station locations were identified to ensure comprehensive hydrological monitoring across the catchment. The visit also provided an opportunity for in-depth discussions with key agencies and officials responsible for flood control in Kalutara and Ratnapura Districts, enabling a better understanding of their specific needs, capabilities, and challenges.

DoI engineers have commenced the technical design of the river gauge posts and are in the process of finalizing detailed budget estimates for installation at the designated sites. RIMES has supported DoI in identifying local suppliers and obtaining quotations; once testing and pre-qualification of suppliers are completed, RIMES will proceed with the procurement process.

Site Visit to Proposed Locations of Rain Gauge Stations along the Kalu River in Sri Lanka
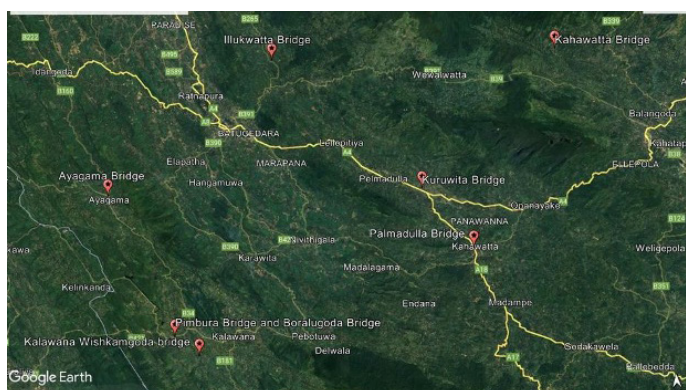
Geographic Location of identified Rain Gauge Stations in Sri Lanka

Installation of Discharge Station at Noonkhawa

In collaboration with the Bangladesh Water Development Board (BWDB) and through the SUFAL II project, RIMES collected hydro-morphological data, including cross-section and discharge, at Mollarhat, Noonkhawa, along the Brahmaputra River. This station is located upstream of the existing FFWC water-level station at Noonkhawa.

Currently, the primary discharge station for the Brahmaputra-Jamuna River basin is at Bahadurabad, much further downstream.

Since 2021, RIMES and BWDB have developed and operationalized a 15-day ensemble streamflow forecast for this station, enabling BWDB's Flood Forecasting and Warning Centre (FFWC) to provide long-range flood forecasts. The collected discharge data is now integrated into FFWC's flood forecast model to generate improved forecasts for upstream communities in Kurigram. Additionally, a new gauge station has been installed at Mollarhat, Noonkhawa. The project funded data collection costs for 2024 for this station, which will replace the existing FFWC gauge located at a downstream position in Noonkhawa.

Installation and site visits to land and river gauges in Gaibandha and Kurigram Districts

River and Land Gauge Installation

Still in Bangladesh, the Local Flood Warning Dissemination System (PROVATi3-R) Project installed six (6) new river gauges, as existing ones do not sufficiently cover the project area. Following consultations in Gaibandha and Kurigram districts, three existing BWDB gauges have been incorporated into the FFWC forecasting system:

- Goalkanda Station, Dewanganj Upazila, Jamalpur (Jinjirum River)

- Boalmari Station, Rowmari Upazila, Kurigram (Jinjirum River)

- Kamarjani Station, Gaibandha (confluence of Teesta and Jamuna Rivers)

FFWC began receiving water level data from these stations in June 2024, with the first observed data published in an August bulletin on their website. To install the remaining river gauges, a field visit was conducted on 7 September 2024 at the proposed sites in Haripur and Tarapur Unions of Sundarganj Upazila, Gaibandha District.

Moreover, 60 land gauges were installed across 19 upazilas in the project area for validation and calibration of trial inundation maps at the local level. These land gauges were distributed as follows: 33 gauges in Kurigram, 16 in Jamalpur, and 11 in Gaibandha Districts.

These gauges are now operational for measuring water levels in flood-inundated areas, improving the accuracy of the inundation model. Site selection was finalized through local and national consultations, with field inspections conducted on 7 September (Gaibandha) and 27 October 2024 (Kurigram).

Provision of Technical Expertise

RIMES also supported Thailand's Department of Disaster Prevention and Mitigation (DDPM) in strengthening its sensor network by assessing existing stations, optimizing new sensor locations, and overseeing installations. RIMES provided its technical expertise in the selection of a consulting firm for CCTV installation, testing equipment performance, and addressing system and data management issues. RIMES also guided pre-installation site assessments to ensure system stability and efficient project execution.

As part of Phase 2 of the DDPM-RIMES collaboration, RIMES conducted site surveys in Ang Thong, Chaiyaphum, and Satun Provinces, laying the groundwork for 2025 project implementation towards enhancing DDPM's flood monitoring and early warning capabilities.

Data Collection

Water level Data

A mobile application has been developed for Gauge Readers of the BWDB to support real-time water level data collection in the northeastern haor region through the SUFAL II Project. This initiative aims to strengthen flash flood monitoring and forecasting for FFWC-BWDB.

The application features both SMS and internet-based data transmission, ensuring functionality even without an internet connection. Designed through a co-production process, it is fully integrated with FFWC's existing data collection system, enabling near real-time data utilization in bulletins and flood monitoring. RIMES has provided the necessary system development support for FFWC-BWDB. The semi-automatic system will reduce delays in data collection and, in the future, can be scaled up to display near real-time data on the FFWC website and issue more frequent bulletins. Additional features may be incorporated to

disseminate forecasts to gauge readers and local volunteers.

To facilitate implementation, a training session was conducted on 8 June 2024 in Sylhet for 15 gauge readers from Netrokona, Sunamganj, and Sylhet. Participants were trained on the mobile application's usage and provided with 15 smartphones along with protective gear, including lifejackets, raincoats, and gumboots (more info on p.63).

Training for Gauge Readers on water level data collection

Flood Shelter Location & Volunteer Data

The PROVATi3-R project was successful in collecting flood shelter location and volunteer data in 2024. There were 154 flood shelter locations across three districts:

- Gaibandha: 15 shelters
- Kurigram: 31 shelters
- Jamalpur: 108 shelters

This dataset will support emergency response planning and coordination.

On the other hand, data on 1,647 volunteers, including Labor Contracting Society (LCS) and Local Government Engineering Department (LGED) members were collected. Additionally, past volunteer lists were compiled from various NGO partners operating in the project area, including Friendship, NRP CARE, SKS Foundation, ESDO, Islamic Relief Bangladesh, NDP, PARI Development Trust, Unnayan Sangha, and RDRS Bangladesh.

Volunteer information is a key aspect of the project in strengthening volunteer capacity for flood preparedness. Volunteers will be trained on flood management practices covering pre-, during, and post-flood scenarios.

DATA INTEGRATION & DATA SHARING SYSTEMS

The PROVATi-3R Project developed a **Kiosk Dashboard** to display real-time flood alerts through digital display boards across 19 upazilas within the project area. The dashboard was refined based on stakeholder feedback gathered from meetings and workshops, leading to its finalization. Procurement for 50" Google TVs or Android display boards for KIOSK installations is currently in progress, ensuring timely implementation and accessibility of critical early warning information at the community level.
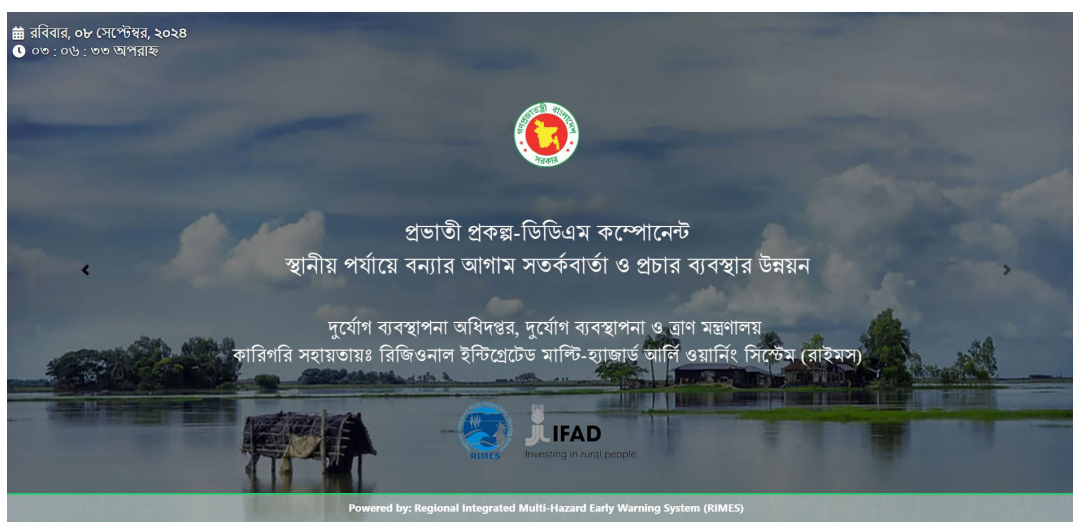
Interface of Kiosk Dashboard

Moreover, in an effort to implement a cost-effective, real-time river water level monitoring system using advanced Internet of Things (IoT) technologies, the Community-Based EWS Piloting (SHEWS-C27) Project developed and deployed the mobile app, "**Water Watch**". This app, available on Google Play Store, aims to simplify data collection, reduce errors, and improve accuracy. Gauge readers were equipped with Android devices and trained to submit water level and rainfall data every three hours.

To ensure data reliability, the app incorporated dual transmission modes—HTTP and SMS—providing redundancy in areas with weak connectivity. A built-in quality control system enabled data validation before integration into the FFWC system via an API, strengthening real-time data sharing and forecasting capabilities.

Additionally, an **IoT-based water level monitoring system** was designed, featuring low-cost LiDAR sensor-based equipment for automated data collection. The system transmits data using the MQTT protocol over 3G/4G GSM networks to designated servers, ensuring seamless and reliable monitoring, even in remote areas with connectivity challenges. While deployment is pending, the system is expected to further streamline flood monitoring and early warning processes upon implementation.

EARTHQUAKE ALERTS & TSUNAMI WATCH

One of RIMES's primary missions is to provide earthquake alerts and tsunami watch services to Member and Collaborating States within the Indian Ocean, South China Sea, and South Pacific regions. This service is delivered through the regional facility located at the RIMES Program Unit in Thailand, operating within the framework of the Intergovernmental Oceanographic Commission (IOC) of the United Nations Educational, Scientific and Cultural Organization (UNESCO). The RIMES tsunami watch center operates continuously, 24/7, utilizing data from various regional and global monitoring networks to assess the potential for earthquake-generated tsunamis.

In 2024, RIMES monitored a total of 2,859 seismic incidents, of which 1,665 fell under its jurisdiction, though no significant tsunami incidents were reported:
- 2153 events were of magnitude below 5.0
- 651 events were of magnitude between 5.1 to 5.9
- 40 events were of magnitude between 6.0 to 6.4
- 15 events were of magnitude 6.5 and above

Earthquake information is typically transmitted by Email/SMS around 12 minutes after the earthquake occurs for automatic solutions (i.e. system-generated information), and approximately 15 minutes after the earthquake occurs for manual solutions (i.e. observer-processed information). Email notifications on earthquakes are typically issued approximately 24 minutes after the occurrence of the earthquake.
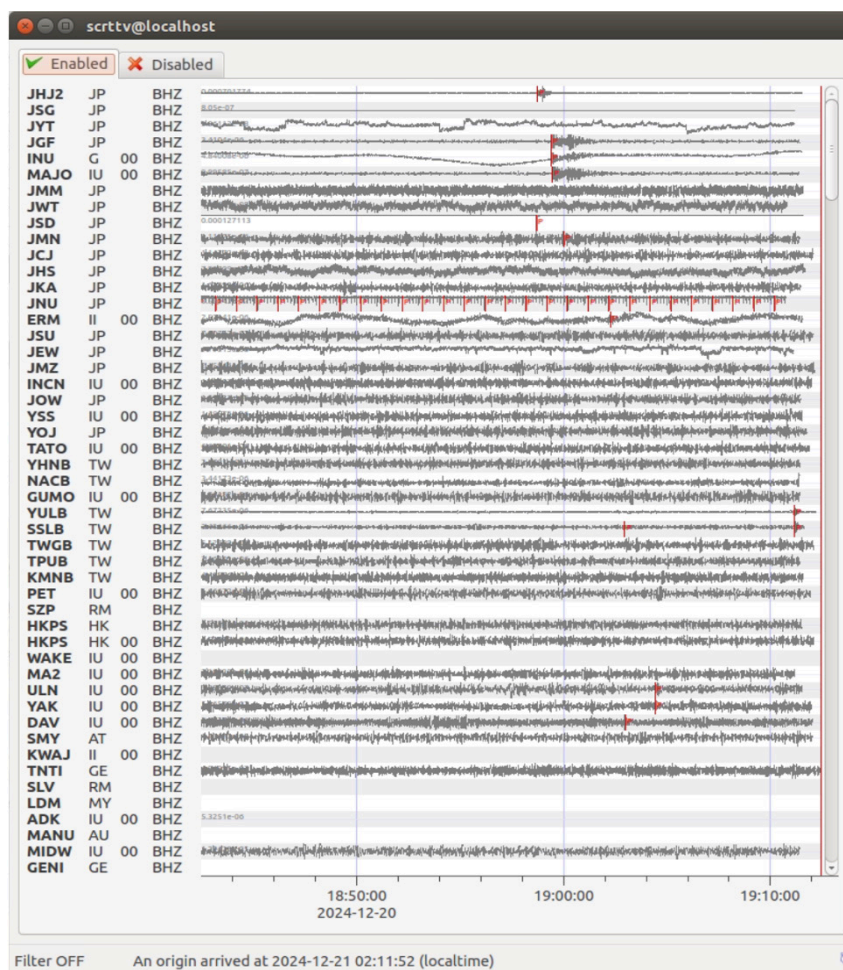
Seismic station data monitoring interface in Seiscomp

Table 1. 2024 earthquake events of magnitude 6.5 and above within RIMES area of responsibility (AOR); earthquake alerts and bulletins were issued during all events

NO.	DATE/ ORIGIN TIME (UTC)	REGION	FINAL MAGNITUDE
1	1/1/24 7:10	Near West Coast of Honshu Japan	7.3
2	9/1/24 22:12	Tonga Islands	6.5
3	22/1/24 18:9	Kyrgyzstan-Xinjian Border Region	7.3
4	24/3/24 20:22	Papua New Guinea	6.8
5	3/4/24 23:58	Taiwan	7.3
6	5/4/24 11:3	Mariana Island	7.0
7	9/4/24 9:48	Northern Molucca Sea	6.5
8	26/5/24 20:47	Tonga Islands	6.6
9	19/7/24 1:50	Chili-Argentina Border Region	7.1
10	3/8/24 4:20	Mindanao, Philippines	6.6
11	11/8/24 7:42	Kyushu, Japan	7.1
12	17/8/24 19:10	Near East Coast of Kamchatka, Russia	7.1
13	26/8/24 20:47	Tonga Islands	6.8
14	1/10/24 20:5	Tonga Islands	6.6
15	10/11/44 16:49	Cuba Region	6.5

Below are the information products sent to Member and Collaborating States on 01 January, for the magnitude 7.3 event in the Near West Coast of Honshu Japan:

a) **Email sent at 07:18 UTC (8 mins elapsed time)**
RIMES QUICK AUTOMATIC EARTHQUAKE PARAMETERS
******** Result may not be accurate ********
A Verified solution will follow immediately
Origin Time = 2024-01-01 07:10:17 UTC
Magnitude = 7.3 Depth = 61 Km
Longitude = 137.50 Latitude = 37.59
Region = Near West Coast of Honshu, Japan
Message sent by RIMES Automatic Alerting

Email sent at 07:23 UTC (13 mins elapsed time)
*** RIMES MANUALLY PROCESSED EARTHQUAKE PARAMETERS ***
Origin Time = 2024-01-01 07:10:17 UTC
Magnitude = 7.3 Depth = 65 Km
Longitude = 137.36 Latitude = 37.61
Region = Near West Coast of Honshu, Japan
Message sent by RIMES Automatic Alerting

b) **SMS sent at 07:18 UTC (8 mins elapsed time)**
RIMES EQ Alert Automatic Solution
OT = 2024-01-01 07:10:17 UTC
Lon = 137.50 Lat = 37.59
Mag = 7.3 Depth = 61 km
Region = Near West Coast of Honshu, Japan
Message sent by RIMES

SMS sent at 07:23 UTC (13 mins elapsed time)
RIMES EQ Alert Verified Solution
OT = 2024-01-01 07:10:17 UTC
Lon = 137.36 Lat = 37.61
Mag = 7.3 Depth = 65 km
Region = Near West Coast of Honshu, Japan
Message sent by RIMES

c) **Earthquake or Tsunami Bulletin No. 1 sent at 07:26 UTC (16 mins elapsed time)**
For the details of Bulletin No. 1, which was issued at 07:26 UTC, refer to image below.

```
RIMES-20240101-0730-001
-----------------------------------------------------------------------------------
EARTHQUAKE BULLETIN
REGIONAL INTEGRATED MULTI-HAZARD EARLY WARNING SYSTEM (RIMES)
Issued at 0730 UTC Monday 01 January 2024
-----------------------------------------------------------------------------------

. . . EARTHQUAKE INFORMATION BULLETIN . . .

1. EARTHQUAKE INFORMATION
RIMES has detected an earthquake with the following preliminary information:

Magnitude:      7.3 Mw(mB)
Depth:          65 Km
Date:           01 January 2024
Origin Time:    07:10:17 UTC
Latitude:       37.61N
Longitude:      137.36E
Location:       Near West Coast of Honshu, Japan

2. EVALUATION
The earthquake is located outside RIMES area of responsibility. This will be the final
bulletin that will be issued by RIMES.

Further information on this event will be available at:
http://www.rimes.int/eqt-tsunami-bulletin

3. ADVICE
This bulletin is being issued as advice. Only national/ state/ local authorities and
disaster management officers have the authority to make decisions regarding the official
threat and warning status in their coastal areas and any action to be taken in response.

4. UPDATES
No further bulletins will be issued by RIMES for this event, unless additional
information becomes available.

Other TSPs may issue additional information at:
IOTWMS-TSP AUSTRALIA: http://www.bom.gov.au/tsunami/iotws
IOTWMS-INDIA:         http://www.incois.gov.in/Incois/tsunami/eqevents.jsp
IOTWMS-INDONESIA:     http://rtsp.bmkg.go.id/publicbull.php
PTWC:                 http://ptwc.weather.gov/
NWPTAC:               http://www.jma.go.jp/en/tsunami/
US NTWC:              http://wcatwc.arh.noaa.gov/
JATWC:                http://www.bom.gov.au/tsunami/

In case of conflicting information from TSPs, the more conservative information should be
used for safety.

5. CONTACT INFORMATION
REGIONAL INTEGRATED MULTI-HAZARD EARLY WARNING SYSTEM (RIMES)
Address:    Outreach Building, AIT Campus, Pathumthani 12120 Thailand
Tel.:       +662-516-5905 to 07
Fax:        +662-516-5908 to 09
Email:      tsunami@rimes.int
Website:    www.rimes.int

END OF BULLETIN
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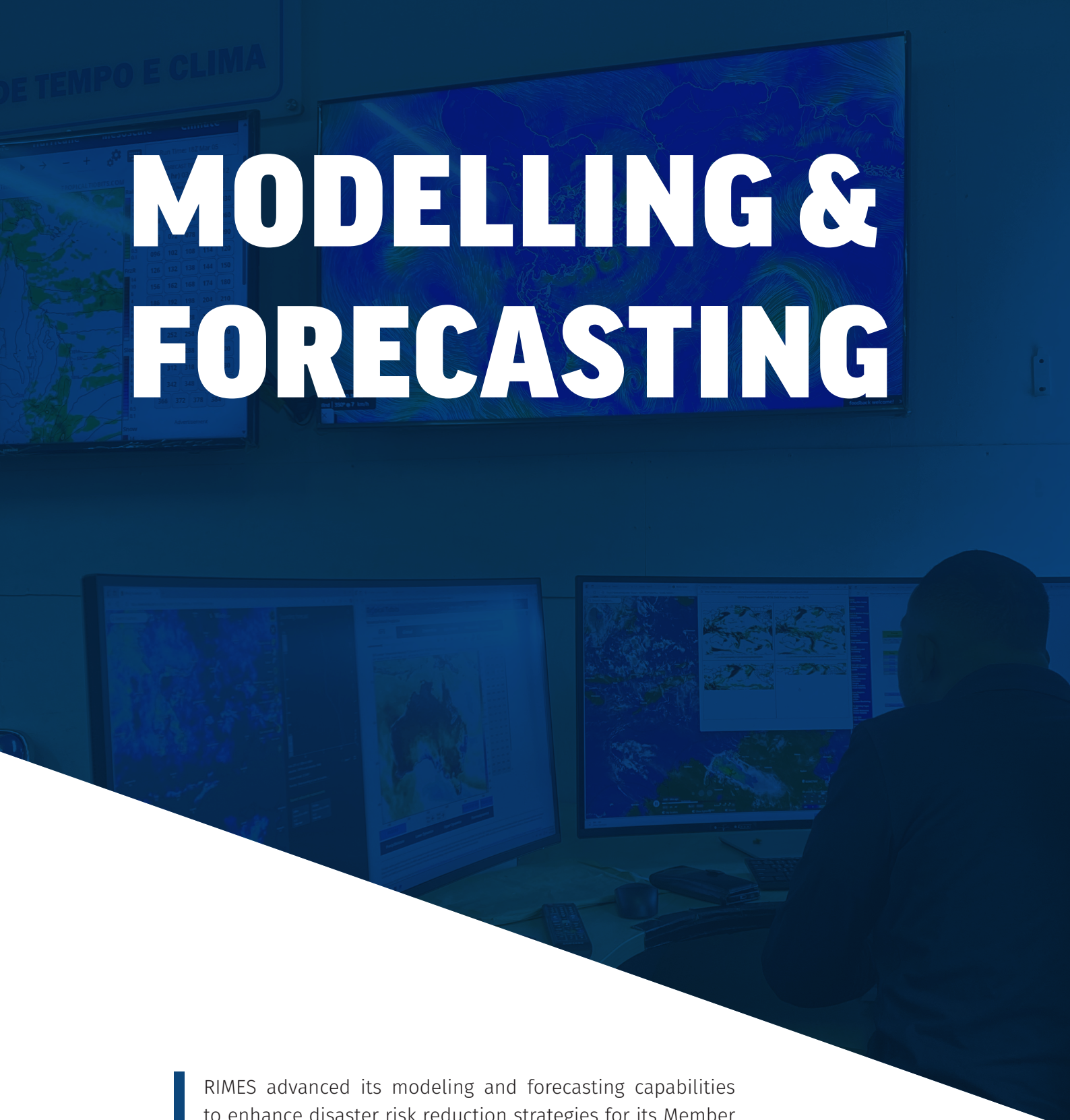
Earthquake or Tsunami Bulletin No. 1 sent at 07:26 UTC (16 mins elapsed time)

MODELLING & FORECASTING

RIMES advanced its modeling and forecasting capabilities to enhance disaster risk reduction strategies for its Member and Collaborating States. This includes developing localized hydro-meteorological forecasting tools, impact-based early warning systems, and numerical ocean prediction models.

These innovations provide timely, actionable insights for flood forecasting, heatwave alerts, landslide risk assessment, and climate-sensitive disease monitoring.

# SUPPORT TO NMHSs ON LOCALIZED HAZARD MONITORING AND PREDICTION

Flash Flood Guidance System

RIMES, through the SUFAL II project, has been supporting FFWC and BWDB in strengthening the existing Flash Flood Forecasting System. Considering the poor performance and very short lead time of existing flash flood forecasting and early warning systems, the current system will be enhanced with simplified and well-defined forecasting techniques, considering the recommendations made by RIMES in a recent technical assessment of the existing flash flood forecasting system in collaboration with Food and Agriculture Organization (FAO). The Flash Flood Guidance System (FFGS) has been developed utilizing a threshold-based approach while incorporating near-real time satellite observation dataset. The threshold-based approach focused on probabilistic data as forcing to account for the uncertainties inherent in the forecast. This is expected to improve the accuracy and lead time of the forecast in contrast with FFWC's existing water level forecast which does not have satisfactory performance beyond 24 hours lead time. The thresholds have been developed based on FFWC's pre-monsoon water level for the stations in Haor Region.

During the 2024 pre-monsoon season, the enhanced system was tested on an experimental basis and successfully forecasted three (3) waves of flash floods in the Haor region. This improved lead time and accuracy which allowed communities to take proactive measures, thereby reducing the adverse impacts of sudden flooding events.
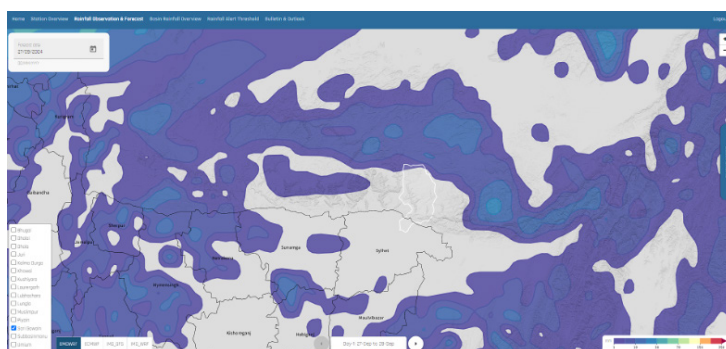
FFGS Rainfall Observation Forecast interface
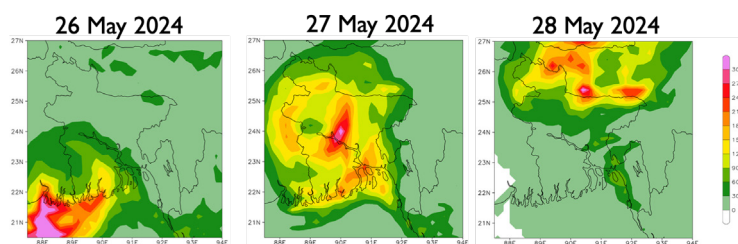
Three (3) waves of flash floods detected during its experimental run in 2024

Additionally, the SHEWS-C27 project developed an advanced FFGS that integrates real-time water level monitoring, rainfall observations, and forecasts from multiple models, enabling predictions up to 10 days in advance. The system provides streamflow forecasts with 72-hour lead times and detailed terrestrial water cycle insights using the WRF-Hydro Model. With automated operational processes and dynamic web-GIS mapping, this innovative system significantly enhances predictive accuracy, community preparedness, and response planning in high-risk flood zones.

Lightning Nowcast System

The SUFAL II project aimed to further strengthen localized hydro-meteorological forecasting by implementing the Lightning Nowcast System in partnership with the Bangladesh Meteorological Department (BMD). This system utilizes real-time observation data from global lightning providers and geostationary satellites to generate alerts 30-45 minutes before hazardous thunderstorms and lightning events occur. These location-specific warnings were disseminated directly to at-risk communities through Recorded Voice Messages, ensuring rapid communication and enhanced safety measures. RIMES is currently exploring additional dissemination channels to improve community access to these life-saving alerts.

Heatwave Portal

RIMES also piloted the El Niño Anticipatory Actions for Drought and Heatwave in Bangladesh in collaboration with Save the Children Bangladesh. Responding to the global El Niño-Southern Oscillation(ENSO) outlook for October 2023, the project involved developing a dedicated heatwave portal that integrated BMD's existing forecasts with customized heatwave thresholds and interactive visualizations. This strategic intervention significantly improved the ability to anticipate and respond to extreme heat events, safeguarding vulnerable communities from adverse health and livelihood impacts.
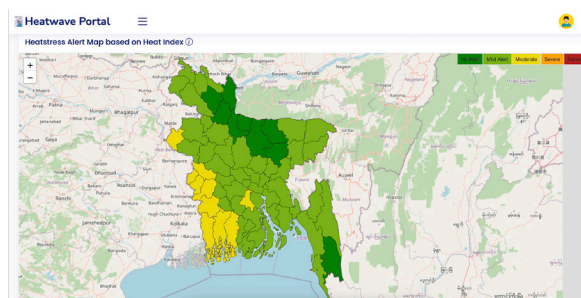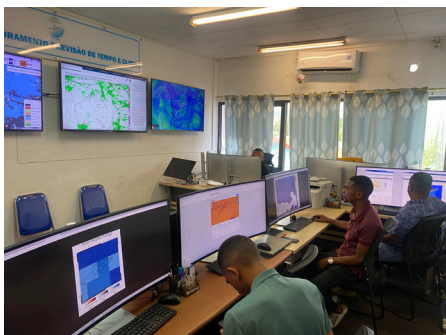

Heatwave Portal Interface

Launching Ceremony of the Heatwave Alert Portal in partnership with BMD and led by Dhaka North City Corporation (DNCC) Mayor Atiqul Islam

SUPPORT TO NMHSs IN ESTABLISHING A FORECASTING CENTER AND CLIMATE DATABASE INFORMATICS SYSTEM

National Forecasting Center & Climate Database Informatics System

Timor-Leste's National Forecasting Center

To further support Timor-Leste's National Directorate of Meteorology and Geophysics (DNMG) in enhancing its modeling and forecasting capabilities, RIMES initiated the establishment of the **National Forecasting Center** in 2024. This development includes setting up an on-premise server with robust computational processing, data management, and storage capacities. The infrastructure is designed to support the implementation and operationalization of the various decision support systems (DSSs) developed under the "Enhancing Early Warning System to Build Greater Resilience to Hydro-Meteorological Hazards in Timor-Leste" project – ensuring seamless integration and centralized data management. The on-premise server setup includes a central uninterruptible power supply (UPS), power distribution unit (PDU), workstations, and essential operating software, ensuring uninterrupted functionality even during power outages.

This infrastructure upgrade will also enhance DNMG's existing data center, enabling it to host critical observation and monitoring data for Timor-Leste while supporting the processing of models developed for the sectoral DSSs. By centralizing data utilization, the new system will enable more accurate and localized forecasting tailored to the needs of various climate-sensitive sectors. In 2024, the hardware and software were successfully procured, with delivery to Timor-Leste scheduled for December 2024. This advancement marks a significant milestone in building the country's capacity for advanced climate modeling and forecasting.

Alongside infrastructure development, RIMES is customizing the **Climate Database Informatics System** (CDIS) to enhance data integration, processing, and weather forecasting capabilities. The CDIS features a suite of advanced modules, including spatial visualization of weather parameters, map meteograms for regional weather trends, time-series analysis for assessing weather patterns over time, synoptic analysis for large-scale weather systems, extreme event analysis for monitoring severe weather conditions, and customizable alert thresholds and dissemination tools. These modules will empower DNMG to produce localized and user-specific forecast products tailored to the needs of diverse climate-sensitive sectors, ranging from agriculture and fisheries to public health and disaster management.

Once operational, the CDIS will enable visualization and analysis of various weather parameters and models from multiple data sources, significantly enhancing DNMG's forecasting accuracy and decision-making capabilities. Building on its extensive experience with CDIS implementation in other Member States, RIMES tailored this system to meet the specific needs of Timor-Leste, reflecting its commitment to localized solutions and user-focused innovations.

CDIS Server setup

# SUPPORT TO NMHSs ON OCEAN STATE FORECASTS AND ADVISORIES

In 2024, RIMES prioritized the development and enhancement of ocean-related EWS with a key focus on customizing localized ocean models for Timor-Leste, including numerical ocean prediction models, remote sensing applications for ocean heat stress monitoring and Potential Fishing Zone (PFZ) identification, and a tailored Ocean State Forecast and Advisory System (OSFAS).

The Regional Ocean Modelling System (ROMS) is used to predict ocean currents, sea surface temperature (SST), and salinity, while WaveWatch3 (WW3) models wave height, direction, and period. The models generate automated ocean parameter outputs based on weather forecasts, improving real-time predictive capabilities.

In addition, an echosounder is being procured to improve the resolution of the existing bathymetric map, with RIMES providing technical training to local stakeholders for sustained data refinement.

Numerical Ocean Prediction Model

A two-tiered numerical modeling approach was adopted:
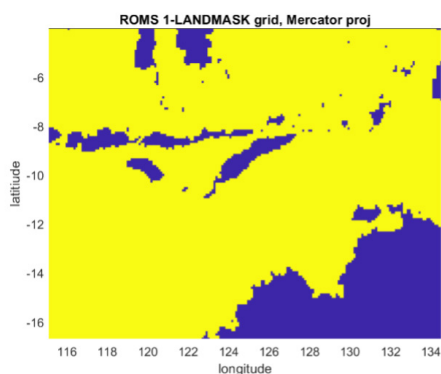
- Coarse Domain: A regional model (10 km resolution) covering the Timor and Banda Seas; this initial phase provided a broad overview of oceanic conditions in the region.
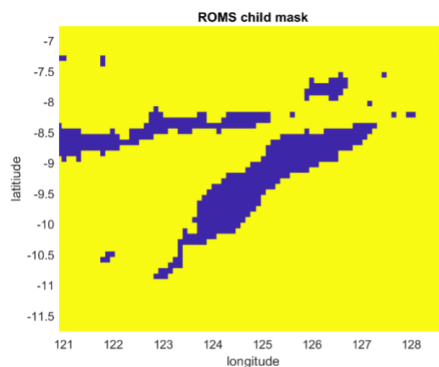
- Fine Domain: A high-resolution (2 km) coastal model for Timor-Leste's main islands; this approach ensures that localized forecasts are accurate and actionable, addressing the specific needs of coastal communities and stakeholders.

Model accuracy was enhanced using GEBCO 2023 bathymetric data, refining the grid for smoother geometry and extending vertical depth to 500 meters, focusing on continental shelf dynamics.

SST validation using NASA GHRSST data showed general agreement with observed patterns, though ROMS slightly underestimated temperatures. Key features, such as warmer water intrusion in the northwest region of Timor-Leste, colder water in open ocean areas, and the coldest water (~25°C) along the Australian coast, were captured by the model.
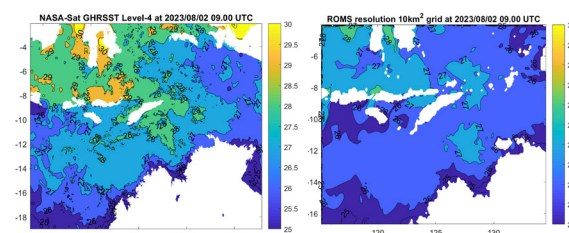
SST models

The smoothed grid derived from the ROMS model was adopted. Nine strategically placed validation points were established across the domain to assess model performance. These points were compared against Global Ocean L4 Significant Wave Height data from NRT satellite measurements (2° horizontal resolution, merging along-track SWH data from multiple satellites).

WW3 Models

The **WW3** model was run using the ST6+GMD parameterization for the first half of 2024, producing daily averaged output. Model results were compared with the remote sensing data. While lower correlation (R) values were observed at deeper locations (points P2, P3, and P6), the model generally captured the overall wave trends. At the remaining validation points, the correlation coefficient (R) exceeded 0.8, indicating good model performance.

TMD3 Model
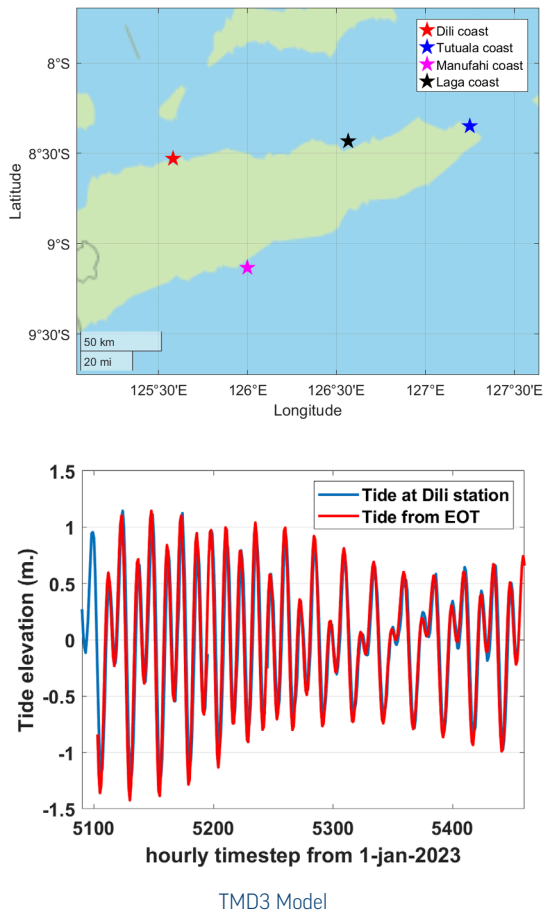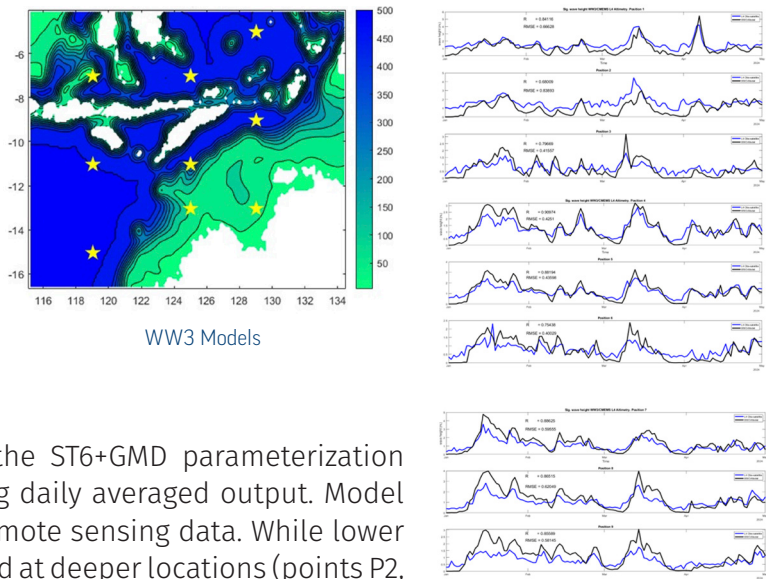
The **numerical tide prediction (TMD3)** predicts tidal elevations and velocities at specified locations and times. It utilizes astronomical tidal potentials and employs harmonic analysis to determine these values. The model incorporates data from the Empirical Ocean Tide (EOT) model, which is derived from residual harmonic analysis of multi-mission altimeter data. For the calculation, the model utilizes data on 17 dominant ocean tide constituents, including Semi-diurnal, Diurnal, Long Period, and Higher Harmonics.

The model was configured to focus on the Timor-Leste region and its surrounding seas for spatial data analysis. Hourly tidal elevation time series were extracted at specific locations. For validation purposes, reference data were obtained from the Dili tide station in Timor-Leste for the month of August.

Initial results demonstrated that the model output, utilizing 17 tidal constituents from the EOT, effectively captured the tidal trends, including ebb and flow tides, even during the transition phase from spring to neap tides. However, the model output exhibited a six-hour time shift. After adjusting the tidal phase, the model results demonstrated excellent agreement with the observed data in terms of both tidal phases and amplitudes.

Remote Sensing Applications

Coral bleaching hotspots were identified using Sentinel-3 SLSTR daily SST data for November and December. Data preprocessing included glint reduction, temperature conversion, and reprojection. The Maximum Monthly Mean (MMM) SST for November (31.06°C) was used to calculate Heat Stress (HS) levels based on NOAA's methodology. Initial hotspot detection in December highlighted cloud cover as a limitation. Additionally, Degree Heating Week (DHW) calculations are being implemented to assess cumulative heat stress over 12 weeks, with ongoing efforts to automate hotspot detection and improve data interpolation.

Sentinel-3 **sea surface temperature** data analysis revealed an expansion of coral bleaching hotspots in December, with rising temperatures over time. While cloud cover poses challenges, near-daily monitoring is feasible. Work is underway to automate hotspot detection and integrate DHW calculations for a more comprehensive assessment of coral bleaching risks.

PFZs were mapped using remote sensing data such as Chlorophyll-A content and SST, which influence fish abundance. While MODIS data was initially used, higher-resolution Sentinel-3 OLCI and SLSTR imagery is now preferred. Daily PFZ maps are generated based on hotspot trends from the past 7–8 days, though cloud cover and satellite coverage gaps can sometimes limit complete national PFZ mapping. Forecast maps can still be produced if at least five previous PFZ maps are available.

Automation/implementation of above methodologies/products will be undertaken following verification and approval by local stakeholders.

Access the research work undertaken by RIMES on Coral Bleaching and Potential Fishing Zone Hotspot Analysis Report for more information.

Hotspot for Potential Fishing Zone in Timor-Leste
(2-3 Dec 2024)
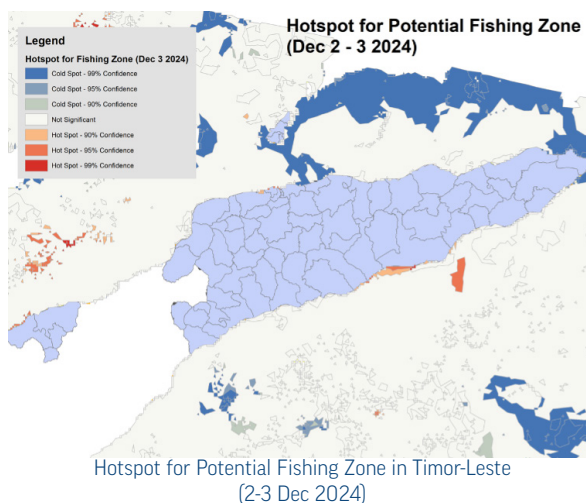
OSFAS Application Development

OSFAS for Timor-Leste was developed based on the features of previously deployed systems in Seychelles and Maldives. The following modules have been implemented:

- Ocean Observation Data: Displays tidal gauge measurements from IOC and near-real-time satellite altimetry from Copernicus.

- Weather & Ocean Forecast Maps: Integrates ocean and wave model outputs to provide three-day forecasts at three-hour intervals. Localized WRF and ECMWF model data are also included, with daily updates.

- Forecast Points Module: Allows users to manage specific forecast locations for tailored ocean predictions.

- Alert Levels & Thresholds Module: Enables users to set thresholds for ocean parameters and assign color-coded alert levels.

- OSFAS Dashboard: Provides an overview of critical alerts, forecast summaries, and highlighted ocean parameter values based on alert levels for quick decision-making.

To tailor OSFAS to Timor-Leste's needs, Focus Group Discussions (FGDs) were held in May 2024 with key stakeholders to validate features and identify additional requirements. Based on these discussions, enhancements such as PFZ mapping, tide and moon phase tracking, bulletin sharing via Facebook and WhatsApp, and language localization were proposed for future development.


OSFAS Interface
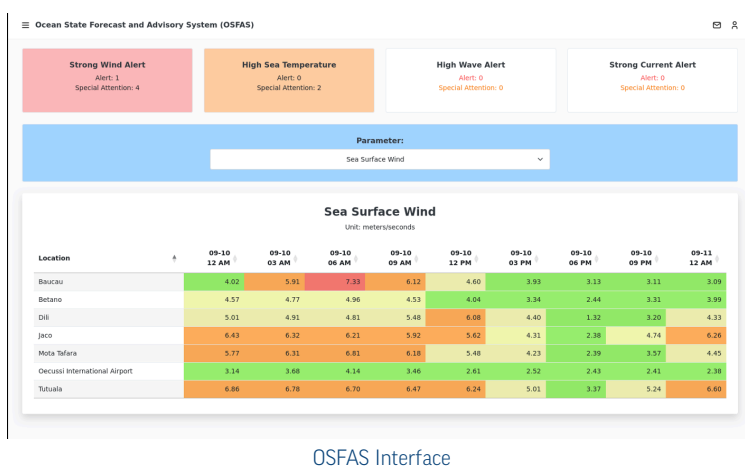
SUPPORT TO NMHSs ON ENHANCED FLOOD FORECASTING

RIMES continues to make significant strides in enhancing flood forecasting capabilities across its member and collaborating countries while building on previous achievements in response to the growing need for effective disaster risk reduction strategies. Working closely with national agencies, RIMES developed and refined hydrological models that enhance data-driven decision-making, ensuring communities are better prepared for flood-related hazards. These initiatives are crucial for regions increasingly vulnerable to extreme weather events due to climate change.

Babai Flood Forecasting Model

In Nepal, RIMES partnered with the Department of Hydrology and Meteorology (DHM) to finalize the Babai Flood Forecasting Model through the SLMC Project. This accomplishment builds on earlier work to strengthen Nepal's hydrological monitoring systems, which were previously limited by fragmented data and less advanced forecasting tools. The newly developed model utilizes forecasts from multiple sources, integrated with DHM's observation data, to provide corrected flood forecasts for the Chepang station along the Babai River. This approach enhances the accuracy of flood predictions, addressing past challenges in forecasting reliability.

The model was integrated into the Flood Forecasting (FLOCAST) tool, greatly improving the visualization of flood forecasts.
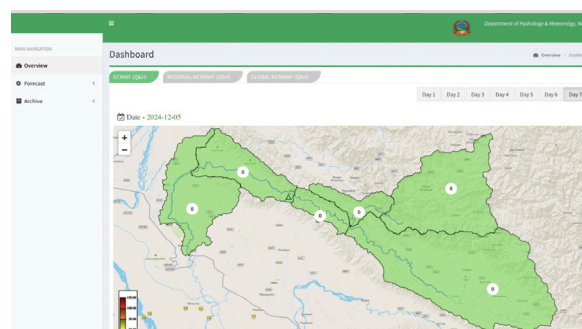
Hydrological Model of the Babai River Basin, Nepal

By offering up to seven (7) days of advance flood predictions, the model now supports more effective early warning systems. This capability is pivotal for local communities and disaster management authorities, enabling timely preparedness actions and the implementation of more robust disaster risk reduction measures. The Babai Flood Forecasting Model exemplifies a strategic shift towards proactive disaster management in Nepal, building resilience in one of the country's most flood-prone regions.

Hydrological Model in Sri Lanka

RIMES is supporting the Department of Irrigation (DoI) in developing and calibrating the Kalu Ganga Basin hydrological model. Despite challenges posed by limited rainfall data—sourced primarily from four observation stations (Ratnapura, Ellagawa, Millakanda, and Putupaula)—RIMES successfully calibrated the model using non-reinforced rainfall station data. The model effectively captured key peaks and patterns, particularly for the Ellagawa and Ratnapura stations.
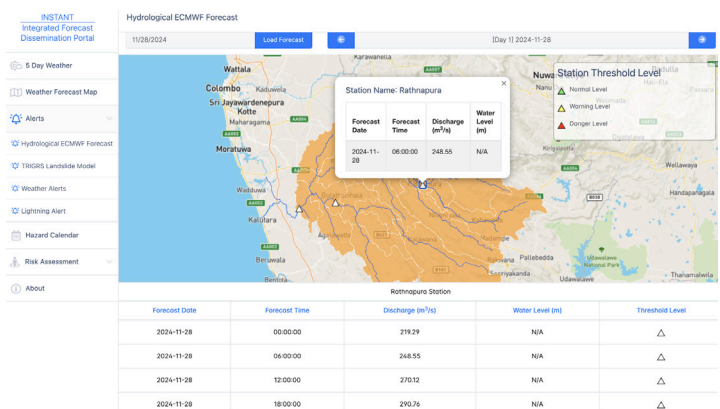
Water Discharge Level Forecasting based on the Calibrated Kalu River Basin Hydrological Model

Now integrated into INSTANT Sri Lanka, the model can predict water discharge levels from these stations. RIMES has also initiated the computation of rating curves for each station, which will be incorporated to enable precise water level forecasting. Further refinements are underway, with ongoing coordination between RIMES and DoI to acquire additional observation data. Model accuracy is expected to improve further with the installation of river gauge posts and expanded basin data collection under the project

Flood IBF and maps for Thailand

The DDPM-Thailand collaboration has made notable progress in developing flood impact-based forecasting (IBF). Data gathered since its launch in mid-2023 was instrumental in creating a detailed flood hazard map, forming the basis for accurate flood IBF.

In 2024, the project produced 16 flood simulation scenarios tailored to local flood risks were developed and presented to the local Mayor, whose approval ensured that they accurately represented real-world conditions and community-specific vulnerabilities. The development of these scenarios is rooted from the need for localized flood forecasting systems, as previous models lacked contextual relevance for Thailand's diverse geographical landscapes.
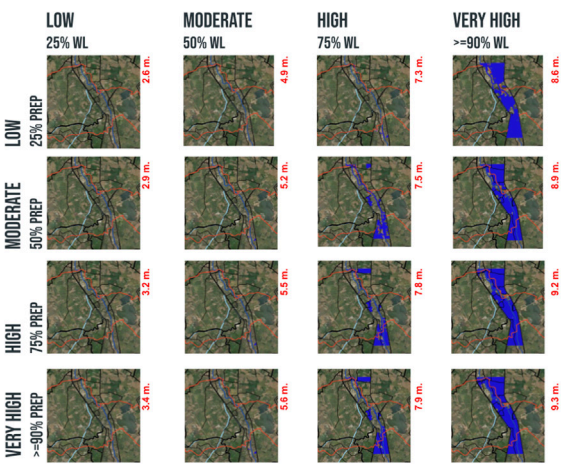
Flood Scenarios Simulation

These flood simulation scenarios were integrated into a flood forecasting platform and is being transferred to the DDPM server for thorough testing. This final phase will ensure that the system will provide accurate and reliable flood risk information. The same configuration is set to be replicated at pilot sites in Chaiyaphum, Satun, and Yasothorn provinces, marking a strategic expansion of localized flood forecasting capabilities.

To ensure the platform meets community needs, RIMES conducted comprehensive requirements gathering for 2025 in collaboration with stakeholders from Chaiyaphum and Satun provinces.

LANDSLIDE RISK MONITORING
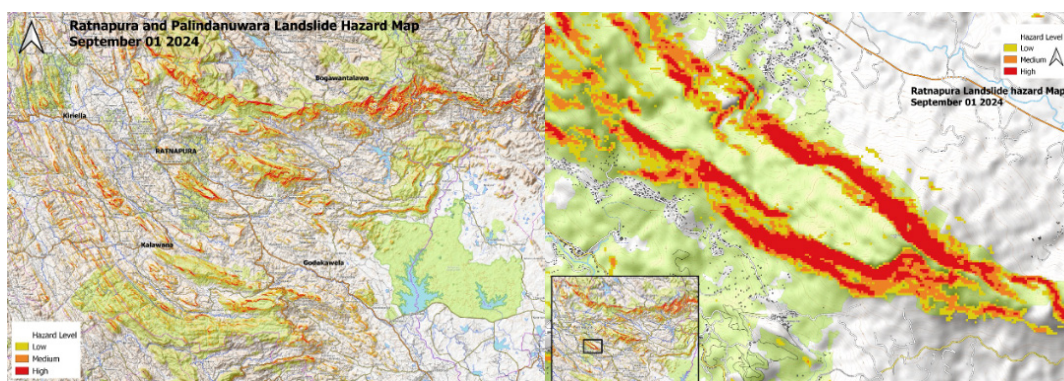
Sample landslide hazard map generated for Sri Lanka on 01 Sep 2024

RIMES developed landslide risk models for Sri Lanka's Ratnapura and Kalutara Districts using the Transient Rainfall Infiltration and Grid-Based Regional Slope-Stability (TRIGRS) tool. This model incorporates catchment-averaged rainfall data, digital elevation models (DEM), and watershed characteristics such as slope, land cover, and soil profiles. TRIGRS simulates infiltration, subsurface flow, runoff routing, and slope stability to assess shallow, rainfall-induced landslides, where infiltration and soil conditions are key factors. However, it does not account for deep-seated or earthquake-induced landslides, nor other mass movements like debris flows, lahars, or avalanches.

Initial model outputs were presented to SLMC project stakeholders during the INSTANT features consultation workshop on 3 November 2024, with participation from DOI, Department of Meteorology (DoM), Disaster Management Center (DMC), and National Building Regulations Organization (NBRO). NBRO expressed interest in the model and requested further discussions on calibration, validation, and potential training. RIMES will continue coordinating with NBRO to validate the model and provide training on TRIGRS.

PUBLIC HEALTH MODELLING AND OUTBREAK DETECTION

Diseases influenced by climate factors such as temperature, precipitation, and extreme weather events are classified as climate-sensitive diseases. In Timor-Leste, climate-sensitive diseases like dengue and diarrhea are prevalent, while extreme heat events have led to widespread occurrences of heatstroke, dehydration, and heat exhaustion.

To address these challenges, RIMES is developing predictive health models for outbreaks of dengue, diarrhea, and heat-related illnesses based on key climate variables, including rainfall, temperature, and relative humidity. These models will enable health authorities to implement targeted and timely preventive measures, such as issuing health advisories to at-risk communities; strengthening Water, Sanitation, and Hygiene (WASH) initiatives; distributing vaccines, medicines, and other medical resources and optimizing resource allocation for outbreak response.

Once completed, the health models will be integrated into the Climate Risk Information System for Public Health (CRISH) decision-support system (DSS), enhancing the country's capacity to manage and mitigate climate-sensitive health risks.

ENHANCING CAPACITIES IN OPERATIONAL FORECASTING

2nd National S2S Training in Lao PDR and Cambodia

As part of the CREWS initiative, RIMES facilitated the second National Subseasonal-to-Seasonal (S2S) Training Workshops in Lao PDR and Cambodia. Held on October 22–25 in Vientiane and October 28–November 1 in Phnom Penh, the workshops engaged 21 participants (8 in Cambodia and 13 in Lao PDR) from National Meteorological and Hydrological Services (NMHS). The training covered probabilistic and ensemble forecasting, global climate circulation models, and climate prediction tools such as the Python Climate Predictability Tool (PyCPT) and XCast.

Participants explored climate dynamics, including global circulations and monsoon systems, and engaged in practical sessions on climate data analysis using platforms like the Copernicus Climate Service. Hands-on exercises involved downloading forecasts, analyzing past events, and creating climate projections to enhance forecast applications in real-world scenarios. The training also addressed forecast accuracy and reliability gaps, with discussions on integrating advanced methodologies into operational systems. The workshops concluded with recommendations for sustained engagement and follow-up training to strengthen forecasting capacity in both countries.

S2S Training in Lao PDR

S2S Training in Cambodia

Training for BWDB Professionals on Flash Flood Guidance Systems

The plan was to provide BWDB professionals at both national and district levels with comprehensive training on the operation, maintenance, and usage of the Flash Flood Guidance System to strengthen understanding and decision-making. This training was designed to include threshold-based forecasting, hydrological models, flood early action strategies, and an in-depth overview of system components, such as the IoT-based river monitoring network, flash flood alert and advisory systems, web-based analytic platforms, and system automation.

CARE COMPONENT 1
PROJECT CAPACITY BUILDING ACTIVITIES

The CARE Component 1 Project conducted and supported capacity building activities throughout 2024. The following is the summary in numbers:

85%
Actual Satisfaction Rating
based on survey forms

1,237
Government Officials trained

15%
Female participants

86
Sessions of the Forecasters' Forum

SOUTH ASIA HYDROMET FORUM (SAHF)

SAHF 4th Annual Conference in Sri Lanka

4TH ANNUAL CONFERENCE

06-09 February 2024, Colombo, Sri Lanka

This year's Annual Conference brought together regional stakeholders to enhance hydrometeorological services and disaster management. The forum focused on value creation and decision-making based on actionable hydromet information, structured around five key themes: strengthening service delivery, expanding observation networks, fostering regional collaboration, empowering communities, and advancing regional prediction and analytics. Discussions highlighted the need for user-driven services, improved data sharing, and digital solutions to support climate resilience, particularly for vulnerable populations in diverse geographic settings.

A major outcome of SAHF IV was the adoption of the SAHF IV Declaration, which reinforces commitments to improving hydromet services, strengthening regional observation networks, and enhancing early warning systems. Stakeholders emphasized multi-sectoral collaboration, skill development, and financial support as critical for long-term sustainability. Moving forward, efforts will focus on establishing COPs for knowledge exchange, ensuring the sustainability of national investments through collaboration with RIMES and other development partners, and leveraging synergies across hydromet, air pollution, and heat-related initiatives.

WORKSHOPS, TRAININGS, & MEETINGS

Training on Customization of Ocean Forecast Products

20-24 May 2024, Hyderabad, India

The training was a collaborative initiative by INCOIS and the SAHF-CARE for South Asia Project. Designed to strengthen the capabilities of NMHSs in Bangladesh, Myanmar, Maldives, and Sri Lanka, the training focused on customizing ocean forecast products to address maritime and climate-related challenges. Participants gained hands-on experience with advanced forecasting tools and methodologies, enhancing their ability to generate and apply oceanographic data for disaster risk reduction and coastal management.

Ocean forecast customization training at INCOIS

The program trained 11 mid-career professionals from NMHSs, who acknowledged its value in improving their operational and tactical skills. The training addressed critical gaps in ocean information access and application, equipping participants to better utilize and customize ocean datasets and forecast products. Key sessions covered operational ocean services, wave forecasting, circulation modeling, and oil spill advisory systems, all of which were highly appreciated for their practical relevance. These enhanced skills are expected to support more effective decision-making in maritime safety, disaster preparedness, and climate adaptation across the South Asian region.

SAHF DataEx Platform AND ECMWF Data Extraction Orientation

24 June 2024, Online

In response to the DHM-Nepal's request for enhanced data extraction capabilities, an orientation workshop was held online on 24 June 2024. The session introduced DHM officials to the tools and methodologies required for effectively accessing and utilizing ECMWF data through the SAHF DataEx platform.

Six (6) DHM officials from various meteorological divisions participated, gaining essential skills in data retrieval and application for meteorological and hydrological forecasting. The training is expected to enhance DHM's operational capabilities, improving their ability to generate high-quality forecasts and early warnings.

Impact-Based Forecasting WG Meeting

31 July 2024, Bangkok, Thailand

The SAHF IBF Working Group Meeting, held on 31 July 2024 in Bangkok, played a crucial role in advancing IBF capabilities across South Asian NMHSs. The meeting translated strategic directions from the SAHF Executive Council (EC) into actionable plans, fostering stronger collaboration between operational forecasters and IBF Working Group members. A key focus was on co-developing DSSs with sectoral agencies, ensuring forecasts are tailored to specific needs.

Aligned with the Regional Training Workshop for SAHF Forum Expanded Service Support, the meeting exposed participants to forecast products and tools used for weekly forecasts and extreme event prediction. Discussions emphasized overcoming challenges in multi-hazard early warning systems, particularly in the context of rising climate variability and extreme weather. Participants also explored strategies for sustaining IBF initiatives, integrating sector-specific applications with broader early warning systems, especially for vulnerable communities.

SAHF IBF Working Group meeting participants

Training on Forecast Interpretation and Verification

23-27 September 2024, Noida, India

With climate change intensifying extreme weather events, the demand for accurate, timely, and reliable hydrometeorological forecasts is rising across South Asia. While many NMHSs have established foundational forecasting capabilities, there remains a pressing need for expertise in probabilistic forecasting, model verification, and IBF. These advanced skills ensure that forecasts are actionable, precise, and relevant to key sectors such as agriculture, aviation, and disaster management.

To address these challenges, the Training on Forecast Interpretation and Verification was organized from 23–27 September 2024 (hybrid format) in collaboration with NCMRWF, India. The training engaged 17 professionals from NMHSs across Afghanistan, Bhutan, India, Maldives, Nepal, and Pakistan, equipping them with advanced tools and methodologies to enhance forecast accuracy and strengthen early warning systems. By improving prediction capabilities, the training supports preparedness and response efforts in the face of severe weather events.

Additionally, the training promoted regional collaboration by fostering peer learning and knowledge exchange among NMHSs. Recognizing that cross-border cooperation enhances forecasting effectiveness, SAHF designed the training to facilitate discussions on national challenges and shared strategies, ultimately strengthening the resilience of the region's forecasting networks.
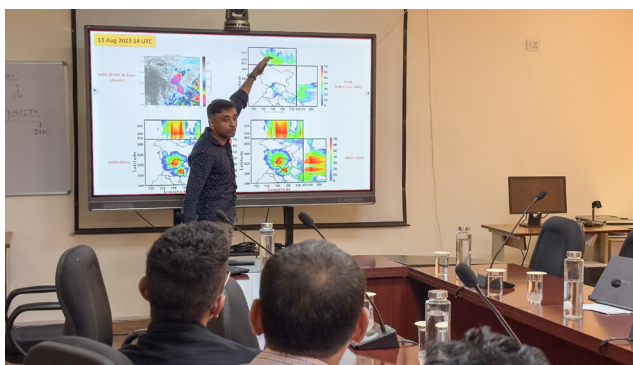
Forecast interpretation and verification training participants

SAHF FORECASTERS' FORUM

The FForum completed 51 sessions in 2024 until 20th December 2024. The forum sessions engage operational forecasters from NMHSs in the region, discussing significant weather events, assessing past forecasts, and forecasting upcoming weather prospects. The FForum's detailed insights benefitted NMHSs in tailoring country-specific forecasts and warnings.

In addition to regular weekly forum four special sessions were also organized including:

- Session to review the 2023 South west monsoon;
- Special lecture series - ENSO, ocean warming and monsoon;
- Special session for REMAL cyclone; and
- Session for mid-season review of 2024 south west monsoon.

In addition to weekly bulletins a special bulletin for the CYCLONIC STORM "REMAL" was also released on 26th May 2024 to support the SAHF member countries.

Photos from the FForum Expanded Service Support Workshop

Regional Training Workshop for SAHF FForum Expanded Service Support
29-30 July 2024, Bangkok, Thailand

The training workshop aimed to strengthen regional collaboration and enhance forecasting capabilities among South Asian NMHSs. With extreme weather events becoming more frequent and severe, the workshop provided a platform for forecasters to explore AI and ML applications in weather forecasting, share best practices, and address common challenges. Eighteen professionals from hydrometeorological institutions across SAHF member countries participated, gaining insights into advanced forecasting tools, data-driven methodologies, and real-world applications. The workshop also emphasized improving forecast dissemination, regional cooperation, and strategic planning to sustain and expand the FForum's initiatives.

Post-training Knowledge, Skills, and Abilities (KSA) assessments highlighted significant advancements in participants' expertise. They reported improved understanding of AI/ML applications, ensemble data usage, and extreme weather prediction, including tropical cyclone forecasting. The training also enhanced skills in medium and extended-range forecasting and integrating new methodologies into operational workflows. Participants felt better equipped to collaborate with regional centers, apply innovative forecasting tools, and advocate for advanced forecasting techniques within their institutions, ultimately enhancing South Asia's collective capacity to manage extreme weather events.

# TRANSFORMING DATA INTO ACTIONABLE INFORMATION

RIMES has played a crucial role in translating scientific data into user-friendly decision support systems (DSS). In 2024, efforts focused on integrating regional analytics, institutionalizing anticipatory action frameworks, and strengthening climate-smart solutions across key sectors, including agriculture, water management, public health, and disaster risk reduction.

REGIONAL DATA ANALYTICS SYSTEM (RDAS)

RDAS is a public-domain platform designed to consolidate open data and analytics relevant for climate-informing key sectoral policies, decisions, and investments across South Asian Regional (SAR) countries, including Afghanistan, Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan, and Sri Lanka. RDAS optimizes the use of open-source data and models, integrating datasets for application in climate risk and resource management.
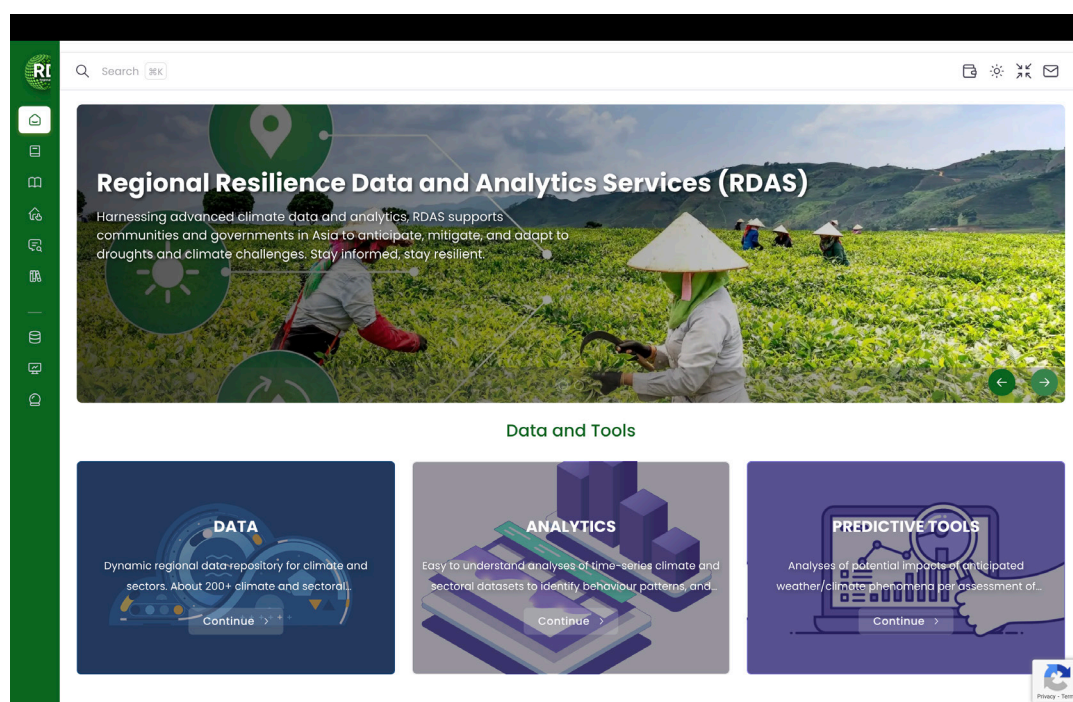
RDAS Dashboard

RDAS Community of Practice (CoP) meetings were organized to bring together users and potential RDAS adopters from various sectors—including government, non-government institutions, and academia—to foster innovation, cross-sectoral partnerships, and knowledge exchange.

Two major CoPs were held:
1) 30 November 2023 in Thailand, and
2) 16 August 2024 in Nepal

These events provided a platform for sharing experiences, lessons learned, and obtaining feedback for the continued refinement of RDAS.

Progress on RDAS Development

RDAS achieved significant progress in 2024, completing 4 out of 5 target milestones:
- ✔ RDAS Prototype System Completed (December 2021)
- ✔ User Interface Developed and Launched (October 2022)
- ✔ RDAS Experimentally Operational (October 2022)
- ✔ Integration with SAHF Knowledge Hub and DSSs (June 2024)
- O Final Milestone (Fully Operational RDAS - Scheduled for completion by December 2024; ongoing enhancements based on stakeholder feedback.

Data Module

RDAS enhances access to climate and sectoral data across various spatial and temporal scales.

✔ Incorporated 228 datasets incorporated, classified by sector, coverage, readiness of use, format, and data source.

✔ Integrated with Google Earth Engine for extracting, processing, and downloading climate parameters.

RDAS Data Module

Analytics Module

Provides user-friendly analysis of climate and sectoral data to identify trends and relationships.

✔ Completed three (3) modules:

· El Niño and Local Climate Analysis – Correlation analysis of El Niño intensities and climate parameters over 30 years; completed in October 2024

· Land Use & Land Cover Change Analysis – Trend analysis of different land cover types; deployed in Nepal and Pakistan DSSs; datasets for Afghanistan and Bhutan to be integrated by December 2024

· Crop Calendar Suitability Analysis – Evaluates inter-annual variability of cropping calendars; deployed in November 2024.

RDAS Analytics Module

Predictive Tools Module

Deploys models to anticipate sectoral impacts of climate variability and guide decision-making.

✔ Completed the integration of El Niño Impacts Prediction Tool – Predicts El Nino-driven rainfall and temperature variations

✔ Ongoing deployment of Growing Degree Days (GDD) Tool – Calculates crop growth stages based on temperature forecasts; enhancements to be completed by December 2024
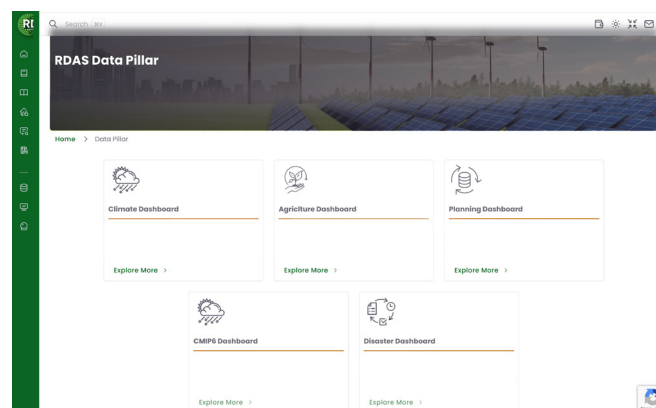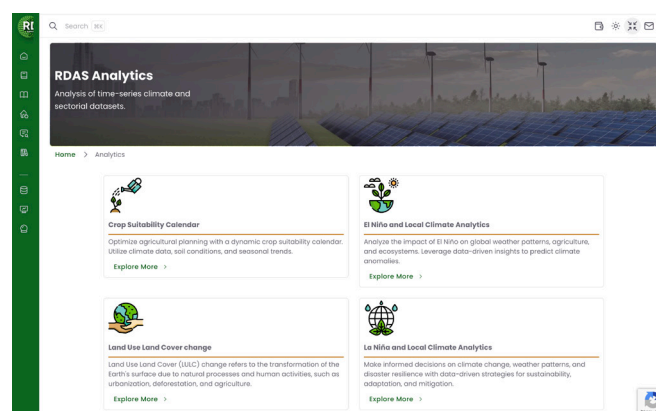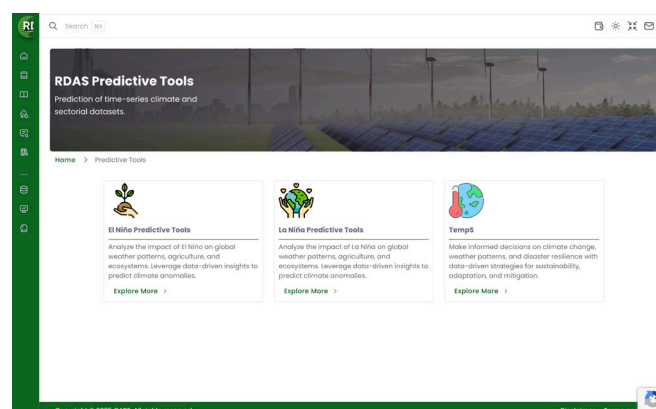
RDAS Predictive Tools Module

DECISION SUPPORT SYSTEMS

Agriculture Sector

BAMIS | Bangladesh
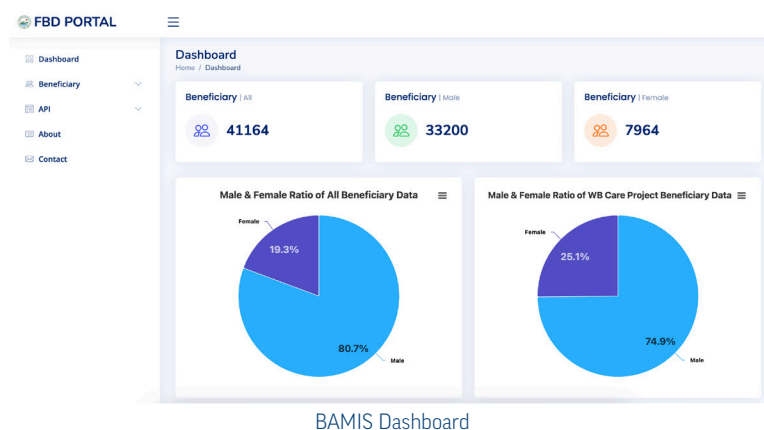
BAMIS Dashboard

Support to DAE's Bangladesh Agro-Meteorological Information Systems (BAMIS) through the development of tools, i.e. 1) Agromet Service Beneficiary Database Portal, 2) Kiosk Monitoring System, and 3) mobile application. The following were completed in 2024:

✔ Integrated **Gender Analytics** in the Agromet Service Beneficiary Database Portal to better understand and optimize the roles of women and men, at different levels, in the agriculture sector;

✔ **Agromet Sercvice Beneficiary Database Portal** (https://farmer.bdservers.site/), a web-based database of farmers, farmer leaders, extension workers, and local service providers, to support rapid dissemination of agromet advisories to specific areas and efficient collection of feedback from end-users and other stakeholders. The database has been expanded to include DMC members, local journalists, community leaders, among others, to maximize the reach and application of agromet services.

✔ Development of the **Kiosk Monitoring System** (https://kms.bdservers.site/) which serves as the central monitoring system for agromet computer kiosks capable of spotting/ flagging non-operational computer kiosks and uploading agromet information for rapid dissemination via these kiosks. The **mobile application** is underway, which include: advisory system/bulletins based on real-time weather conditions, disease detection and management, user-crop-wise task reminder system, farmers' database, and feedback mechanism.

✔ **Sent Special Advisories to stakeholders** in the agriculture sector:

» Special advisories for heat stress disseminated to 59 districts, and to 22,145 lead farmer-recipients from 11 to 16 of April 2023;

» Special advisory messages disseminated to 7,009 lead farmers ahead of cyclone 'Mocha' in 14 districts from 10 to 13 May 2023;

» iii) Special advisory messages disseminated to 7,234 lead farmers for cyclone 'Hamoon' in 17 districts from October 24 to 25, 2023;

» iv) Advisory for heavy rainfall due to depression disseminated to 7,989 lead farmers for cyclone 'Midhili' in 50 districts in November 2023;

- » v) Advisory for cyclone 'Michaung' disseminated to 22,289 lead farmers from 54 districts in December 2023;
- » vi) Advisory and Flood Alert disseminated to 7 districts via voice messages (3,977) on 29 April 2024;
- » vii) Special Bulletin for Cyclone 'Remal' has been disseminated to all (64) districts via voice messages (25,481) and scroll messages/push notifications sent to kiosks on 25 May 2024.

National Livestock Advisory System (NLAS) | Bangladesh

NLAS is a climate-smart DSS tailored for the livestock sector that aims to help ensure sustainable livelihoods of farmers amid changing climate conditions through the generation and dissemination of location-specific risk management options/advisories in local language/dialects.

NLAS Dashboard

NLAS provides weather updates, interactive visualization (figures, charts, and table) of location-specific BMD (WRF) forecasts of relative humidity, temperature, precipitation, and humidity for all 495 Upazilas for the next 6 days including Upazila-wise 3-hourly forecasts; threshold-based alerts for heatwave, cold wave, rainfall, wind, and temperature heat index (THI); and ML-enabled temperature bias correction tool

✔ **Climate**, integrates the climatology of Bangladesh (baseline 1990-2020), including comparison between monthly normal and observed rainfall/temperature data from BMD; district-wise monthly/seasonal/annual climate projection of rainfall/temperature data using SSP2-4.5 of the CMIP6 ACCESS-CM2 model for various period/range, e.g., 5, 10, 20, 30 years; monthly climate outlook (e.g., mean/min/max temperature, total rainfall)

✔ **Analytics**, analyses of district-wise, monthly/seasonal/annual Foot and Mouth Disease (FMD) clusters and incidence (cattle and buffalo) from 2014 to 2020 and visualization of predictive risk map and guidance for pre-/post-monsoon/winter seasons; data sources include DLS and Bangladesh Bureau of Statistics

✔ **Decision Box**, district-wise graphical visualization of projected THI for the years 202-2050, 2031-2060, and 2041-2070

✔ **Statistics**, charts and maps visualization:
- » Annual statistics on livestock animals (e.g., cattle, buffalo, goat, sheep, chicken, duck) and their products (e.g., egg, milk, meat) over 15 years from DLS
- » Gender analytics, including i) gender in farmers and agriculture labors (Bureau of Statistics);

ii) women's income in raising small ruminants (Sumi et al, 2021); iii) gender in labor force disaggregated by category, e.g., agriculture, services, and industries (World Bank); iv) agriculture-related policies; v) gender in livestock extension workers; vi) participation in capacity building activities by gender

✔ **Advisory and Dissemination**, provides region-wise monthly advisory for livestock and poultry

✔ **Special Bulletin**, capable of generating advisories for extreme events such as heatwave based on weather forecast provided by BMD and flood/flash flood conditions based on flood forecast by FFWC

   Special advisories disseminated to stakeholders in the livestock sector: i) Special bulletin for heat stress for livestock sent to 44,148 farmers and local extension workers in 13 districts form 11 to 16 April 2023; ii) special advisory voice messages disseminated to 36,441 farmers in 13 districts ahead of cyclone 'Mocha' in May 2023; iii) heat wave alert disseminated to 7 districts via voice call (42,759) on 18 April 2024; iv) heat wave alert disseminated to 24 districts via voice call (77,161) on 22 April 2024; v) heat wave alert disseminated to 18 districts via voice call (60,234) on 28 April 2024

✔ **Vaccine & Disease**, provides a list of diseases/vaccines from DLS for guiding their management/administration

✔ **Long Term Adaptation Plan** (additional module), identifies specific climate risks relevant to a region including assessment of the frequency and severity of climate-related disasters, such as, heatwaves, floods, and droughts and provides recommendations (such as implementation strategies for infrastructure improvements, ecosystem restoration, community engagement, etc.), based on the goals of the National Adaptation Plan of Bangladesh (2023-2050) for the livestock sector

✔ **Mobile application**

BICAS Chatbot Development | India

Under the Climate-Resilient Agricultural program, RIMES and Bihar Agricultural University developed an innovative chatbot aimed at revolutionizing how farmers access agricultural information and weather advisories. The chatbot features an intuitive interface with three main sections: Home, Chats, and Help. The Home section showcase frequently asked questions about weather and crops, while the Chats section enable farmers to interact directly with the AI system for specific queries. The Help section provides easy access to essential contacts, including government-operated call centers for additional support.

A key feature of the chatbot will be its ability to provide location-specific weather updates and agricultural advisories. By accessing the user's location data, the system will deliver targeted information crucial for day-to-day farming decisions. The technical architecture of the chatbot is being designed to integrate seamlessly with external weather APIs and agricultural databases. This integration will ensure that farmers receive the most current and relevant information about weather conditions and crop management practices.

Agro-Advisory System (ADVISE) | Nepal
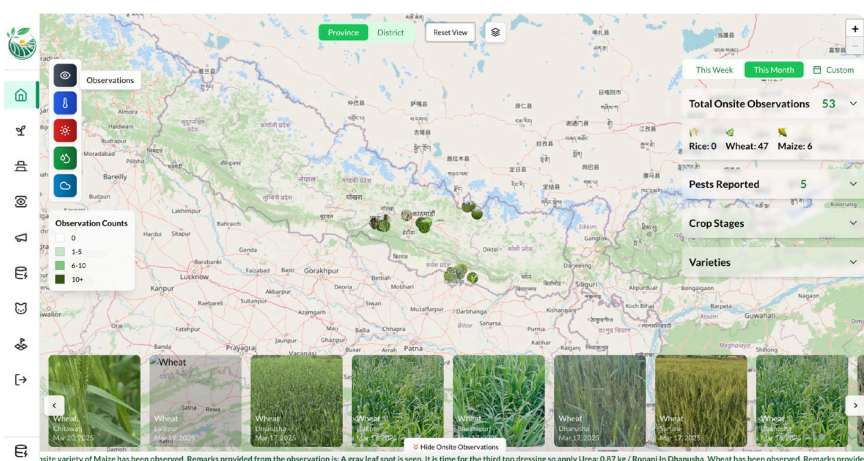
ADVISE-Nepal Dashboard

ADVISE is a climate-resilient agriculture system supported with real-time data and crop advisories. It has completed the following in 2024:

✔ **Climate-Agriculture Patterns (Data Repository)**, hosts time-series data on crop production and observed climate, to better discern interaction patterns between climate and agriculture

✔ **Observation & Forecast**, this module includes:
- » <u>On-ground observations</u>, which include data for all key parameters (rainfall, max temp, min temp, wind, and humidity) at district level, for the latest day, past 7 days, and past 30 days
- » <u>Location-specific 3-day forecast</u>, automatically fetched from DHM; with redundancy mechanism for ensuring regular flow of information

✔ **Resources**, to host literatures/materials that are useful for further developing the agriculture sector

✔ **3-Day Advisory, General Advisory, Seasonal/Monthly Advisory**, capable of generating and sending the location-specific, anticipatory crop-specific advisories that are supported with observation and forecast data, for managing better crops productivity and managing risks;

✔ **Mobile application**

Agro-Advisory System (ADVISE) | Balochistan and Punjab, Pakistan

ADVISE in Pakistan aids climate-resilient agriculture in Balochistan and Punjab to generate analytics and crop advisories to guide decisions of institutional leaders, extension agents, and farmers through dynamic analysis of climate information of various timescales and crops requirements.

✔ **Climate-Agriculture Patterns (Data Repository)**, equipped with time-series data of crop production and climate from Crop Reporting Services and PMD, respectively, to provide analytics to discern interaction patterns between climate and agriculture

✔ **Gender analytics**, that includes: i) gender in farming, ii) gender in agriculture extension, and iii) participation in capacity building activities by gender

✔ **Observation & Forecast**, that includes:

» On-ground observations, which include PMD observation data for all key parameters (rainfall, max temp, min temp, wind, and humidity) at district level, for the latest day, past 7 days, and past 30 days

» Location-specific 3-day forecast (WRF), automatically fetched from PMD; with redundancy mechanism for ensuring regular flow of information (e.g., ECMWF)

✔ **3-Day Advisory, Seasonal/Monthly/General Advisory,** supports agriculture extension agents to automatically generate location-, crop-, and crop stage-specific advisories, supported with observation and forecast data, for climate-informed crops, nutrients, pests, diseases, and water management, with lead times of 3 to 7 days; monthly/seasonal advisories offer a perspective for season-wise planning, to align crop strategies to anticipated climate and other relevant conditions

✔ **Resources,** a repository of literatures, research resources, and other materials that are useful for further developing the agriculture sector; and a platform for stakeholders to access and share beneficial information, for broader benefit of the sector

✔ **Mobile application**, an integrated platform for ADVISE Punjab and Balochistan has been published at Google Play Store
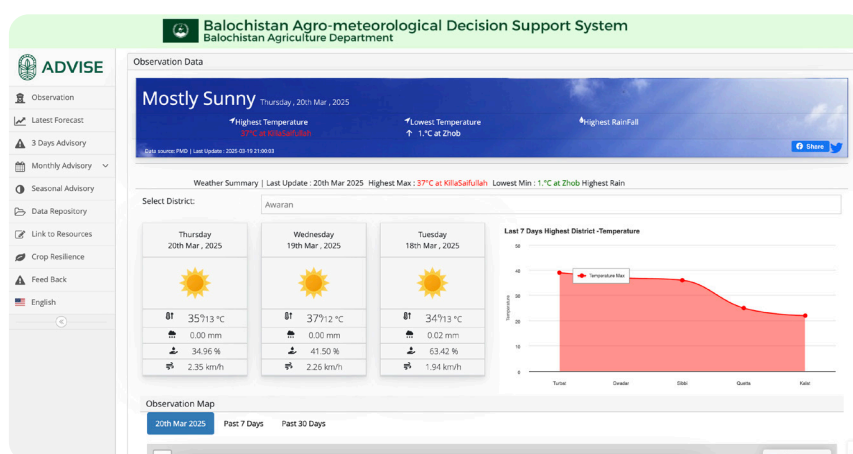
ADVISE Dashboard for Balochistan, Pakistan

Specialized Expert System for Agro-Meteorological Early Warning for Climate Resilient Agriculture (SESAME)| Timor-Leste

SESAME for Timor-Leste includes several key modules like Dashboard, Forecast, Weather Alerts, Crops, Bulletins and Outlooks, and Dissemination. It provides alerts and warnings on critical weather parameters such as strong winds, rainfall, and extreme heat or cold. These features assist agricultural extension workers in guiding farmers with timely advisories to enhance crop yields and mitigate potential damage from extreme weather disturbances. Currently, the prototype system is being populated with data for rice and corn, which have been identified as priority crops.
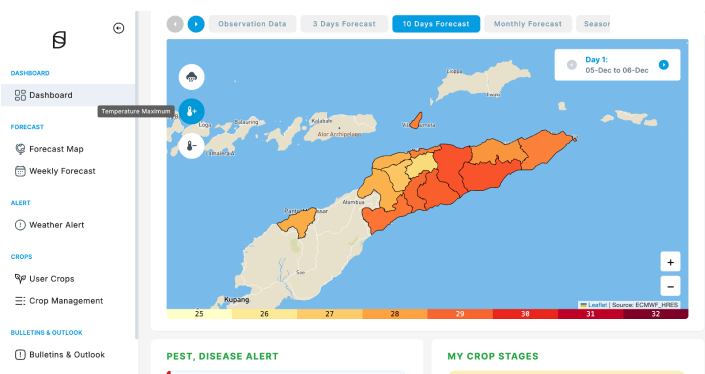
SESAME Dashboard

Water Sector

FFWC Web Portal | Bangladesh
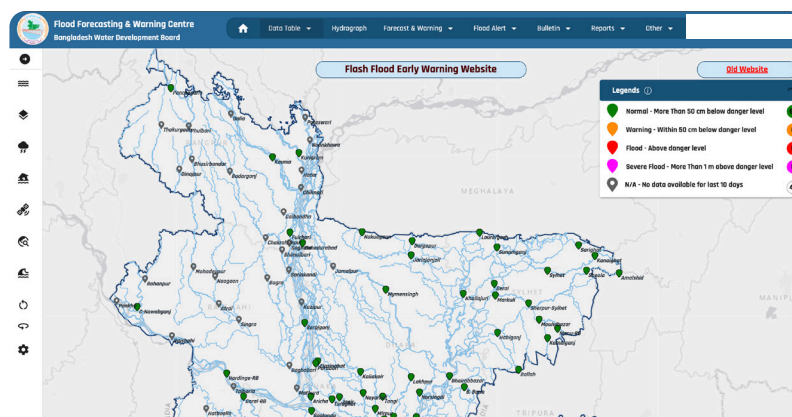
Enhanced FFWC Web Portal

The technical support to FFWC aims to enhance and transform its existing web portal into a DSS. The following have been completed in 2024:

✔ **Admin Panel**, facilitates efficient management of users and data (e.g., configuration of roles/access levels, data import-export and search mechanisms)

✔ **Forecasters' Panel**, include:
   » Observed Water Level of Transboundary Rivers, visualization of transboundary and in-country stations' water level on a map
   » Flood Forecasting, predicts in-country flooding using transboundary Indian station data
   » Flash Flood Guidance, provides an estimation of the amount of rainfall required over a given area during a given duration to cause flooding of small streams
   » Feedback, facilitates collection of users' experience/feedback/recommendations

✔ **Flood Magnitude Map** (Additional Module), a newly developed module that provides district-wise flood condition, e.g., normal (more than 50cm below danger level), warning (50cm below danger level), flood (above danger level), severe flood (more than 1m above danger level); clustering of stations into similar groups based on flood level type, including animated blinking of stations under severe flood, flood, and danger status

✔ Enhancements to existing modules within the FFWC website include:
   » **Rainfall Distribution Map**, a new method, Inverse-Distance Weighted (IDW), has been applied to generate rainfall distribution in raster format
   » **Inundation Map**, integrated a comparative/side-by-side visualization of satellite-based (Sentinel 1) and model-based flood extent and assessment of historical flood extent and affected cropland/urban areas/population (MODIS, GHSL) from 2019 to 2022
   » **Data Table**, integrated year-wise monthly sum and average water level observation data
   » **Hydrograph**, integrated basin-wise/district-wise/station-wise spatial maps for visualizing observed, short range (5-days)/medium range (10 days) forecasts of water level
   » **Forecast & Warning**, capable of generating automated bulletins with interactive table and filter options

Transport Sector

National Vehicular and Transport Resilient Gateway (NAVIGATE) | Nepal

NAVIGATE, customized for the Department of Roads (DoR), is a climate-resilient road operations and maintenance system that aids different stakeholders in addressing gaps in climate-informed planning and decision-making in the transport sector through provision of guidance information products such as long-range planning for planners and decision-makers and/or short-range decision making for end-users.

NAVIGATE Dashboard
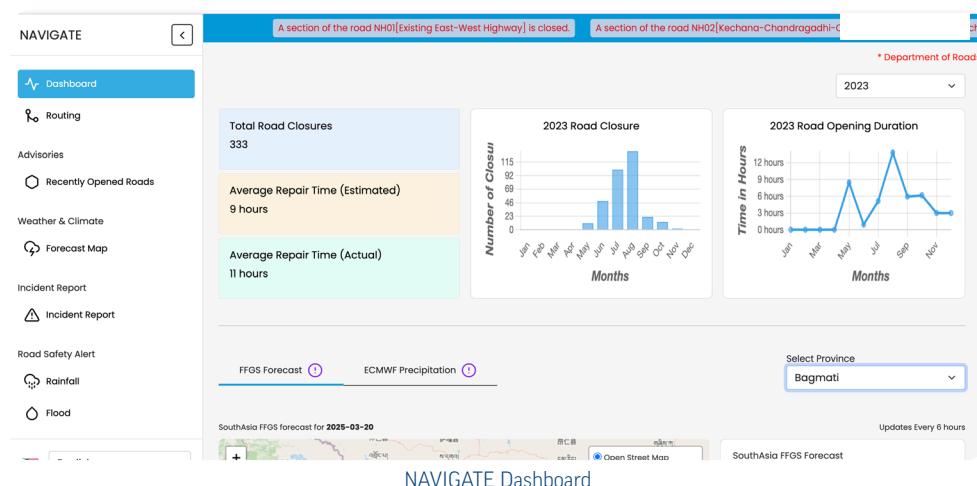
✔ **Weather & Climate**, provides rainfall/max temp/min temp forecast (ECMWF) for a specific day

✔ **Road Safety Alerts**, highlights location of roads/bridges, per province, that will likely be affected by heavy rainfall, flash flood, and landslide (refining landslide model for integration in the system)

✔ **Advisories**, capable of generating and disseminating district-wise rainfall and flash flood alerts/advisories, for Madhesh and Bagmati provinces

✔ **Data Repository**, this module provides time-series province-wise data/analytics on registered vehicles from Year 2012; and spatial visualization of rainfall impacts to roads, in terms of road closure and damage cost

✔ **Road & Bridge Closure Data and Analytics**, equipped with records/analytics of road/bridge closure events disaggregated district-wise, month-wise, road-wise/bridge-wise, including month-wise average repair time for better management of road operations and maintenance activities

✔ **Equipment** (additional module), takes stock of available heavy equipment, such as backhoes and dump trucks, for quick access/response during road/bridge closure events

✔ **Mobile application**, by December 2024

Ocean Monitoring

Ocean State Forecast and Advisory System (OSFAS) | Timor-Leste

OSFAS aims to deliver vital alerts for strong winds, high sea temperatures, high waves, and strong currents, which are crucial for safe sea navigation and sustainable fishing practices. As depicted in the figure below, OSFAS allows users to easily visualize forecasts for weather and ocean parameters. Additional modules currently in development include point of interest forecasts, fishing zones, tide and moon phases, forecast validation, advisory composition, and asset inventories. These features will empower end-users with actionable insights to make informed decisions regarding maritime and fishing activities.

OSFAS Dashboard
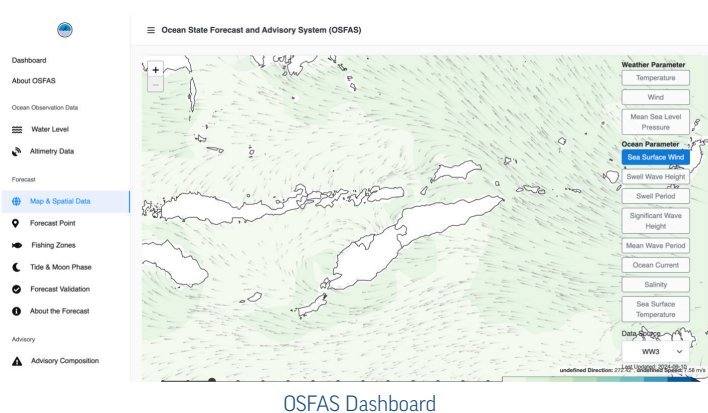
Tsunami DSS | Thailand

The DSS, design by RIMES, includes inflow data of processed earthquake information from the Thai Meteorological Department (TMD), ocean monitoring data from DDPM resources, seismic data from both TMD and DDPM seismic stations, and outflow data of hazards products following standard operating procedures. DDPM's key requirements were identified to define a list of key features and functionalities to ensure that the DSS effectively meets user needs.

A thorough assessment of available data sources evaluated the availability of crucial inputs for the DSS platform, including:
- Hazards: Data on potential hazards such as earthquakes and tsunamis.
- Exposure: Data on populations, infrastructure, and assets at risk.
- Vulnerability: Data on the potential impact of hazards on vulnerable populations and assets.
- Observation Data: Data from various sources, including real-time monitoring systems and historical records.
- Historical Disaster Information: Data from both online and offline databases.

Furthermore, existing tsunami warning products were analyzed to develop templates for automated advisory generation. These templates include formats for faxes, bulletins, SMS notifications, and warning sirens used by the NDWC.

Health Sector

Climate Risk Information System for Public Health (CRISH)| Timor-Leste

CRISH is a public health advisory system that is based on 3-day and 10-day forecasts of extreme weather conditions, for diseases that have high correlation with weather patterns, such as malaria and dengue. While awaiting the integration of the predictive health models for outbreaks of dengue, diarrhea, and heat-related illnesses, CRISH currently includes geo-tagged health facility inventories per municipalities, as shown in the figure below. Further enhancements will include case reporting for the priority diseases, medical transport network, and weather forecasts tailored to health risks. The system will enable assigned Health DSS Managers to disseminate health alerts and warnings via the Dissemination module, ensuring rapid communication of critical information to affected communities.

Dashboard of the prototype of CRISH DSS

Planning and Development Sector

Climate-Informed Planning (CLIM-PLANNeD) | Pakistan

CLIM-PLANNeD, designed for the Ministry of Planning, Development & Special Initiatives (MoPDSI), aids climate mitigation and adaptation efforts by providing data-driven insights for strategic planning across sectors.

CLIM-PLANNeD Dashboard

✔ **Agro-Suitability Pro**, a dynamic tool for analyzing/assessing province-/district-wise suitability of crops in various areas in Pakistan considering climate, soil, crop, and water availability parameters; and for supporting current and future decisions on crop resilience, up to district level, with 15 years of historical data and projections extending up to 2100; in addition to the 4 priority crops targeted for analyses, i.e., rice, wheat, maize, and cotton, the tool integrated pulses and oilseeds, such as, groundnut, brassica, sesame, soyabean, sunflower, chickpea, lentil, mung bean, cowpea, olives, based on stakeholder recommendations; data sources include ISRIS, Extension 2.0 Project of Punjab, World Climate Data, and crop norms from FAO, CMIP

✔ **Hazards and Impacts**, this module records district/provincial/national-level historical and future climate events and impacts, for better understanding of risk patterns, tailoring solutions, and supporting informed disaster resilience plans and decisions; data from Emergency Events Database [EM-DAT] since 1950 are disaggregated by frequency, casualty, sectoral and economic impacts at district/province/country-level

✔ **Resources**, serves as a hub for literatures/information materials that are useful for sustainable development planning and platform for knowledge-sharing and informed decision-making across sectors

✔ **Green Transport**, this module provides insights on current and future carbon emissions from land transportation and evaluates mitigation strategies to reduce these emissions; analysis of potential carbon outputs from land transportation over different time slices aids in data-driven planning and decisions on sustainable transport systems; parameters include population, renewable energy, oil prices, road infrastructure, energy intensity, and GDP per capita; data sources include Pakistan GHG data inventory GCISC, Climate Watch

✔ **Land Use & Land Cover** (additional module), trend analysis of increasing/decreasing trends of different land cover types (e.g., water, trees, flooded vegetation, rangeland, crops, built-up areas, bare ground, snow/ice, etc.) over a specified period (presented in charts and maps)

✔ **Mobile application**

Data Integration Platform | Thailand

One of the core objectives of the DDPM-RIMES project is to address the challenges in Integration of data from various sources by the development of a Data Integration platform. This platform's primary focus was on integrating data from multiple Thai's governments into a central platform using application programming interfaces (APIs), based on available data from DDPM and NDWC. Data used for flood forecasting included both observation and forecast data. All necessary information from the DDPM is ready for transfer via API to the RIMES platform.

Overall, the key accomplishments for this section include the successful integration of necessary data from DDPM, the allocation of a dedicated server for data management, and the initial design of the DSS framework.

Ongoing tasks the developer team prepared to transfer the system into data server as soon as developer completed to check their data server system, including verifying the data server system's functionality, ensuring that all necessary ports and configurations are properly set up, and conducting tests to ensure compatibility and security.

Disaster Risk Management Sector

Risk Anticipation for Preparedness and Informed Decision-making (RAPID) | Bangladesh

RAPID is a web-based platform integrating flood vulnerability, inundation, impact maps, and early action plans. It helps AA practitioners systematically implement FbA by linking FFWC's flood forecasts with potential impacts and actions. Designed through co-production workshops with disaster management professionals, it currently serves SUFAL II districts—Kurigram, Gaibandha, Bogura, and Jamalpur.

Following a 13 July 2023 workshop, the portal was populated with monsoon flood data. It was shared with stakeholders on 14 March 2024, where DDM's Director General, Mr. Mijanur Rahman, was the Chief Guest. Participants recommended linking RAPID to DDM's PROVATi3 Project, where RIMES is also providing technical support for flood early warning systems.

A tutorial is being developed for online access. SUFAL II will support DDM in hosting the portal, initially for flood-specific FbA in pilot districts, with potential expansion to other areas and hazards. The system aims for automated data processing to ensure sustainability. SUFAL II continues advocating for RAPID's integration with PROVATi3.

RAPID Portal Dashboard

RAPID Portal hand over to DDM on 11 March 2025

Integrated Forecast Dissemination Platform (INSTANT) | Cox's Bazar and Bogura, Bangladesh

As the continuation of INSTANT portal enhancements in Bangladesh, new features have been added to the portal such as heat stress alert and lightning nowcasting system.
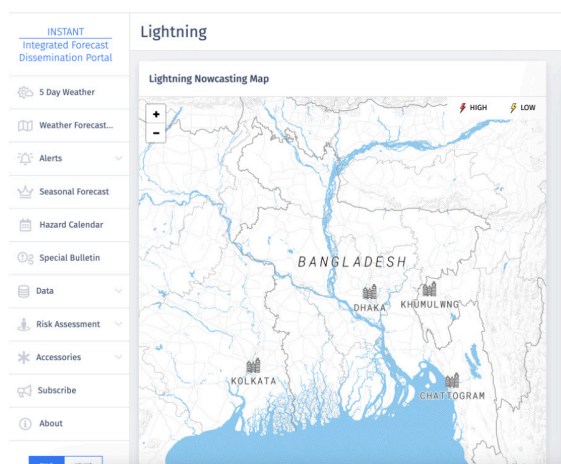
Lightning Nowcasting Section in the INSTANT Bangladesh

✔ **Lightning Alert**: Under SLMC project RIMES has purchased a subscription to lightning nowcasting products from Vaisala. The team has also developed the communication protocol for lightning alert dissemination and tested email notification dissemination internally to test the functionality of the system. SLMC project will start disseminating lightning alerts to its project areas subject to fund allocation.
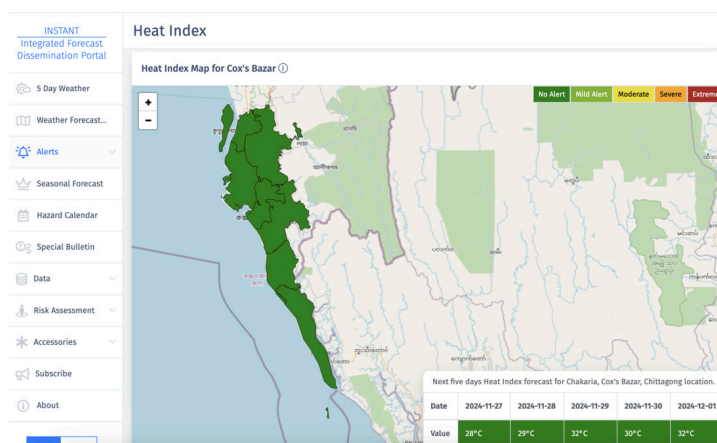
Heat Index Section in the INSTANT Bangladesh

✔ **Heat Stress Alerting System**: Considering the current need for a Heat Stress Alerting system, the SLMC team introduced the Heat Stress Alert/Forecast Section into the INSTANT Portal for the Cox's Bazar Region, integrating heat index forecast over the region. In addition to the forecast, real-time heat index graph/ visualization has been added to the portal using observation data from Ukhiya Weather Station (AWS) for real-time heat index monitoring.

Integrated Forecast Dissemination Platform (INSTANT) | Melamchi and Paanch Pokhari Municipalities, Nepal
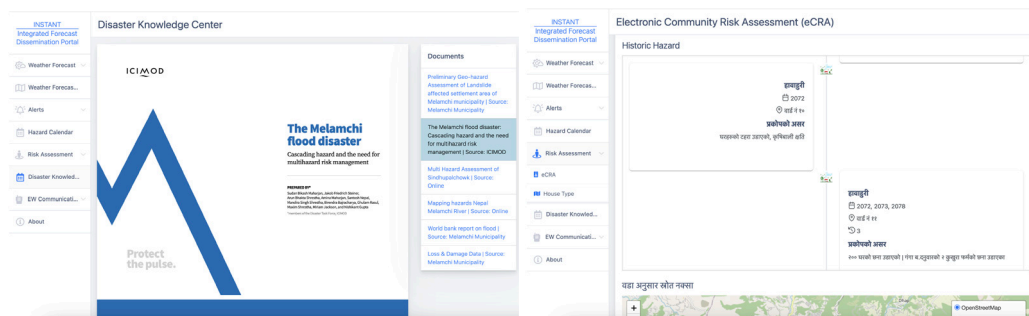
INSTANT Nepal Disaster Knowledge Center and e-CRA Sections

Significant enhancements have been made to the DSS, with focus on the pilot district of Sindhupalchowk:

✔ Modified the system logic to **integrate weather forecasts** for all the local levels within the district, ensuring comprehensive and localized predictions.

✔ Incorporated **RIMES's 3-day WRF rainfall, min and max temperature, relative humidity and wind speed forecast data** with a resolution of 9 km x 9 km were incorporated into the system, along with ECMWF data.

✔ Incorporated a **feature for visualizing house types** by construction type, using map, bar graphs, and charts for clear and intuitive data representation.

✔ Added **historic and major hazard data** from the draft Local Adaptaion Plan for Action (LAPA) document of Melamchi Municipality

✔ Integrated **editable communication framework** for easier editing of names and contact details in case of any changes in focal persons listed in the communication channel.

✔ Integrated the **resources profile** of the 13 wards in Melamchi Municipality including the resource maps, ward information, and elected personnels are have also been integrated.

✔ Introduced the **Lightning nowcasting** feature, which references data from the Vaisala API, although it remains in the testing phase.

✔ Integrated **Google Analytics** was integrated to monitor user engagement and feature usage.

✔ Launched **"Disaster Knowledge Center" module**, enabling public users to access disaster-related documents uploaded by admin users, complete with metadata like the source and title.

Integrated Forecast Dissemination Platform (INSTANT) | Chitral District, Pakistan

RIMES is closely coordinating and consulting with the PMD for the possible integration of the FFGS data into the system for flash flood alerts. Thresholds for other alerts including severe rainfall, temperature, strong winds, etc. will be co-developed with PMD and will soon be integrated into the portal. RIMES has also initiated consultation with PMD on their feature requirements of the INSTANT portal. Preliminary outcomes showed that there is no demand for lightning alerting system at the moment, however, they are more interested in integrating landslide monitoring under INSTANT, considering the vulnerability of Chitral to aforementioned hazard. To formalize demonstration and secure feedback from relevant stakeholders in Pakistan, a system features consultation workshop is also planned to be conducted in the country.

INSTANT Pakistan e-CRA Section
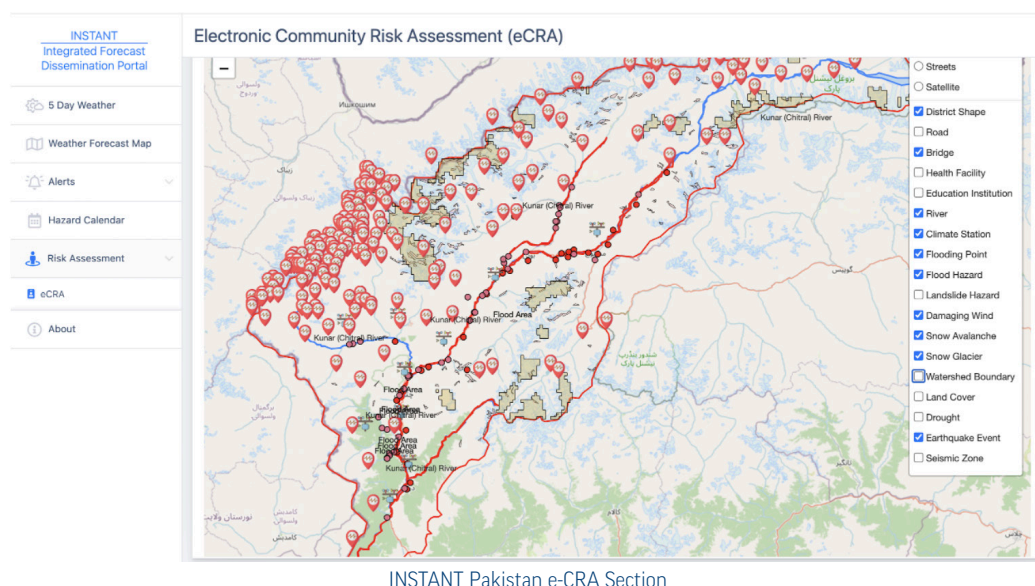
Recent efforts have focused on:

✔ Enhancing the system's documentation and infrastructure

✔ Development of a comprehensive technical documentation, detailing the system's architecture, database design, and API specifics to facilitate better understanding and maintenance

✔ Re-configuration and successful re-deployment onto a new server, ensuring improved performance and scalability

✔ Updating of the Pakistan INSTANT DSS Server Management Manual

Integrated Forecast Dissemination Platform (INSTANT) | Kalutara and Ratnapura Districts, Sri Lanka
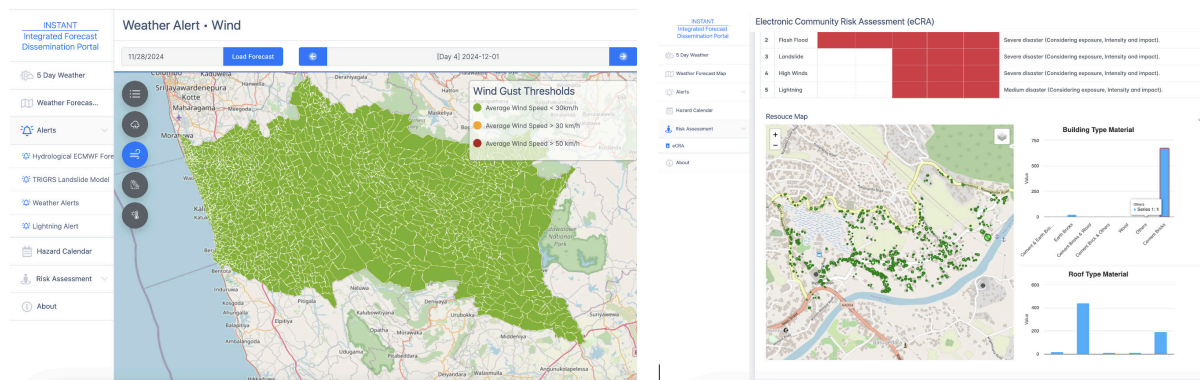
INSTANT Sri Lanka Weather Alert and e-CRA Sections

Extensive work has also been undertaken for INSTANT Sri Lanka to enhance system capabilities. A five-day ECMWF weather forecast has been integrated for the two (2) divisional secretariats: Palindanuwara and Ratnapura. This is along with the visualization feature of weather patterns across the entire country for the next 10 days. The integration of alerts thresholds of different hazards (extreme weather events, landslide and flood) has also been completed, enabling the system to now automatically generate alerts and warnings. The system now also includes risk-related data, encompassing major hazards, a hazard calendar, hazard ranking index, major livelihoods, a livelihood calendar, and historical hazard data from several pilot locations, especially of the two (2) most vulnerable Grama Niladhari Divisions of Palindanuwara and Ratnapura Divisional Secretariats. The data collected from household-level surveys, including information on exposure, vulnerability and capacity were thoroughly processed to ensure consistency across all filter criteria when integrated into the system. This data was imported into the INSTANT database, and corresponding APIs were created to facilitate data access for visualization. The frontend was designed and developed to include various charts, such as bar and pie charts, to visualize housing and non-housing data, including geo-tagged data on a map. An advanced filtering system was incorporated, allowing users to filter data through interactive charts based on 12 criteria, including building type, roof material, disaster impact status, and more.

Additionally, the hydrology model of the Kalu River basin was integrated and was continuously enhanced to be more stable using ECMWF forecasts initially. While only 6-hourly discharge forecast data is currently computed, water levels and corresponding alerts will be available once the necessary rating tables are secured. Same with the INSTANT system for other countries, lightning nowcasting system has been integrated.

Comprehensive technical documentation was created, covering system architecture, database design, and API details. For better management and maintenance of the system, the Sri Lanka INSTANT DSS Server Management Manual has been updated.

System for Assessing, Tracking, and Alerting Disaster Risk Information based on Dynamic Risk Knowledge (SATARK) | Nepal
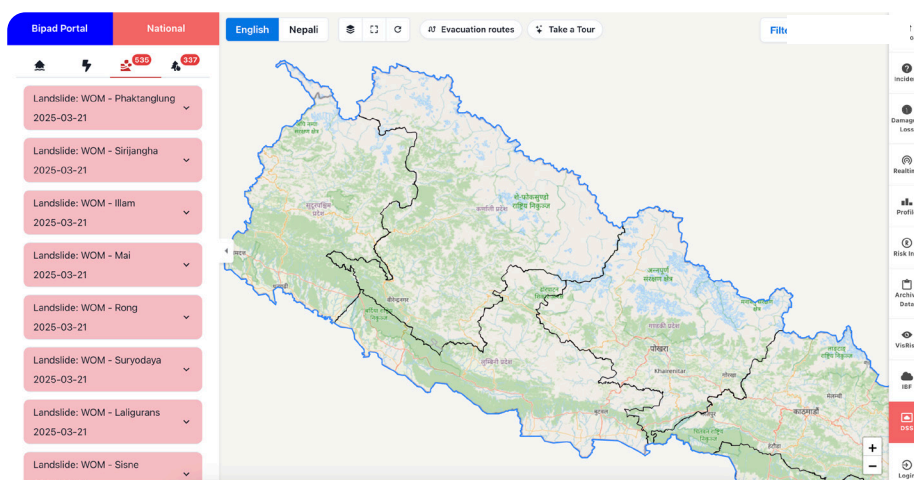
SATARK-Nepal Dashboard

SATARK is designed for the National Disaster Risk Reduction and Management Authority (NDRRMA). The following modules have been completed in 2024:

✔ **Lightning Alerts**, visualizes lightning probability (%) at municipality level using ICIMOD's probability of lightning products (from the HIWAT tool); including lightning data for the last 5 minutes from Vaisala

✔ **Flash Flood Decision Guidance**, generates dynamic 3-hourly/6-hourly flash flood alerts based on the SAsiaFFGS' FFFT product provided by DHM

✔ **Forest Fire Alerts**, generates dynamic forest fire alerts using ICIMOD's forest fire outlook (provided by MoFE), which considers various forecast parameters from the HIWAT tool such as temperature, relative humidity, wind speed, and precipitation; and 3-day forest fire susceptibility forecast for Okhaldhunga District based on the Fire Risk Index developed by Martin et al (2017)

✔ **Landslide Impact Forecasting**, dynamically generates landslide hazard (TRIGRS)/threat alerts based on 3-day rainfall forecasts

✔ **Gender Analytics**, including i) gender in DRR (focal persons), ii) gender in DEOC (focal persons), iii) gender in PEOC (focal persons), and iv) participation in capacity building activities by gender

✔ **Evacuation Routes** (additional module), maps out alternative evacuation routes from a user-specified location to the nearest shelters in Tikapur Municipality, using OSM road network data

✔ **Mobile application**

System for Assessing, Tracking, and Alerting Disaster Risk Information based on Dynamic Risk Knowledge (SATARK) | India

SATARK Phase 1 has been completed, including User Assessment Test for cyclone, tsunami, and flood modules. All systems are running successfully.

Meanwhile, for the Phase 2, the Odisha State Disaster Management Authority (ODSMA) signed a new Memorandum of Understanding (MoU) with RIMES on 06 March 2024 that would extend the partnership between the organizations for the next five (5) years. RIMES will continue to serve as a knowledge partner in the overall project and improvement of the SATARK tool for the development of Impact Based Forecasting for various hazards.

Disaster Risk Reduction Decision Support System (DRR DSS) | Timor-Leste

DRR DSS Dashboard
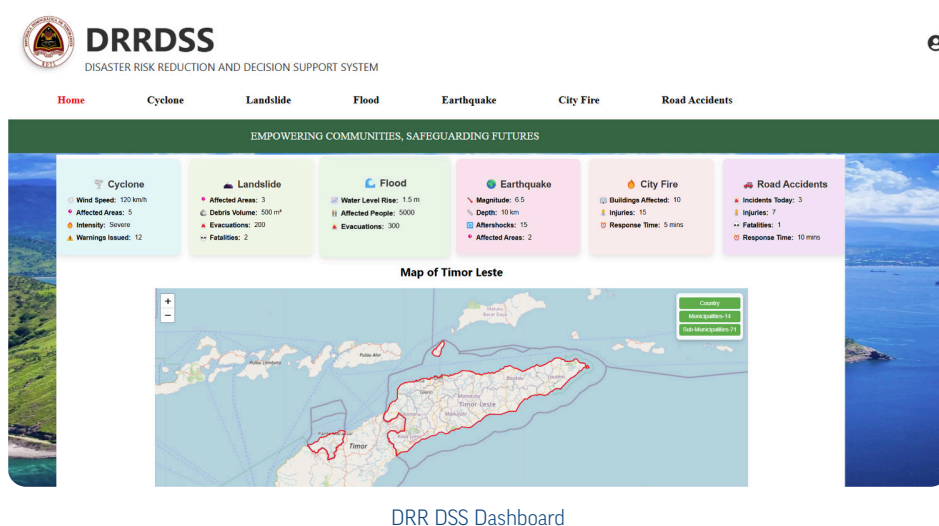
DRR DSS is designed for monitoring and/or providing warnings on potential occurrences of cyclones, landslides, floods, earthquakes, city fires, and road accidents as seen in the figure below. As shown in the figure below, the system will provide detailed information on hazard characteristics, intensities, and the identification of potentially affected areas and populations. By consolidating hazard maps and demographic data, the DRR DSS will support the development of impact-based forecast modules, enabling authorities to take preemptive action to reduce disaster risks.

Tamil Nadu System for Multi-hazard potential impact assessment, Alert, emergency Response planning and Tracking (TNSMART) | India

TNSMART is a web-GIS based DSS that aims to strengthen preparedness, response, recovery and mitigation measures during multi hazards of flood, cyclone and tsunami. TNSMART 2.0 project was initiated on 01 March 2024 and has carried out the following since:

Launched the TN-Alert public centric mobile application in March 2024 which contains information about the Daily Rainfall, Water storage capacity, Weather forecast, Nowcast alerts, Vulnerable location status, Report emergencies, Real-time subway water stagnation and traffic information for Chennai, and Street flood forecasting for Chennai.

Conducted exposure visits to various facilities: Space Applications Centre (SAC), Ahmedabad and IMD, NIDM, NCFC, NCMRWF, New Delhi. These visits were aimed for TNSMART team to learn about various data products and tools available for integration in TNSMART.

Following the exposure visits various product access has been received and integrated into TNSMART including SAC - 5km WRF forecast, IMD - 12 km GFS forecast, IMD - 3km WRF forecast.

Developed new features:

✔ Inventory Management System, including data entry to feed information, development of spatial visualization, and report generation and dashboards

✔ Integration of complaints received with GCC and Tangedco in the web system

✔ One-page status report state wise and district wise

✔ Real-time data acquisition system, including:
   » Identification of locations to install ARG and AWS stations
   » Purchasing and configuration of server for RTDAS module
   » Development of Ticketing system for raise a ticket to vendor
   » Development of application to receive data from the stations
   » Writing API to share the data with other departments
   » Performing quality check of rainfall data before sharing outside
   » Development of UI to visualise the rainfall data

✔ Donors and seekers - relief materials

✔ Flood database

✔ Landslide database and preparation of LULC for Nilgiris district

✔ Undergoing corrections in boundary shapefiles

LOCALIZED RISK INFORMATION

RIMES recognizes the need for customized solutions that address specific local challenges in disaster preparedness and risk reduction. Through tailored projects, RIMES provides targeted training, data collection methodologies, and technological solutions that empower communities and decision-makers. The following initiatives highlight RIMES' commitment to transforming data into actionable insights for risk mitigation and adaptive planning.

Community Risk Assessment (CRA) Data Collection
Under the Child-Centered Anticipatory Action for Better Preparedness of Communities and Local Institutions in Northern and Coastal Areas of Bangladesh (GFFO-SC) project, RIMES conducted training sessions on Community Risk Assessment (CRA) tools for volunteers and project staff in three key locations: Patuakhali in July, Gaibandha in September, and Chattogram in October. These sessions equipped participants with the necessary modules and templates to systematically collect risk-related data.

Data collection efforts spanned 24 unions across six upazilas (three in Gaibandha, two in Patuakhali, and one in Chattogram). The methodology incorporated diverse community perspectives through Focus Group Discussions (FGDs) with three groups: working individuals, children and women, and mixed groups, alongside Key Informant Interviews (KIIs). Additionally, Risk and Resource maps were developed for these unions using CRA tools. The collected data is currently undergoing digitization, ensuring structured and accessible information for effective decision-making and risk mitigation planning.

Partners from Jago Bari orients participants on CRA data collection in Patuakhali on 24 August 2024.

Cyclone Vulnerability Indicators Data Collection
Recognizing the heightened cyclone risk in Patuakhali and Chattogram, RIMES collaborated with Save the Children under the GFFO-SC project to enhance cyclone vulnerability assessments in the project areas. Specifically, data was collected from Union Parishads and Upazila Parishads in Banshkhali, Patuakhali Sadar, and Kalapara upazilas, guided by predefined cyclone vulnerability indicators.

To ensure efficient and standardized data collection, RIMES provided targeted training to local partners, Jago Nari and YPSA, equipping them with knowledge on cyclone vulnerability indicators and data collection methodologies. The gathered data is currently being processed to develop comprehensive vulnerability maps for these unions, which will serve as critical tools for anticipatory action and community resilience planning.

Topography Survey & Local Area Inundation Mapping

Under the PROVATi3-R project, RIMES has developed inundation map algorithms tailored for the project areas to strengthen flood forecasting and preparedness. A crucial step in this process involves topographic surveys, which have been conducted in collaboration with a team of experts.

DEM data is being collected in flood-prone areas along major river systems to refine flood modeling and forecasting capabilities. Initial data collection was successfully completed in Gaibandha and Jamalpur. The current focus is on Kurigram district, where drone-based LiDAR surveys are being conducted in Kurigram Sadar upazila and Ulipur upazila. As of October 2024, a total of 1,123.63 square kilometers has been surveyed using LiDAR drone technology.

The DEM data collected will be instrumental in inundation modeling, which will significantly enhance decision-making for both local and national authorities during the monsoon season. This initiative underscores RIMES' commitment to leveraging technology-driven solutions for disaster risk reduction and adaptive planning.

Drone survey at Shoshariabari of Pathorshi Union of Islampur Upazila, Jamalpur

TAILOR-MADE SERVICES

Ensuring that climate and early warning information and services are user-relevant, forecast-based, and actionable to integrate information into user stakeholder institutions and empower climate-sensitive decision-making, resulting in greater socio-economic benefits.

This includes setting up or strengthening institutional mechanisms and collaborative partnerships between the NMHSs and the sectoral agencies to co-design and formulate contextual impact-based forecasts and unified advisories.

INSTITUTIONAL MECHANISMS

In 2024, RIMES continued strengthening institutional mechanisms for anticipatory action, early warning dissemination, and decision support systems across multiple countries, ensuring that climate and disaster risk information is effectively translated into actionable measures.

NEAP for Monsoon Riverine Flood

In Bangladesh, RIMES played a pivotal role in advancing Forecast-based Action through the SUFAL II project. A key milestone was the approval of the National Early Action Protocol (NEAP) for Monsoon Riverine Flood Anticipatory Action by the Ministry of Disaster Management and Relief (MoDMR) in June 2024. This protocol establishes a standardized framework for implementing anticipatory actions to mitigate flood impacts during the monsoon season. RIMES led the development of the trigger mechanism and technical aspects of the NEAP, which was refined through consultations with the Forecast-based Action and Financing (FbA/F) Working Group and Taskforce under MoDMR's guidance.

The NEAP was successfully tested during the 2024 monsoon season in northwestern SUFAL II districts under the Brahmaputra-Jamuna basin, validating its practical application in flood response.
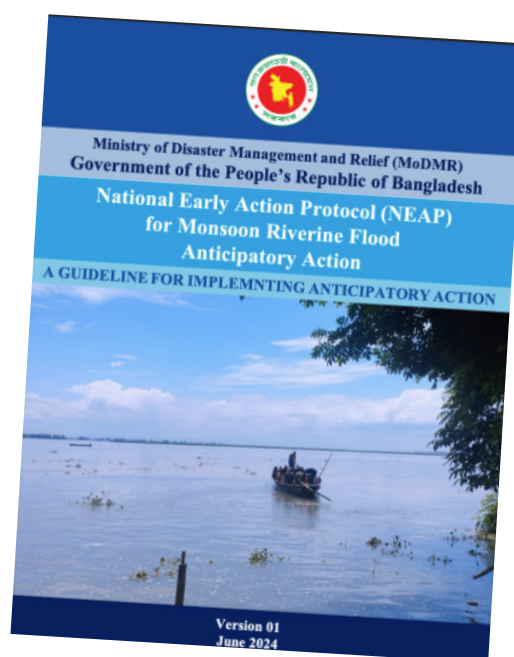
Guidelines for Implementing Anticipatory Action for Monsoon Riverine Flood

NEAP for North-Eastern Flash Flood

RIMES also spearheaded the development of a trigger matrix for anticipatory action for North-Eastern Flash Floods in collaboration with the FFWC, FAO, and the SUFAL II consortium. This matrix will serve as the foundation for the forthcoming NEAP for North-eastern Flash Floods, which is currently being drafted under MoDMR's oversight.

Updating of the District DRM Plan of Chitral, Pakistan

RIMES has updated the District Disaster Risk Management Plan for the District of Chitral to incorporate early warning component in support to the district's disaster risk reduction and management efforts. The scope of the DRM plan encompasses DRR and DRM strategies for the district; role and responsibilities (before, during and after a disaster) of relevant stakeholders within the district; and early warning component to ensure timely dissemination of warnings and alerts to the end user, for effective preparedness and response.

District Disaster Risk Management Plan Validation Workshop in Chitral, Pakistan

On 10 June 2024, a validation workshop has been conducted to share and review the updated Chitral DRM plan, which was participated by 20 participants from various line departments and other non-government stakeholders in the district lower Chitral. Through a series of interactive sessions, line departments and stakeholders reviewed and discussed the plan, ensuring a shared understanding of their roles and responsibilities. Feedback and suggestions were incorporated into the plan, fostering ownership and commitment among stakeholders. The missing roles and responsibilities of the Livestock department were incorporated into the revised plan. This collaborative approach resulted in a robust and inclusive plan that leverages the strengths of all stakeholders. The plan's implementation is expected to significantly enhance DRR and management capabilities in Chitral Lower, protecting the lives and livelihoods of the district's residents.

Trial Basis Inundation & Flood Shelter Mapping

A mathematical model has been developed under the PROVATi3-R project to generate flood inundation maps using Digital Elevation Model (DEM) data obtained from drone surveys in the project area. Based on this data, several trial runs were conducted to map the flood extent from the July monsoon event, enhancing the understanding of flood dynamics in the region.

Geo-spatial maps have been created for three districts using collected flood shelter location data. These maps provide critical insights into the proximity of shelters to flood-prone areas, ensuring that affected communities can access safe locations quickly during floods.
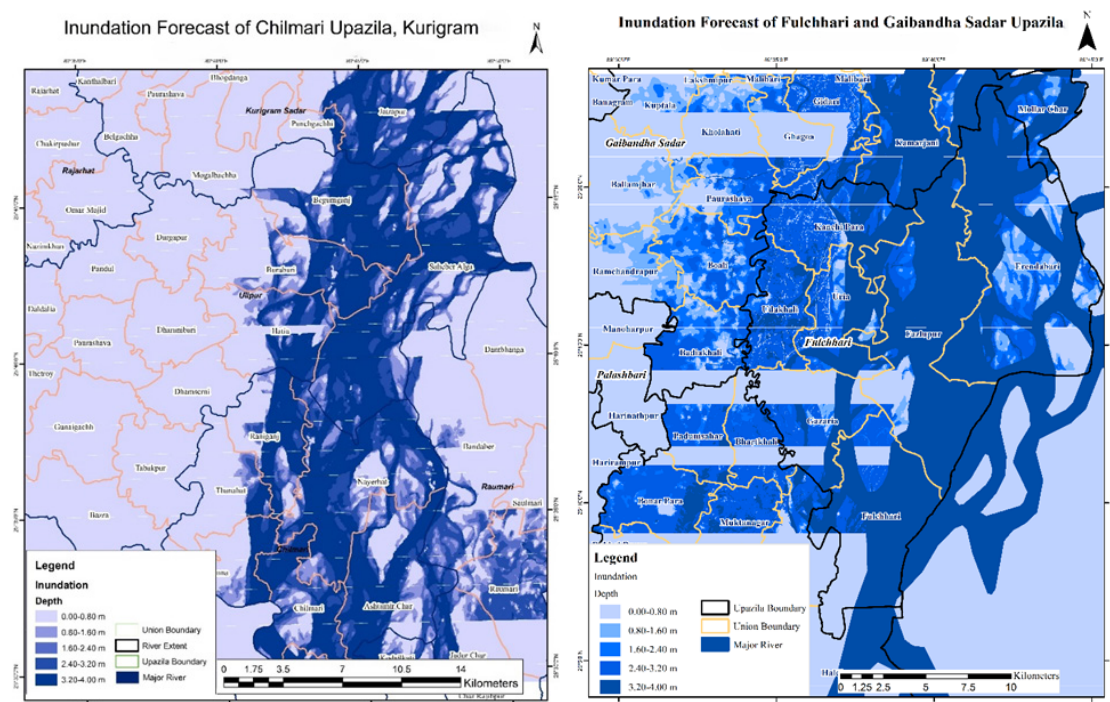
Trial inundation forecasts for Chilmari (left), Fulchhari, and Gaibandha (right) Upazila

Roadmap for sustainable early warning dissemination

The SUFAL II project also supported the development of a roadmap for sustainable early warning dissemination. While Bangladesh currently lacks dedicated funding for voice message-based (VMB) early warning dissemination, the project generated evidence of its effectiveness since its first phase. As a result, the Department of Disaster Management (DDM) is working to enhance and integrate the system into its operations.

With support from RIMES, the system is being expanded under the PROVATi3-R project and is also being integrated into the Department of Agricultural Extension (DAE), which uses VMB to disseminate agromet advisories to lead farmers. Additionally, the project has introduced digital display boards in administrative buildings and facilitated direct communication of early warning information to communities. While project funding initially covered dissemination costs, DDM has taken over costs in Kurigram, Gaibandha, and Jamalpur since 2024, while RIMES continues to support Bogura under the SLMC project. In the Haor region, where SUFAL II project is relatively new, dissemination costs remain project-funded.

To ensure long-term sustainability, RIMES is drafting a roadmap for an integrated early warning dissemination system. This framework outlines how different government agencies can adopt and operate the system, identifies responsible officials, and explores potential funding sources. It also considers private sector involvement to enhance the system, including the possibility of upgrading VMB into a two-way communication platform.

RIMES is actively engaging mobile network operators to scale up dissemination efforts through corporate social responsibility (CSR) initiatives. Local cable networks in seven districts across the Char and Haor regions will be leveraged to broadcast early warning messages, maximizing community reach before disasters strike.

SOP on Flash Flood Forecasting

To institutionalize the SHEWS-C27 project's outcomes, a Standard Operating Procedure (SOP) was developed for the FFWC. The SOP detailed protocols for data collection, quality control, forecasting, and multi-channel dissemination. It also outlined the roles and responsibilities of various stakeholders, ensuring coordinated responses during flood events. This framework provided a structured approach to managing flash flood risks, enhancing operational efficiency and accountability.

War Room for Thailand's NDWC

In Thailand, RIMES has strengthened institutional early warning mechanisms through its collaboration with the DDPM. Efforts focused on developing a War Room at the National Disaster Warning Center (NDWC) to enhance earthquake and tsunami early warning services. Following an initial assessment and conceptual design in 2023, RIMES further evaluated operational needs in 2024, identifying core functional sections within NDWC. RIMES is now supporting the integration of decision-support tools such as Seiscomp, Tidetools, and a DSS to enhance warning generation and situational awareness at NDWC's Bang Na facility.

Assessment of DDPM's War Room

ENHANCING COMMUNITY PREPAREDNESS THROUGH FORECAST-BASED EARLY ACTION

Local-level AAP for Flood

RIMES further contributed to localized flood preparedness through the SLMC project in Bangladesh with the conduct of a series of community consultations with beneficiaries and non-beneficiaries to assess the feasibility of implementing the national Flood EAP at the community level. Based on these insights, RIMES is developing a localized sub-district-level EAP for Flood, ensuring that anticipatory measures are tailored to community needs.

Community awareness raising and simulation exercises for Preparedness

One of the notable initiatives, the SUFAL II project, has implemented extensive awareness-raising activities on lightning and thunderstorm safety in the Haor region. Over 1,200 participants, including farmers and school children, have been engaged through educational sessions utilizing Information, Education, and Communication (IEC) materials and animation videos previously developed by RIMES under the SHOUHARDO III program. These materials have been reviewed and vetted by government agencies for further distribution. Additionally, to reinforce awareness, impactful wall paintings conveying safety messages have been placed in key community locations such as flood shelters, Union Parishad offices, and schools.

The project also spearheaded a Simulation on Monsoon Flood Anticipatory Action across the northwestern districts, aiming to mainstream proactive flood response measures. Local government representatives, volunteers, and community members participated in realistic exercises simulating flood warnings, early action steps, and multi-purpose cash grants via mobile money transfer. These simulations strengthened community preparedness by ensuring that stakeholders understood their roles in mitigating flood impacts.

Flood Simulation Exercise on FbA

The SLMC project collaborated with SUFAL II project to conduct a local-level Simulation Exercise (SimEx) on FbA in Shariakandi Upazila, Bogura. This initiative tested the FbA mechanism and the implementation of corresponding anticipatory actions. The exercise provided key lessons to improve the FbA mechanism, with active participation from Union Disaster Management Committee (UDMC) members, government agencies, and community representatives. To enhance early warning dissemination and response, RIMES, through the SLMC project, provided lifejackets to Union Parishads.

STRENGTHENING AGRICULTURAL RESILIENCE WITH AGROMETEOROLOGICAL INNOVATIONS

Forecast Application for Risk and Resource Management (FARRM) School in Bangladesh

In the agricultural sector, the SHOUHARDO-DRR project, supported by USAID, introduced the first-ever Agromet - Forecast Application for Risk and Resource Management (FARRM) School in Bangladesh in collaboration with CARE Bangladesh and the Department of Agricultural Extension (DAE). Sixteen schools were piloted, providing 32 Sub-Assistant Agriculture Officers (SAAOs) with Training of Trainers (ToT) on agrometeorology and farm advisory services.

Over two crop seasons, 400 farmers attended 160 sessions, equipping them with practical knowledge on utilizing weather forecasts to optimize agricultural productivity. Post-season surveys highlighted significant economic benefits, with estimated household savings of USD 400 in the agricultural sector and up to USD 800 in the livestock sector.

One of the field learning sessions in Gaibandha

Building on this success, the Child-Centred Anticipatory Action for Better Preparedness of Communities and Local Institutions in Northern and Coastal Areas of Bangladesh (GFFO-SC) project expanded the initiative by piloting 24 additional Agromet FARRM Schools across Gaibandha, Patuakhali, and Banshkhali Upazilas. With training provided to 48 SAAOs, the project engaged 600 farmers in localized climate adaptation strategies. Furthermore, the project amplified early warning dissemination efforts, reaching over 30,668 individuals through voice calls on monsoon floods, cyclones, and sector-specific advisories for agriculture and fisheries.

Meanwhile, the STEP project introduced a Crop Stage Monitoring App for impact-based forecasting in cyclone-prone coastal districts. A training session demonstrated the Farm Metrics App, emphasizing its role in agricultural data collection and analysis. Participants learned to input and monitor data on crops, soil health, water levels, and farm conditions. The app's advisory and alert system supports timely decision-making, improving agricultural productivity. Sub-Assistant Agricultural Officers (SAAOs) expressed strong interest in the app's efficiency in field data management and real-time intervention support.

2nd BICAS Capacity Enhancement Training: 01st April-11th April 2024

Three scientists from Bihar Agriculture University (BAU) were cordially invited to participate in a two-week capacity-enhancement training program at the RIMES PMU in Pathum Thani, Thailand. The primary objective of this training was to offer a practical orientation on the newly developed ADSS system under the BICAS Project. The capacity enhancement training assisted the scientist from BAU to understand the various functions of the ADSS, including roles and responsibilities of the various stakeholders and to understand the agro advisory generation mechanism in the system. The scientist from BAU will be responsible for training the staff under CRA program to train on the use of BICAS tool. The opportunity was also utilized to finalize the pilot locations to operationalize the FARM School training program.

The scientist from BAU were trained on newly developed BICAS web ADSS and BICAS mobile application.

CAPACITY BUILDING IN IMPACT-BASED FORECASTING AND ANTICIPATORY ACTIONS

Workshop on Impact-Based Forecasting and Anticipatory Action Planning in Pakistan

RIMES, with the support of PMD, organized a one-day orientation workshop on IBF for development sector stakeholders in Peshawar on 24 September 2024. The workshop was aimed to enhance capacity on IBF, equipping participants with comprehensive knowledge of its principles and methodologies, including hazard, exposure, and vulnerability assessments. Presentations and sessions at the event highlighted the steps in implementing IBF and warning services, the importance of building partnerships, and best practices for effective communication to disseminate IBF and reduce risks.

The program also underscored the importance of collaborative partnerships across public and private sectors, essential for the successful execution of IBF, ultimately reinforcing coordination among various entities for better risk mitigation. The event was participated by representatives from various departments and organizations, including PMD, Pakistan Disaster Management Authority (PDMA), Agriculture Department Khyber Pakhtunkhwa (KP), Forestry Department KP, Rescue 1122 KP, Planning and Development (P&D) Department, Local Government KP, KP Relief Department, KP Tourism Department, FCRD Peshawar, KP Irrigation Department,   International

Workshop on Impact-Based Forecasting and Anticipatory Action Planning in Khyber Pakhtunkhwa, Pakistan

Red Cross (IRC), FAO, United Nations Development Programme (UNDP), Peshawar University, Agriculture University Peshawar, WFP, Welthungerhilfe (WHH), Khyber News and TV, and Regional Met Center KP-Peshawar.

The workshop also tackled the significance of evaluating hydrometeorological hazards for anticipatory planning where participants stressed the need to categorize impacts for effective prioritization and discussed methodologies for mitigating these impacts. Key actions that need to be taken to improve IBF operationalization in the region, as identified during the workshop, include the development of a methodology by PMD to mitigate the impacts of severe weather and provide guidance on actions to be taken by users, especially in the sector of agriculture for increased productivity; and for all concerned departments to strengthen collaboration and coordination to improve the dissemination of weather forecasts and impact-based forecasting information to end-users.

Capacity Building Program on DRM Planning for Subnational Level Officers in Sri Lanka

RIMES, in collaboration with the Disaster Management Center, conducted a table-top exercise on 01 March 2024 to verify effectivity of the existing Ratnapura District DRM Plan. This was aimed to identify gaps and suggest necessary updates to the plan as well as to familiarize the subnational officials in the district with the existing DRM plan and protocols. The activity was participated by the District officials including the District Secretary, DRM Additional District Secretary, 18 Divisional Secretaries, Health Ministry and Irrigation Department representatives in the Ratnapura District. The activity involved scenario-based exercise, wherein participants are familiarized with DRM-related protocols and procedures during different cases of emergencies, identified gaps in the current DRM plan and suggested improvements and changes.

The participants were better sensitized on the actions to be taken in dealing with specific disaster/ emergency situation based on the reviewed plan. With the up-to-date knowledge on IT solutions and communication strategies shared during the workshop, local authorities have suggested updates on the DRM plan to strengthen strategies and protocols for mitigating risks, ensuring community safety, and optimizing resources available in the district. Lastly, the activity has contributed to strengthening collaboration among the various levels of the Ratnapura District Government in the context of disaster risk reduction and management.

District Disaster Risk Management Plan Validation Workshop in Chitral, Pakistan

USER INPUTS AND FEEDBACK

Stakeholder Consultation Workshops

Nepal

RIMES actively participated in the 3rd National Dialogue on Anticipatory Action (AA), organized by the National Disaster Risk Reduction and Management Authority (NDRRMA). This forum brought together key stakeholders, including government agencies, scientists, private sector representatives, media, and the Anticipatory Action Community of Practice, to collaboratively reflect on lessons learned and define a roadmap for advancing AA in the country. Discussions emphasized the development of a comprehensive National Multi-Hazard Early Warning System (MHEWS) aligned with the "Early Action for All" initiative. The envisioned end-to-end system places users at the center by addressing forecasting and risk communication challenges. Key recommendations included ensuring readily available financing for anticipatory action through mechanisms such as the Central Emergency Response Fund (CERF) and Disaster Response Emergency Fund (DREF).

Nepal's experience in AA has evolved significantly, from testing early actions to refining protocols during real events, such as unseasonal floods. The integration of protection, gender, and inclusion (PGI) principles, as well as the linkage with social protection programs, was identified as crucial for ensuring that anticipatory actions do not inadvertently exacerbate vulnerabilities.

Nepal: INSTANT Portal Features Consultation Workshop

A consultation workshop was held in Kathmandu on June 14, 2024, to gather user feedback and finalize the proposed features of the INSTANT portal. The event provided an opportunity for key stakeholders, including DHM, NDRRMA, and local government representatives from Melamchi and Paanch Pokhari Municipalities, to engage in discussions on system development. The workshop underscored the importance of co-designing the system with stakeholders to ensure full ownership and sustainability. Feedback highlighted the need to integrate local data from DHM to enhance system reliability. RIMES is actively coordinating with DHM to facilitate this integration and to develop a comprehensive capacity-building program to strengthen forecasting capabilities.

INSTANT Portal Features Consultation Workshop in Nepal

Sri Lanka

Consultation meetings with DMC (left) and Kalutara DS (right) in Sri Lanka

As part of the SLMC Project's field mission to Sri Lanka from September 30 to October 1, 2024, RIMES conducted a series of consultation meetings with government agencies, including the DMC and Irrigation Department, as well as district authorities in Kalutara and Ratnapura. These meetings provided a platform to present project progress, align initiatives with local needs, and secure partner commitments for successful implementation. Key outcomes included expressions of strong interest in further developing the INSTANT portal, commitment to aligning project activities with existing policies, and identification of specific needs, particularly in search and rescue equipment for Kalutara.

Sri Lanka: INSTANT Portal Features Consultation Workshop

On November 3, 2024, RIMES conducted a consultation workshop in Colombo to solicit feedback on the proposed features of the INSTANT Sri Lanka DSS. Participants included representatives from the DoM, DMC, National Building Regulations Organization (NBRO), and the Irrigation Department, along with development partners such as the World Food Programme (WFP) and Dialog Axiata PLC. The workshop reviewed the INSTANT DSS implementation progress, lessons learned from its deployment in Bangladesh, and customization efforts for Sri Lanka. Stakeholders provided valuable insights, recommending the integration of local data from technical agencies, further calibration of hydrological and landslide models, alignment with existing early warning systems, and linking DSS alerts to national disaster risk management frameworks.

National Level INSTANT Portal Features Consultation Workshop in Sri Lanka

Baseline Surveys

Bangladesh

During RIMES' participation in a landslide risk mitigation training in Cox's Bazar on May 7, 2024, discussions were held with key stakeholders, including BRAC and UNDP, regarding potential collaborations for disaster risk management. A key focus was the upgrading of the e-Community Risk Assessment (e-CRA) module within the INSTANT portal. Both organizations expressed strong support for assisting RIMES in future field-level data collection to update the e-CRA database. The collected baseline information on hazard exposure, vulnerabilities, and capacities will be integrated into the system to support informed decision-making by local authorities.

Pakistan

RIMES supported PMD in conducting an EWS audit for the Chitral District. The audit underscored the need to strengthen monitoring and warning systems through the installation of automatic weather stations and community-managed alarm systems. The Regional Meteorological Center (RMC) Peshawar is leading the finalization of the audit report, incorporating feedback from relevant stakeholders. RIMES has facilitated coordination between PMD and the Khyber Pakhtunkhwa Provincial Disaster Management Authority to ensure that the audit checklist meets the required standards. Further validation of the audit results will be conducted through a multi-stakeholder meeting.

e-CRA training in Cox's Bazar, Bangladesh

Nepal

On September 16-17, 2024, RIMES organized a workshop in Melamchi Municipality to validate and update hazard, vulnerability, exposure, and capacity (HEVC) maps. These maps were developed based on a User Needs and Capacity Assessment Survey conducted in 2023, covering 478 households across multiple wards. The workshop provided a crucial opportunity for municipal stakeholders to verify and refine these maps before final distribution. To enhance usability, recommendations included translating maps into Nepali, conducting ward-wise data collection, refining risk and evacuation maps, and improving map readability through simplified icons and colors. Additionally, the workshop introduced stakeholders to the INSTANT portal's map visualization feature, enhancing user engagement and system accessibility.

HEVC maps orientation, updating, and validation workshop in Melamchi Municipality, Nepal

Sri Lanka

RIMES, in collaboration with the Disaster Management Center, conducted hazard, exposure, vulnerability, and capacity assessments (HEVCA) in two highly vulnerable Grama Niladhari (GN) Divisions within Kalutara and Ratnapura Districts. The surveys, conducted between April and May 2024, utilized the Kobo Toolbox for digital data collection, covering 2,242 households. The findings have been integrated into the INSTANT Sri Lanka portal to aid in risk hotspot identification and emergency preparedness planning. These results will support local authorities in participatory risk mapping, DRM planning, and emergency action planning. Moving forward, RIMES will continue to assist GN authorities in utilizing these insights for localized disaster resilience efforts.

HEVCA Survey in Kalutara District

SOCIETAL ENGAGEMENT & FEEDBACK

Ensuring that early warning information reaches vulnerable communities and building capacity in the effective use of early warning information are essential for enhancing resilience of communities. This section outlines RIMES initiatives in enhancing information and dissemination mechanisms and capacity-building of forecast and early warning information users.

USER FORUMS

RIMES engages with users at regional, national, and sub-national levels through climate outlook/ monsoon forums. Regional Climate Outlook Forums (RCOFs) gather experts from NMHSs in the region and climate experts from global and regional centers, for a joint assessment of the state of the regional climate for the upcoming season. This consensus outlook informs the preparation of the seasonal outlook at national level. The RCOF also integrates a user forum for climate service provider – user interaction to facilitate climate information application.

National-Level Climate Outlook Forums

Nepal Climate Application Forum held on 31 April 2024

Nepal National Monsoon Forum

RIMES supported the organization of the National Climate Application Forum (CAF) in Nepal to prepare for the 2024 monsoon season. The forum provided a platform for evaluating the performance of the DHM-Nepal's climate information products, presenting monsoon forecasts, and guiding stakeholders in anticipatory preparedness measures. Participants included representatives from government ministries, the Office of the Prime Minister, the National Disaster Risk Reduction and Management Authority (NDRRMA), the National Agriculture Research Center, international and national NGOs, media, and various government sectors. Discussions highlighted DHM's forecasting capabilities and limitations, with a dedicated session on improving information dissemination to local governments and farmers. Key challenges addressed included rainfall variability, long lead-time outlooks, the need for quality weather and flood forecasts, activation of the Common Alerting Protocol, and impact-based forecasting.

Sub-National Climate Application Forums

Provincial Climate Application Forum in Bagmati, Nepal

RIMES supported the first provincial-level CAF in Bagmati Province, Nepal held on June 12, 2024 in Hetauda. The forum reviewed DHM's climate information performance, assessed user experiences in climate-informed decision-making, presented updated monsoon forecasts, and discussed potential risks and preparedness measures. Participants included representatives from provincial ministries, DHM personnel, disaster risk reduction (DRR) focal points from 13 districts, NGOs, and media professionals. While seasonal forecasting has improved, discussions underscored the need for enhanced forecast accuracy and increased local capacity to interpret and apply climate information effectively.

Climate Application Forum in Bagmati, Nepal

District-Level Climate Application Forum in Sindhupalchowk, Nepal

A District-Level CAF was held in Sukute, Sindhupalchowk on February 20, 2024, with RIMES' support. The forum reviewed DHM's climate information products across different timescales, analyzed users' experiences in applying climate information, and gathered recommendations for improving climate information generation and application. The event engaged 58 participants from the Local Emergency Operating Center (LEOC), District Emergency Operating Center (DEOC), local municipalities, the Red Cross, NGOs, and sectoral representatives from health, agriculture, and infrastructure. A key recommendation was to schedule similar forums ahead of critical seasons to maximize preparedness and response effectiveness.

Climate Application Forum in Sindhupalchowk, Nepal

Climate Services Provider-User Forums in Timor-Leste

In 2024, two Climate Services Provider-User Forums were conducted in Dili, Timor-Leste, to strengthen collaboration between climate service providers and users. Timed ahead of the dry and wet seasons, these forums provided seasonal climate outlooks and facilitated stakeholder coordination.

- 7th National Monsoon Forum (7MF): Held on May 23, 2024, this forum focused on the dry season outlook, engaging 58 participants from 17 user institutions.

- 8th National Monsoon Forum (8MF): Conducted on November 26, 2024, this forum addressed the wet season outlook, with participation from 114 key stakeholders.

The forums aimed to issue seasonal climate outlooks, assess potential climate impacts across sectors, coordinate preparedness strategies, evaluate climate service applications, and gather user feedback for improved service delivery. Representatives from national agencies, international organizations, and media outlets attended, including the Ministry Transport and Communication, National Designated Authority (NDA), Ministry of Defense, Ministry of Health, Ministry of Agriculture and Fisheries / Agricultural Land Use Geographic Information Systems (ALGIS), Ministry of Tourism and Environment (MTA), Civil Protection Authority (APC), National Directorate for Water and Sanitation (DNRAS), National Directorate of Electricity (DNRE), National Directorate of Climate Change (NDCC), Air Navigation Timor-Leste (ANATL), Civil Aviation Authority (AACTL) Bee TL, Geosciences Institute (IGTL),National Authority of the Environmental License (ANLA), Raes Hadomi Timor Oan (RHTO), Rede Feto, Red Cross, National Directorate of Maritime Transport and Port Administration, Navy (F-FDTL), National Authority for Maritime, National Directorate of Information and Communication (DNIC), Secretary State of Inclusion (SEI), National Directorate of Logistic and Procurement, UNEP, Australian Humanitarian Partnership, Mercy Corps, Food and Agriculture Organization (FAO), International Organization of Migration (IOM), Internation Federation of Red Crescent (IFRC), Indonesian Meteorology Agency (BMKG), Tatoli,

8MF attendees actively participating at the Forum

Dili Post, Lifau Press, and RTTL, EP.

- Among the suggestions identied were to: Provide localized forecasts for sectors like agriculture and aviation, standardize alerts, ensure 24/7 updates, and disseminate warnings through multiple channels, and

- Operate DNMG Monitoring Centre continuously, invest in technical staff, establish DSS, and enhance collaboration with agencies and communities to ensure information reaches the grassroots level.

ENHANCING EARLY WARNING COMMUNICATION MECHANISMS

As part of its commitment to strengthening last-mile early warning dissemination and preparedness, RIMES has undertaken multiple pilot demonstrations across Bangladesh focused on enhancing forecast interpretation, anticipatory action planning, and community engagement to ensure that vulnerable populations receive timely, actionable information. Through collaborations with government agencies, humanitarian organizations, and local communities, these projects have successfully improved early warning systems, disaster preparedness, and response capacities in flood and cyclone-prone regions.

Leveraging Voice Message Broadcasts and Email Alerts for Effective Early Warnings

Early warning dissemination through voice messages and email alerts played a crucial role in reaching vulnerable communities under the GFFO-SC Project. Over 30,668 voice calls have been issued since May 2024, covering monsoon floods, cyclones, and extreme weather events like heatwaves and heavy rainfall. These messages targeted 4,362 individuals across multiple unions, upazilas, and wards, providing timely warnings and sector-specific advisories for agriculture, livestock, and fisheries.

In collaboration with BMD, RIMES issued six (6) special bulletins on cyclones, complete with impact maps, to support local officials and humanitarian organizations in planning and response. These bulletins were shared via the INSTANT portal, email, and WhatsApp groups. During Cyclone Remal, while coastal regions experienced storm surges of 3-5 feet, hilly areas faced heightened landslide risks due to heavy rainfall. To enhance awareness, miking campaigns were conducted alongside bulletin dissemination.

Finally, the Strengthening Community Resilience Through Flood Forecast-Based Early Action in Jamalpur (FbA Project) reinforced localized flood preparedness through targeted voice message broadcasts. Between January and September 2024, a total of 21,060 calls were disseminated, with an adaptive approach ensuring that messages reached recipients despite network challenges in remote areas. The frequency of broadcasts increased during flood situations, demonstrating an effective model for dynamic early warning communication.

These pilot demonstrations underscore RIMES' commitment to bridging the gap between scientific forecasts and community-level action, ensuring that vulnerable populations receive timely and practical early warnings.

Bridging Gaps in Early Warning Dissemination

The SHEWS-C27 project addressed significant gaps in flash flood warning dissemination in Netrokona and Sunamganj. A baseline assessment revealed that only 19.5% of respondents received early warnings, often with inadequate lead times. This pointed to critical deficiencies in the dissemination of timely and actionable flood warnings. Additionally, awareness of technologies such as Interactive Voice Response (IVR) systems was found to be very low, at just 6.77%. The findings underscored the need for improved communication systems, capacity building, and technology-driven solutions to enhance community resilience.

The project responded by implementing a multi-channel dissemination approach, incorporating voice message broadcasting, SMS alerts, and email notifications to maximize coverage. Community feedback mechanisms ensured that warnings were timely, understandable, and actionable.

The Local Flood Warning Dissemination System (PROVATi3-R) project further advanced early warning communication by conducting extensive voice message

broadcasts during the July and September 2024 flood events. A total of 52,041 calls were made across 59 unions, ensuring that the DMC members and relevant authorities received timely alerts. Notably, for the first time, AI-generated voice messages were trialed, demonstrating the potential for automated, scalable warning systems in Bangladesh.

Several IEC materials were also prepared and shared among participants of different workshops and trainings at local and national levels.

CAPACITY BUILDING OF USER INSTITUTIONS

Efforts in 2024 focused on enhancing the ability of disaster management institutions, local government authorities, and community stakeholders to effectively prepare for, respond to, and manage disaster risks. These initiatives were delivered through structured training programs, workshops, and technical capacity-building exercises.

Bangladesh

Flash flood risk management for National and District-level DMC

A training session on flash flood risk management was organized for national and district-level professionals, including DRROs, DDM staff, district DMC members, and other stakeholders, to enhance their use of forecast guidance in risk management.

This training, held at the national level with at least 15 participants, was facilitated by experts from FFWC, DDM, BMD, and RIMES. Participants received instruction on flood forecasting fundamentals, flash flood forecast products, interpretation, trigger mechanisms, early actions, and financing.

Meanwhile, the District-level Training of the Interpreter Pool on Early Warning Message Interpretation and Dissemination was held on June 12, 2024, at the District Parishad Hall Room in Netrokona, organized by SHEWS. The training included a comprehensive overview of flash flood forecasting and early warning systems in Bangladesh, presented by representatives from FFWC, BWDB, and RIMES. Topics covered included essential elements of forecasting, understanding danger levels, and interpreting water level data.

Training on Flood Early Warning and Risk Management for DMCs

To make community people aware of flood early warning and its risk management, there is a provision of one training per upazila where DMC members would be trained up on basic disaster terminologies, flood early warning and their roles and responsibilities during disasters. The training had been conducted in 18 upazilas under the project area–5 upazilas in Jamalpur district and 5 upazilas in Gaibandha and 8 in Kurigram district. One more training remains to be done to cover all the upazilas.

Early Warning Training in Gaibandha District, Bangladesh

Training on DMC Database operation and management

As DMC portal is developed to keep records of the existing DMC committees and their activities, it is important to train the users on it. For this purpose, field-level demonstrations have been given at 16 upazilas in the study area. Project Implementation officers (PIO) of all upazila, their office secretaries, Paura Nirbahi Officers (PNO) and their officer secretaries were the participants in the training session. The training session was facilitated by ICT specialist of PROVATi3 project- DDM Component. Participants learnt to use the portal practically and they gave feedback on the portal to upgrade to ease operation at user level.

DMC Database training in Kurigram and Gaibandha Districts

Guests for the Volunteer's Training

Volunteer's Training on Vulnerability Data Collection

Training sessions on vulnerability data collection introduced digital tools like the Kobo Toolbox survey app for gathering field data, including GPS coordinates. Participants, particularly local disaster preparedness volunteers, were also trained on interpreting cyclone forecasts and understanding the national forecasting process.

Additionally, they were introduced to real-time forecast platforms, enabling them to take anticipatory actions based on impact-based forecasting. By integrating technology with traditional disaster preparedness measures, these efforts contribute to a more data-driven, proactive approach to reducing cyclone risks in vulnerable communities.

KNOWLEDGE SHARING MECHANISMS

Knowledge Sharing session in Cox's Bazar on DRM

DRM in Cox's Bazar: Insights & Lessons Learned

The DRM UNDP-IRIG project organized a workshop to review lessons learned from recent disaster preparedness initiatives and explore strategies for improving response mechanisms. The discussion highlighted the increasing frequency of multidimensional hazards such as landslides and lightning, emphasizing the need for anticipatory actions beyond cyclones.

Participants recommended making early warning platforms more accessible, including features for people with disabilities and offline users. Suggestions also included expanding community training on forecast interpretation, increasing awareness of digital tools, and enhancing the clarity of warning messages. The workshop reinforced the importance of continuous learning and adaptation to strengthen institutional and community capacity for multi-hazard preparedness.

Learning and Sharing Workshop of strengthening hydrological services and EWS

Hydrological Information & EWS Learning-Sharing Workshop

A Learning and Sharing Workshop on the Bangladesh Weather and Climate Services Regional Project (BWCSRP) Component B, focusing on the Strengthening Hydrological Information Services and Early Warning System (SHEWS) project, was held on June 27, 2024, at Pani Bhaban. Chaired by Md. Wahid Hussain, Additional Chief Engineer of BWDB, the workshop provided an overview of the project's objectives and outcomes. A baseline survey of user awareness in the flood-prone districts of Sunamganj and Netrokona revealed gaps in early warning communication, with many respondents receiving alerts less than six hours before a flood event. Discussions highlighted the potential for the BWDB to disseminate alerts through voice messages, social media, and public announcements. Updates on recent initiatives included gauge reader training for SMS-based water level reporting and the implementation of an IoT-enabled water level monitoring system in pilot areas. Md. Golam Rabbani presented a flash flood forecasting system using WRF-Hydro, extending lead times from three to five to seven days.

Knowledge Café: Knowledge Sharing on project implementation

Save the Children, RIMES, and Mahideb Jubo Somaj Kallayan Somity (MJSKS) conducted a Knowledge Cafe on 03 October 2024 as a culminating activity of the "El Niño Anticipatory Actions to Drought and Heatwave in Bangladesh" project.

The Knowledge Café brought together government officials, the Anticipatory Action Working Group, and members from International Non-Government Organizations (NGO), Local NGO, and UN Agencies to share findings, assess triggers, and explore heatwave responses for the community. Insights from from BMD and Save the Children revealed the impacts of El Niño on agriculture, livestock, and healthcare, highlighting how timely interventions helped reduce losses for many families.

Conduct of the Knowledge Cafe, a knowledge sharing workshop

TNSDMA Team Exposure Visits

NIOT & NCCR

The visit to the National Institute of Ocean Technology (NIOT) and the National Center for Coastal Research (NCCR) provided valuable insights into coastal disaster management and mitigation strategies. NIOT's cutting-edge technology in ocean observation systems, coastal protection, and underwater monitoring tools directly contributes to disaster preparedness, especially for tsunamis and cyclones. NCCR's focus on coastal erosion studies, early warning systems, and climate change impact assessments enhances coastal resilience. Additionally, NCCR's Integrated Flood Warning System (I-FLOWS) flood forecasting model provides real-time flood predictions, improving preparedness and response during heavy rainfall and flood events. The collaboration between these institutions and disaster management agencies is vital in reducing vulnerabilities and improving response mechanisms to coastal hazards.

IIT, Madras

The visit to Indian Institute of Technology (IIT) Madras' Thaiyur and Guindy campuses provided crucial insights into advanced disaster risk reduction technologies. At Thaiyur, the team explored the development of a Storm Surge Model specifically designed for Tamil Nadu's coastal regions. This model, tailored for the Tamil Nadu State Disaster Risk Reduction Agency's project, simulates storm surge impacts, aiding in more precise evacuation planning and coastal protection strategies. Further showcased ongoing research in climate along infrastructure sustainability, further contributing to disaster preparedness and response capabilities. These innovations are pivotal for enhancing disaster mitigation and reducing risks in the state.

Exposure Visit at NIOT & NCCR

storm surges and they predict weather using different models. They also use data from the INSAT satellite to improve accuracy.They track weather patterns through synoptic methods and issue important bulletins about the step-by-step process for cyclone warnings.Their Precipitation Forecast helps predict heavy rainfall, aiding in flood risk assessments, while the Heat Wave Alerts support mitigation during extreme temperature events. RMC also provides Nowcasting Services, offering short-term weather predictions that are essential for real-time disaster response.

Exposure Visit at IIT, Madras

RMC, Chennai

The visit to the Regional Meteorological Centre (RMC), Chennai, highlighted the critical role of weather forecasting in disaster management. RMC's advanced meteorological models and real-time data on rainfall, cyclones, and wind patterns are instrumental for the Tamil Nadu State Disaster Risk Reduction Agency's initiatives. The center's expertise in early warning systems for cyclones and

National Center for Seismology (NCS)

The visit to NCS provided insights into its specialized role in earthquake monitoring and seismic hazard assessment. NCS operates a network of seismological observatories across the country, delivering real-time alerts during seismic events. Their Seismic Hazard Zonation Maps are vital for urban planning and disaster mitigation in earthquake-prone regions. NCS also collaborates with tsunami warning centers to monitor undersea seismic activities that can trigger tsunamis. The center's micro-zonation studies offer detailed risk assessments for cities, enabling better disaster preparedness. NCS's work

supports the design of earthquake-resistant structures, contributing to long-term disaster resilience.

National Crop Forecasting Centre (NCFC)

The visit to NCFC highlighted its essential role in ensuring food security during disasters. NCFC's FASAL (Forecasting Agricultural Output) project uses satellite imagery and meteorological data to monitor crop health and predict yields, helping mitigate agricultural losses due to natural disasters. Their NADAMS (National Agricultural Drought Assessment and Monitoring System) identifies drought-prone regions, enabling timely interventions. NCFC also integrates weather data with soil and crop information to assess flood and pest impacts. The center's Vegetation Condition Index (VCI) and Normalized Difference Vegetation Index (NDVI) are critical tools for tracking crop conditions. These products play a significant role in post-disaster recovery, ensuring sustainable agriculture and economic stability.

NCMRWF

At the National Centre for Medium Range Weather Forecasting (NCMRWF), the focus was on its advanced Numerical Weather Prediction Models and their applications in disaster management. The center's Ensemble Prediction Systems (EPS) provide probabilistic weather forecasts, aiding in effective decision-making for extreme weather events. NCMRWF's Global and Regional Forecasting Models deliver medium-range forecasts, crucial for cyclones, floods, and drought preparedness.

Indian Meteorological Department (IMD)

The visit to IMD highlighted its critical contributions to disaster management through cutting-edge meteorological services. IMD's Cyclone Early Warning Systems and Storm Surge Prediction Models provide accurate and timely alerts, saving lives and minimizing damage during cyclonic events. The department's Doppler Weather Radars, deployed across India, enable real-time tracking of severe weather phenomena like thunderstorms and cloudbursts.

Space Applications Center (SAC)

The visit to SAC showcased the critical role of satellite technology in disaster management. SAC's Remote Sensing Applications provide real-time data on floods, droughts, landslides, and cyclones, ensuring timely response. Their INSAT and Cartosat satellite data offer high-resolution imagery for monitoring and assessing disasters.

Exposure Visit at NCMRWF (top) and SAC (bottom)

CAPACITY BUILDING OF END USERS

Efforts in 2024 focused on enhancing the ability of disaster management institutions, local government authorities, and community stakeholders to effectively prepare for, respond to, and manage disaster risks. These initiatives were delivered through structured training programs, workshops, and technical capacity-building exercises.

Protection against lightning public awareness training

Protection against Lightning (PaL) Public Awareness cum Training

02 May 2024, Sindhupalchowk District, Nepal

The event engaged local government representatives, community disaster management committees, sectoral agencies, and youth groups to raise awareness on lightning threats, early warning systems, and safety measures. Interactive sessions addressed misconceptions, demonstrated protective devices, and highlighted the need for wider public awareness campaigns, adoption of IEC 62305 standards for lightning protection, and enhanced multi-hazard early warning systems.

Community-based mock drill on Floods and landslides

04-05 June 2024, Helambu and Melamachi Municipalities, Sindhupalchowk, Nepal

RIMES in Nepal, in partnership with local governments, Practical Action, and the Red Cross, conducted flood and landslide mock drills in Helambu and Melamchi Municipalities. The exercises involved elected representatives, disaster management committees, students, and media to strengthen risk dissemination and decision-making. Key takeaways included the need for better community awareness alongside security force training to enhance resilience.

Mock drills in Sindhupalchowk District, Nepal

Landslide and Monsoon Risk Management Training

10-11 June 2024, Ukhiya Upazila, Cox's Bazar

Landslide and Monsoon Risk Management Training in Ukhiya Upazila, Cox's Bazar

The SLMC project, in collaboration with UNDP, supported a Landslide and Monsoon Risk Management Training in Ukhiya Upazila, Cox's Bazar, on 10–11 June 2024. The training aimed to enhance the capacity of UDMCs and Cyclone Preparedness Programme (CPP) volunteers in weather forecast interpretation and monsoon-related landslide preparedness.

A total of 37 participants (22 men, 15 women) took part in interactive sessions, group discussions, and a demonstration of the INSTANT portal, with a focus on localized weather forecasting for landslide risks. On behalf of the SLMC project, a RIMES meteorologist led the technical sessions on 11 June 2024.

Forecast Interpretation and Capacity Building for CPP Volunteers

28 August 2024, Cox's Bazar, Bangladesh

RIMES in Bangladesh otrained 41 CPP volunteers from Teknaf, Ukhiya, and Cox's Bazar Sadar Upazila on multi-hazard early warning systems, impact-based forecasting, and the INSTANT portal's new features (lightning nowcasting, heat stress alerts, and risk/resource mapping). Led by RIMES experts and supported by UNDP's DRM team, the training empowered volunteers to interpret and respond to various hazards beyond cyclones.

Forecast Interpretation Training for Local Youth and Volunteers in Cox's Bazar, Bangladesh

Tsunami Awareness Session

04 November 2024, Cox's Bazar, Bangladesh

Ahead of World Tsunami Awareness Day, RIMES in Bangladesh conducted a tsunami awareness session in Teknaf, Cox's Bazar, a coastal area vulnerable to tsunamis. The session aimed to educate the local community on tsunami risks, early warning systems, and life-saving response actions.

Tsunami awareness session in Cox's Bazar, Bangladesh

Led by a RIMES meteorologist, the session covered tsunami causes, early warning mechanisms, and essential safety measures. Around 50 participants, including local government officials, humanitarian stakeholders, youth volunteers, and Disaster Management Committee members, attended, reinforcing a collaborative approach to disaster resilience.

This initiative aligns with RIMES' ongoing efforts to enhance early warning systems and preparedness in Bangladesh's coastal communities, ensuring stronger local resilience and improved disaster response.

Empowering Climate-Resilient Youth in Chitral through Search-and-Rescue and First Aid Volunteer Training

18-21 November 2024, Chitral, Pakistan

Search-and-rescue and first aid training in Chitral, Pakistan

RIMES, in collaboration with Rescue 1122 and the Chitral District Office, trained high school students and teachers in Union Council Shogore on search-and-rescue and first aid. The training covered disaster response, emergency medical care, and teamwork through role-playing exercises. First aid kits were provided to schools, ensuring immediate application of newly acquired skills and contributing to safer learning environments.

Advancing Cyclone Preparedness in Local-Level Response

Bangladesh

The STEP project played a pivotal role in enhancing government and community preparedness for cyclones. A training program was conducted focusing on impact-based forecasting and anticipatory actions for cyclones in coastal regions. This initiative aimed to strengthen the understanding and application of forecast-based actions to mitigate cyclone-related risks effectively.

The training sessions were implemented across four (4) pilot upazilas in four (4) different districts, targeting both government officials and community representatives. These sessions emphasized key areas such as anticipatory action planning, interpreting cyclone early warnings, and executing timely, sector-specific interventions based on forecasts.

A total of approximately 280 participants were equipped with practical skills and knowledge in these critical areas. The training also included community demonstrations, which provided hands-on experience in implementing forecast-based actions. These demonstrations highlighted actionable steps for different sectors, enabling communities to better prepare and respond to cyclone threats. This initiative not only built the technical capacity of stakeholders but also fostered a collaborative approach to disaster preparedness, ensuring a more resilient and proactive response framework in the coastal regions.

Anticipatory Actions Against Heatwaves

The El Niño AA project has supported the capacity building of both meteorologists and local stakeholders(users of the forecast) to enhance the forecast accuracy and forecast usability. A three-day long training of seasonal forecasting tools (X-Cast) was arranged for BMD officials to enhance their capacity for seasonal and sub-seasonal forecasting. In parallel, capacity building for DMC members of the project area, health workers, and farmers was also arranged in the health, agriculture, and livestock sectors.

Capacity Building Training on Forecast Interpretation

Ukhiya, Teknaf, and Cox's Bazar, Bangladesh

A targeted capacity-building program through the UNDP-IRIG project engaged 170 participants, including government officials and humanitarian actors, in cyclone-prone regions. The training covered essential topics such as cyclone tracking, signal warning interpretation, uncertainty management, and the use of digital platforms for real-time forecast access.

Through group discussions, participants identified gaps in early warning dissemination and proposed solutions such as integrating hazard data, increasing grassroots training, and improving data sharing through a unified system. Key recommendations included strengthening volunteer networks, enhancing equipment support, and developing a more inclusive early warning system to reach vulnerable populations, including seagoing fishermen. These efforts aim to bolster disaster resilience and improve the effectiveness of early warnings at the community level.

Forecast interpretation and capacity building training for UDMC and local government humanitarian stakeholders

Capacity Building for Media and Communication Professionals

On March 27, 2024, RIMES successfully organized a one-day "Forecast Interpretation for Media and Communication Professionals" training in Dhaka. This training equipped participants with the knowledge and skills required to accurately communicate early warning information, including weather forecasts, potential impacts, and preparedness measures. Attendees included representatives from print, broadcast, and digital media, as well as professionals from NGOs and government agencies such as the Emergency Operations Center and the Media Communication Wing of the Department of Disaster Management (DDM). The program covered key topics such as meteorological terminologies, the role of impact-based forecasting, and best practices in risk communication. Additionally, participants explored opportunities for future collaborations to further enhance disaster risk management (DRM) efforts and strengthen coordination among stakeholders.
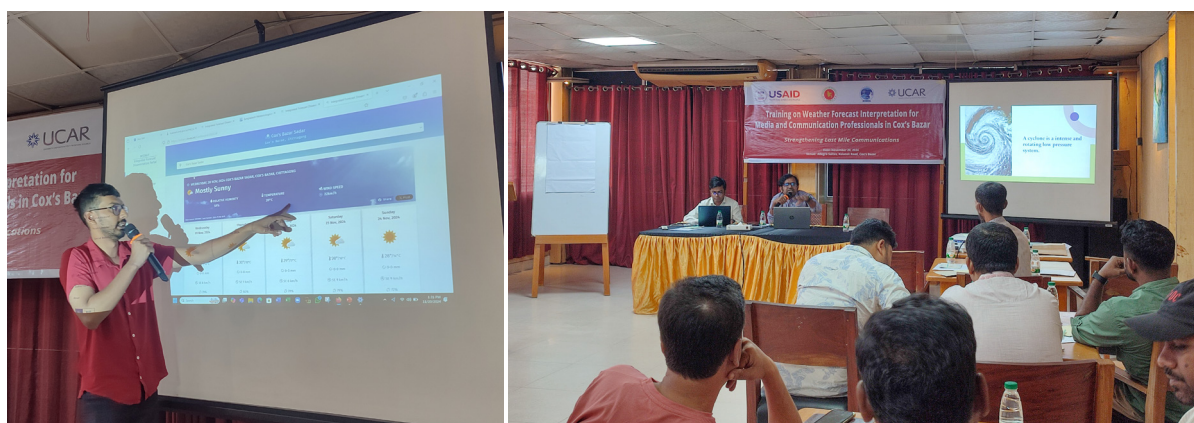
Forecast interpretation training for media professionals in November 2024

Building on the success of the national-level training, RIMES conducted a district-level "Weather Forecast Interpretation for Media and Communication Professionals" workshop on November 20, 2024, at Allegro Suites, Kalatoli Road, Cox's Bazar. This day-long session specifically targeted local journalists and media professionals, providing them with hands-on training to improve their understanding and reporting of weather-related information. Participants represented various media outlets, including print, radio, and electronic media. The workshop featured in-depth discussions on numerical weather forecasting, cyclone early warning systems, forecast uncertainties, and lightning and thunderstorm awareness. Additionally, a practical demonstration of the INSTANT Portal showcased its functionalities and applications in real-time weather monitoring and reporting.

INSTITUTIONAL DEVELOPMENT

RIMES strengthens its institutional capabilities to better serve its Member States and ensure sustainable program outcomes. This ongoing development, essential for delivering actionable warning information as outlined in its Master Plan, is facilitated by the critical support of its development and technical partners.

RIMES COUNCIL MEETING

The 16th RIMES Council Meeting focused on advancing RIMES' mission to enhance disaster resilience. Key discussions included progress on the Institutional Development Plan 2024–2030, the establishment of Regional Headquarters to decentralize operations, and the adoption of Policy Note 1 of 2024. The meeting also emphasized the significance of the upcoming 4th RIMES Ministers' Conference in April 2025, encouraging strong ministerial participation to drive impactful policy decisions. Discussions also addressed the need for increased Member State contributions to maintain financial stability.

A major focus of the meeting was preparing for the 4th RIMES Ministers' Conference. Key concerns from Member States were raised, including logistical support and resource management assistance. The Council approved measures to facilitate ministerial participation, while updates on the IDP, Settlement Agreement, and newly formed committees (Finance, Technical/Program, and Policy/Steering) underscored efforts to improve governance, transparency, and operational efficiency. The World Bank's continued investment in RIMES, particularly in financial modernization and data analytics, was highlighted as a crucial step toward strengthening institutional capacity.

In conclusion, the Council approved the 2025 Work Program and endorsed innovative project implementation models to enhance disaster management solutions. The next Council Meeting was confirmed for April 2025 in Colombo, Sri Lanka, alongside the Ministers' Conference.

INSTITUTIONAL DEVELOPMENT PLAN

Establishment of Institutional Development Plan (IDP) and IDP Unit

RIMES is committed to enhance RIMES governance and business processes to support the effective and efficient implementation of its organizational mandate and the programs. In May 2024, RIMES, with the approval of RIMES Council, developed its Institutional Development Plan 2024 -2030 with technical and financial assistance from World Bank. The IDP is being implemented in three distinct but interconnected Phases:

- Phase 1 (August 2024 – end of 2025): The focus will be on foundation-setting and capacity development, including the restructuring of the RIMES Program Unit and the strengthening of financial, human resource, procurement, project management, monitoring and evaluation, information security systems, and regional data analytics capabilities.

- Phase 2 (January 2026 – December 2027): RIMES will step into its role as an "Integrator," strengthening trust-based relational partnerships and achieving sustainability through tested funding models. Concurrently, RIMES will continue implementing SAHF priorities, establishing institutional mechanisms for integrating NMHS with user stakeholder institutions to facilitate data sharing and the co-generation of Impact-Based Forecasts.

- Phase 3 (January 2028 - 2030): This phase will focus on demonstrating RIMES' sustainability, continuous improvement in its organizational structure, operations, service delivery, and funding models. RIMES will further enhance its support for the efficient implementation of climate information and early warning system services and actions in Member and Collaborating States.

These implementation process envisioned to transform existing governance and business processes by redesigning, reorganizing, or reengineering as well as infusing brand-new State of Art management practices as may be needed.

IDP establishment implementation

- September 2024: RIMES Council approved implementation process on 5th September, 2025 and a dedicated IDP Unit was established.

- October 2024: Head of IDP Unit, who has more than 25 years of experience in capacity building and institutional development of both private and public sectors in more than 20 countries was appointed.

- December 2024: The IDP Unit was further strengthen with the appointment of IDP Specialist and IDP Implementation Officer.

From October to December 2024, the IDP Unit carried out following tasks:

✔Reviewing and improving the financial management process, policies and internal controls by adopting international standards such as the Committee of Sponsoring Organizations (COSO) Framework.

✔Assessment and compliance of financial reports and statements to be in line with International Financial Reporting Standards (IFRS) standards.

✔Establishing contract management and review processes and procedures for all legal documents and letters to ensure all contracts are reviewed and vetted for any potential issues.

✔Assessment of existing financing /contract agreements (FA/CA) and the capacity of RIMES in meeting the obligations and commitment as per the FA/CA.

✔Preparation and planning for RIMES to achieve ISO certifications especially ISO 9001 and ISO 27001.

IMD-RIMES UNIT

The IRU team is focused on developing three (3) distinct tools for IMD to enhance its operational efficiency and provide advanced solutions tailored to its specific needs.

iRAINS (IMD Rainfall Information System)

✔ **Comprehensive Rainfall Data Management**: provides a centralized platform for retrieving historical and real-time rainfall data at various levels, including Meteorological Centres (MC), Regional Meteorological Centres (RMC), and headquarters (HQ).

✔ **Automated Map Generation**: processes daily rainfall station data to produce rainfall maps across different time intervals—daily, weekly, seasonal, departure, cumulative, and normal. These maps can be generated for a range of geographic regions, including blocks, districts, states, sub-divisions, regions, and the entire nation.

✔ **Customizable User Preferences**: offers users the flexibility to create maps and statistics tailored to specific requirements, enabling detailed analysis for individual rainfall stations.

✔ **Sophisticated Database Operations**: acting as an automated database, iRAINS ensures seamless data storage, retrieval, and processing, reducing manual interventions and improving operational efficiency.

✔ **Alert Notifications and Data Dissemination**: equipped with an automated alert notification system and mechanisms for efficient dissemination of rainfall data to stakeholders.

Majority of functionalities of iRAINS have been developed and tested. The tool is ready for operational deployment. It is expected to enhance IMD's capabilities in rainfall data analysis and decision-making.

Weather Decision Support System (WDSS)

The primary focus of development is on enhancing the existing "Synergie" tool used by IMD, and adding more advance functionalities. These enhancements have been made with the aim of supporting the operations of forecasters at both the MC/RMC level and HQ level. The tool is designed to facilitate daily operations, as well as disaster/event-specific operations, and to enhance the user-friendliness of the DSS system.

The primary goal of the DSS system is to optimize the tasks of users by providing them with a consolidated platform through which they may retrieve weather data. Users can efficiently retrieve the data within a short timeframe utilizing this strategy. In addition, the system's application architecture allows users to easily access all accessible options on a single page, providing them with ease. It possesses several functionalities like "Observation," "Macro," "Dynamic Legend," "Print," "Time-Dimension," "Side-by-Side." "Data Validation," "Weather Inference," "Auto Alert," "Map Data Retrieval," "Auto Dissemination," etc.

The tool has enhanced its user-friendliness and improved its development, in addition to its existing capabilities on the internet. The implemented features are fully functional in each subsection, namely Exposure, Metar, Synop, Sounding, Ship & Buoy, Radar, Satellite, Lightning, Mesoscale Forecast, Medium-Range, and Export Polygon, together with their respective sub-module layers.

The webpage prominently displays a map that offers a comprehensive overview of nationwide information. This enhances user assistance and enhances the user's experience by presenting all relevant information in a cohesive viewpoint. Furthermore, it incorporated additional tools to assist users in performing daily forecasting duties, hence improving accessibility.

Development is in advanced stage, the system is being refined based on the feedback received from IMD officials. Due to challenges identified with the current PHP technology, a technology shift to Marine technologies has been recommended and is now underway. This transition aims to address the identified difficulties and improve the system's overall performance and scalability.

Agro-Meteorological Decision Support System (AgroDSS)

AgroDSS integrates various time-scale forecast products from IMD, including short-range, medium-range, and extended-range forecasts. Value-added high resolution model output at district and block levels through RMCs/MCs are integrated in AgroDSS.

The tool has been functional for IMD since 2021, but due to challenges faced in PHP, complete transformation of AgroDSS to Marine technology is in progress.

The specific updates on development are:

✔ Updating the Agro-met DSS Website for improved usability and functionality.

✔ Upgrading the Backend/Data Server to enhance performance and scalability.

✔ Addressing Networking and Server Security issues to ensure robust operations.

✔ Integrating a Dynamic Crop Weather Calendar for more precise and localized agricultural decision-making.

ACTIVE PROJECTS

Project Title:	**Intra-ACP Climate Services and related application Programme (ClimSA)**
Country of Focus	Bangladesh
Period	01 June 2023 - 30 March 2025
Client	World Meteorological Organization (WMO)
Overview	The program aims to support the efforts of SADC and its Member States to produce and provide enhanced climate services to stakeholders at the national and regional levels. To further strengthen the service delivery mechanism of SADC, the program intends to assess and capacitate the CSC to be a WMO-designated Regional Climate Centre (RCC).
	This also entails the necessity of revisiting and understanding the current capacity and the residual needs of the member NHMS. WMO engaged RIMES, under this program, to conduct a stocktaking of the current capacity of the NHMS and their readiness to provide climate services to the stakeholders.

Project Title:	**Child Centred Anticipatory for Better Preparedness of Communities an Local Istiutions in Nothern and Coastal Areas of BD**
Country of Focus	Bangladesh
Period	February 2024 - August 2026
Client	Save the Children - Global Fund for Funding Organizations (GFFO-SC)
Overview	The project aims to achieve the outcomes: i. Increased access and capacity of communities and local institutions to climate information services and effective early warning systems to cope with climate variability and multi-hazard risks; ii. Communities and local institutions are well-equipped with risk-informed Early Action Plans to foster child-centred anticipatory action for reducing loss and damages; iii. Learnings from localized child-centered Early Action Planning embedded in the Disaster Risk Management Framework across local and national Anticipatory Action in order to minimize shocks from extreme events. The project will focus on enhancing the early warning system for cyclone and landslide in the coastal areas of Bangladesh and for flood in the north-western flood-prone districts. The project will also pilot Agromet FARRM school in the project areas

Project Title:	**Promoting Resilience of Vulnerable through Access to Infrastructure, Improved Skills and Information (PROVATI-3R)**
Country of Focus	Bangladesh
Period	01 June 2023 - 30 March 2025
Client	International Fund for Agricultural Development (IFAD)
Overview	The project PROVATI3 works to improve rural infrastructure, enhance poor people's ability to generate income, and increase access to flood information at the community level. The project provides last-mile connectivity to stimulate growth/ commercialization through market access (roads and markets), and increases resilience through diversification of incomes, infrastructure design improvements, and better maintenance.

Project Title:	**Strengthening local leadership to promote resilience and effective response for the vulnerable communities in Sylhet region and other district in Bangladesh**
Country of Focus	Bangladesh
Period	01 October 2024 - 31 March 2026
Client	Save the Children
Overview	The initiative focuses on providing flood-affected households with climate-resilient livelihood opportunities while strengthening local capacities for early warning systems and disaster preparedness in the Sylhet region. Led by SC, project implementation in Sylhet and Sunamganj, focusing on livelihood restoration and risk mitigation in rural areas and enhancing multi-hazard risk reduction awareness and capacity building in urban areas. Schools will also be engaged through disaster risk reduction (DRR) capacity-building, early action, shelter management, and safe education programs.

Project Title:	**Strengthening Household Ability to Respond to Development Opportunities (SHOUHARDO III - DRR)**
Country of Focus	Bangladesh
Period	20 September 2023 - 31 August 2025
Client	US Agency for International Development
Overview	The project aims to foster locally led, gender inclusive and policy informed community resilience in Bangladesh, with particular focus on the most vulnerable and flood-prone areas of Bangladesh (country-wide). Its interventions include: ・ Build capacity on adaptive, productive, equitable and resilient agriculture through improved agricultural practices, ・ Boost the ability of households, communities, and institutions to anticipate and react to calamities, and ・ Augment household and communal resilience to provide safe shelter during natural disasters.

Project Title:	**Strengthening Forecast-based Early Actions in Cyclone Prone coastal region in Bangladesh (STEP)**
Country of Focus	Bangladesh
Period	01 October 2023 - 31 January 2025
Client	Action Contre la Faim France (ACF)
Overview	This project intends to strengthen resilience of institutions and cyclone vulnerable communities by improving DRM governance through the capacity building of institutions/communities in identifying and managing risks through FBA. This will enable coordination and collaboration between FbF/A taskforce, implementing agencies, communities and the local authorities. STEP project will support national and local authorities in improving institutional, legislative & policy frameworks that are specific to preparedness and response where appropriate, relevant and necessary in collaboration with respective development actors. This action will also emphasize building on and contextualizing existing protocols, guideline and modules to make the FbA protocol more specific to the locations and context.

Project Title:	**Building climate resilience through strengthened Communication across the WCIS system (BRIDGES)**
Country of Focus	Bangladesh, Kenya, Nepal
Period	01 October 2023 - 31 January 2025
Client	BBC Media
Overview	The project aims to improve weather and climate information services (WCIS) to ensure that people are taking positive actions to adapt to climate change and building resilience to climate-related natural hazards, specifically to: i. Strengthen knowledge and capacity of different stakeholders through training and mentoring, ii. Facilitate greater cross-disciplinary collaboration and sustainable mechanisms for better coordination among stakeholders, iii. Increase accessibility, timeliness, relevance, usefulness of, and trust in WCIS among mass people, especially the marginalised communities, and iv. Increase global interest & knowledge of effective communication approaches into WCIS through research and evidence generation.

Project Title:	**Climate Adaptation and Resilience (CARE) for South Asia (Component 1)**
Country of Focus	Bangladesh, Nepal, Pakistan
Period	10 July 2020 - 05 August 2025
Client	World Bank
Overview	The project aims to create an enabling environment for climate-resilient policies and investments in the South Asian Region through increased access to regional climate data and analytics and their application in national-level planning and decision-making, incorporation of regional climate resilience guidelines into national standards, consideration of climate risks and resilience in the design of sectoral investments, and strengthening of institutional capacities to undertake climate-informed policies and planning. RIMES key role is to develop a regional resilience data and analytics service platform and decision-support systems for the agriculture, planning, road transport, and water sectors, including capacity development of users of these systems and their products. RDAS is a cloud-based open-access platform for acquiring, storing, managing, processing, analyzing, visualizing, and reporting data, for use in screening climate risks to inform investments, while DSSs are sector-specific systems, linked to the RDAS, and used to assist users in sectoral planning and decision-making.

Project Title:	**Strengthening Last Mile Communication (SLMC)**
Country of Focus	Bangladesh, Nepal, Pakistan, Sri Lanka
Period	29 October 2021 - 01 June 2025
Client	US Agency for International Development (USAID) through the University Corporation for Atmospheric Research (UCAR)
Overview	The project seeks to enhance the overall national institutional framework that underpins DRR/DRM planning, emergency response and disaster reporting till the local level. This initiative will capacitate representatives of NMHS, NDMA, local authorities and relevant agencies including media in the pilot areas on impact-based forecasting and risk-based warning to help them better formulate and communicate early warning information. The project's primary focus are on customization and piloting of DSS to assist with last mile response, emergency management and long-term DRR.

Project Title:	**Improvements in TNSMART (TNSMART 2.0)**
Country of Focus	India
Period	01 March 2024 - 28 February 2026
Client	Tamil Nadu Disaster Management Authority (TNSDMA)

Project Title:	**Development and implementation of the System for Multi-Hazard Potential Impact Assessment and Emergency Response Tracking (SMART)**
Country of Focus	India
Period	01 March 2024 - 28 February 2026
Client	Government of Tamil Nadu
Overview	The project aims at developing an expert system for analyzing potential impacts from various hazards, using weather forecast information, and for evaluating, generating, and disseminating impact management options. The system also acts as data management system for managing and processing weather, disaster risk, and emergency response resource data, for use by the Revenue Administration, Disaster Management and Mitigation Department. In 2020, RIMES operational team, at the Commissionerate of Revenue Administration and Disaster Management, provided operational and maintenance support to TNSMART. Also, the on-site unit provided capacity building support to the Tamil Nadu Government to ensure data flow from various administrative levels to the centralized system.

Project Title:	**Technical Support and Training in Seasonal forecasting under the framework of the CREWS and Lao**
Country of Focus	Cambodia, Lao PDR
Period	20 March 2024 - 30 April 2025
Client	World Meteorological Organization (WMO)
Overview	The main objective of the project is to assess the capacities, gaps and priorities of the DoM & the Department of Hydrology and River Works (DHRW) in Cambodia & the Department of Meteorology and Hydrology (DMH) in Lao PDR. This assessment covered aspects relating to infrastructure, service delivery, IT and network architecture, human resources, governing mechanisms, training, and existing coordination among key stakeholders in the country. In the second phase, RIMES will provide technical support on seasonal and sub-seasonal forecasting of Cambodia and Lao DPR through training on the use of the FOCUS tool for monthly and seasonal forecasting, conduct of monsoon forums to assist with forecast translation and dissemination to sectoral agencies and end-users, and the organization of ASEANCOF 2024.

Project Title:	**Systematic Observations Financing Facllity**
Country of Focus	Maldives
Period	09 September 2024 - 31 December 2028
Client	United Nations Environment Programme

Project Title:	**Systematic Observations Financing Facllity**
Overview	The Systematic Observations Financing Facility (SOFF) aims to enhance meteorological infrastructure in the Maldives to comply with the Global Basic Observing Network (GBON). The project focuses on upgrading surface and upper-air observation stations, automating existing systems, and integrating advanced data management per WIS 2.0 standards. Institutional reforms emphasize stakeholder engagement, cost recovery, and regional collaboration for sustainability. Capacity development includes technical training, gender balance, and CSO engagement. A risk management framework supports a phased transition to the SOFF investment stage, ensuring funding and technical support to improve climate resilience, disaster risk reduction, and weather forecasting.

Project Title:	**A collaborative implementation Program for the development of DSS for Flood IBF and Ocean Advisory Service**
Country of Focus	Thailand
Period	20 March 2024 - 30 April 2025
Client	Department of Disaster Prevention and Mitigation (DDPM)
Overview	The project is a joint initiative that focuses on the development of a cutting-edge technology-driven DSS tailored for Flood Impact Forecasting and on the provision of essential technical support for Ocean Advisory Services coupled with local knowledge. This collaborative program also included activities such as a knowledge sharing meeting at the NDWC and exposure visit of DDPM and NDWC officials to India.

Project Title:	**Enhancing Early Warning System to Build greater resilience to hydro-metrological hazards in Timor-Leste**
Country of Focus	Timor-Leste
Period	24 March 2022 - 01 May 2027
Client	UN Environment Programme - Green Climate Fund (UNEP-GCF)
Overview	This project aims to address the urgent need for integrated climate information services, covering oceans, and proactive disaster risk management approaches founded on impact-based forecasting and end-to-end MHEWS in Timor-Leste.

The project will enable a paradigm shift to evidence-based planning and early action for climate resilience through accurate, timely and actionable climate information, impact-based forecasting, people-centred, MHEWS and FbF. It will also build the capacity of Timor-Leste to provide the essential high-resolution data and climate information needed to underpin science-based transformational planning and programming, de-risk investments, and facilitate long-term resilience and adaptation to climate change, protecting both human lives as well as the diverse ecosystems that sustain them. |

PROJECTS COMPLETED IN 2024

Project Title:	**Strengthen Community Resilience Through Flood Forecast-based Early Action in Jamalpur (FbA)**
Country of Focus	Bangladesh
Period	01 January 2023 - 30 September 2024
Client	Islamic Relief Worldwide
Overview	This project aimed to build the capacity of institutions and communities in implementing FbA to reduce the loss of life, assets and livelihoods on an anticipated hazard in monsoon flood-prone Char since 2019. Its main objective was to reduce the impact of recurrent monsoon flood by strengthening the capacity of DMCs, local service providers, and community groups through provision of access to flood forecast information and implementation of flood forecast-based early action strategies to mitigate the impact of floods and fostering a more prepared and resilient community. Under this project, location-specific forecasts with extended lead times for multiple target sectors were developed and vulnerable communities and institutions are trained to take timely, effective and inclusive early action.

Project Title:	**Strengthening Hydrological Service and Early Warning Systems (SHEWS)**
Country of Focus	Bangladesh
Period	January - June 2024
Client	Bangladesh Water Development Board (BWDB)
Overview	The project aimed to enhance the resilience of communities in flash flood-prone districts of Netrokona and Sunamganj through the development and implementation of a comprehensive Community-Based Early Warning System. The project developed near real-time river monitoring system while implementing a FFGS at FFWC. This project also strengthened information dissemination system with IT-enabled services, improved the capacity of local communities and stakeholders to interpret, act upon flash flood warnings, and develop an SOP on flash flood forecasting for FFWC's operational forecasting.

Project Title:	**El Niño Anticipatory Actions to Drought and Heatwave in Bangladesh**
Country of Focus	Bangladesh
Period	February 2023 - August 2024
Client	Save the Children
Overview	This project focused on piloting drought and heatwave Anticipatory Actions (AA) in the context of El Niño. A trigger mechanism for drought and heatwave was piloted in Kurigram to introduce drought and heatwave AA.

Project Title:	**Supporting flood forecast action and learning in Bangladesh (SUFAL) Phase II**
Country of Focus	Bangladesh
Period	01 July 2021 - 30 September 2024
Client	CARE International
Overview	The project supported the development of a community-based approach to forecast-based early action, under the broader objective of strengthening capacity of government and communities to take early action against flood impacts. SUFAL-II highlighted the risks and specific needs of most vulnerable households and communities, and links them to available institutional resources and/or services, thereby supporting institutions to better assist the most vulnerable communities ahead of anticipated floods.

Project Title:	**Strengthening Risk Information for Disaster Resilience Project - Enhancement of the Agromet Decision Support System (ADSS)**
Country of Focus	Bhutan
Period	June 2023 - May 2024
Client	World Bank
Overview	The project developed the ADSS which provides agrometeorological services, including a crop calendar, 72-hour weather forecasts, historical weather data, crop advisories, and pest panels. This project subcomponent enhanced ADSS to support 11 gewogs (5,140 households) with improved risk information on priority crops. Key activities included integrating remote sensing and global meteorological data, extending weather forecasts to 10 days, expanding pest panels, training agromet focal persons, strengthening the Department of Agriculture's capacity to update agronomic data and issue advisories, advancing research on crop-weather relationships, and developing SOPs for direct advisory dissemination.

Project Title:	**Bihar Integrated Knowledge System for Climate Resilient Agricultural Services (BICAS)**
Country of Focus	India
Period	June 2023 - June 2024
Client	Bihar Agriculture University
Overview	The project customized the IMD-Agro DSS for Bihar to enable dissemination of location-specific Agromet services at the required level in pilot sites. The system is based on forecasts made available by IMD Pune research teams at various lead times. BICAS is a web-based component connected to IMDAgro- DSS that can be used by State Agricultural University scientists, KVKs, and extension workers for generating and disseminating crop advisories for specific crops at particular growth stages at the pilot locations of the CRA project.

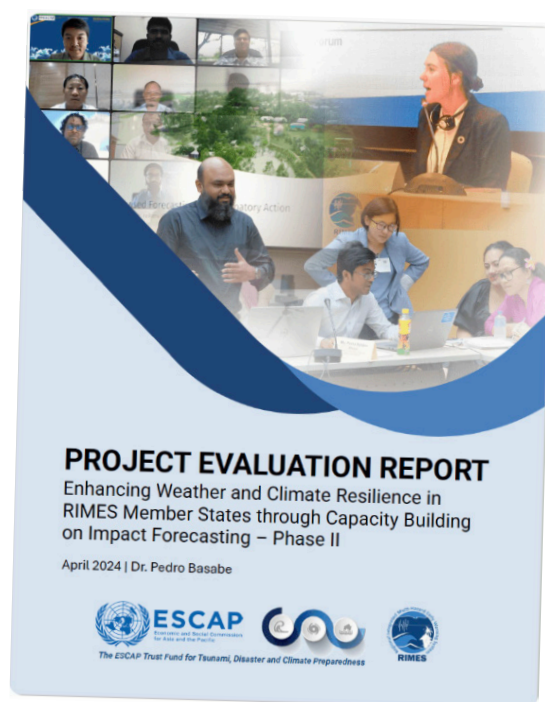| Project Title:	**Operational systems for Integrated Disaster Risk Management for Odisha, India (SATARK)**
Country of Focus	India
Period	01 July 2018 - 06 June 2024
Client	Odisha State Disaster Management Authority (OSDMA)
Overview	The project aimed at developing a One-Stop Risk Management System for automated assessment of risks and evaluation and dissemination of risk and resource management actions, informed by climate information at different timescales, and integration into OSDMA operations. Activities included training of relevant OSDMA personnel, collaborating departments, and other relevant stakeholders in the operation, maintenance, and application of information products from the system in planning and decision-making for managing risks and resources.

PUBLICATIONS, CONFERENCES, AND OUTREACH ACTIVITIES

Terminal Report on the ESCAP-Funded Enhancing Weather and Climate Resilience on RIMES Member States through Capacity Building on Impact Forecasting – Phase 2

An independent end-of-project evaluation to assess the impacts of the United Nations ESCAP-funded project, "Enhancing Weather and Climate Resilience in RIMES Member States through Capacity Building on Impact Forecasting - Phase 2" was conducted from March to April 2024. The project aimed to contribute in improving weather and climate risk-informed decision-making and seasonal planning in climate-sensitive sectors in Bhutan, Cambodia, Fiji, Laos, Maldives, Papua New Guinea, Samoa, and Sri Lanka.

Based on the result of the impact evaluation, the project and its implementation were relevant, coherent, effective, efficient, impactful, and sustainable. It has been successful in terms of: strengthening the sectoral use of weather and climate information such as in the sectors of agriculture, DRR, water resources, energy, health, transportation and tourism; sustaining/ re-establishing conduct of multi-hazard seasonal/ monsoon or climate outlook fora in Laos, Maldives, Papua new Guinea, Sri Lanka and Samoa; identification of complementary activities with other on-going initiatives in the project region; upgrading the decision support system for agriculture; providing capacity building support that have benefited the hydromet services in improving their products and services offered for sectoral use; and providing avenue for sharing project experiences and insights among beneficiary countries.

PROJECT EVALUATION REPORT
Enhancing Weather and Climate Resilience in RIMES Member States through Capacity Building on Impact Forecasting – Phase II

April 2024 | Dr. Pedro Basabe

Read the full report here: https://www.rimes.int/ESCAPIIEvalReport

Heatwave Mass Awareness Campaign in Bangladesh

In response to the ongoing El Niño conditions expected to persist until mid-May 2024, Save the Children, in collaboration with RIMES and the BMD, launched an anticipatory action program in November 2023. Implemented in Kurigram and Dhaka, the initiative focuses on protecting vulnerable communities, particularly children and families. The project pilots a drought trigger mechanism for anticipatory response and introduces the Universal Thermal Climate Index (UTCI) for the first time in Bangladesh to assess heatwave risks. Based on BMD's heatwave definition, a two-level trigger system guides early interventions.

With the heatwave trigger now activated at Level 2, predefined actions are underway to minimize community impact. RIMES and Save the Children Bangladesh are conducting awareness campaigns for both urban and rural populations, educating them on heatwave preparedness through interactive demonstrations. Volunteers have distributed guideline leaflets, water bottles, and caps to help communities cope with extreme heat. In high-risk areas identified by Dhaka North City Corporation, a temporary cooling shed has been set up to provide relief for day laborers, such as rickshaw pullers and pedestrians. These proactive measures aim to enhance resilience and reduce the adverse effects of extreme weather conditions.

Recipients of the awareness campaign conducted by the project

IN PHOTOS: RIMES during the International Coastal Cleanup Day
21 September 2024

RIMES partnered with the Marine and Coastal Resources Administration Office 2 (MCRA2) or a half-day cleanup at San Chao Pho Saen, Bang Saen Beach, Chonburi Province, Thailand.

RIMES and BMD observed the ICC Day 2024 at one of the longest sea beaches in the world, Cox's Bazar Sea Beach.

Tsunami Awareness Program
11 November 2024

In recognition of World Tsunami Awareness Day, RIMES organized an educational program on November 11, 2024, to enhance disaster preparedness among children. The event brought together 18 students from various schools, including Children's Garden School, Mohammadpur Preparatory School and College, and SFX Greenherald International School. Through interactive activities, the program introduced essential concepts on natural hazards, with a focus on tsunamis, ensuring a dynamic and engaging learning experience.

RIMES in Bangladesh conducted an educational program on tsunami with children

The program featured a series of hands-on sessions, beginning with a Weather Booth that introduced children to different weather patterns, followed by an Interactive Game Session on appropriate clothing for varying weather conditions. The highlight was a storytelling session featuring The COPE Squad, where children learned about tsunami risks, early warning signs, and safety measures, such as seeking higher ground. Complemented by educational videos and an Arts and Crafts Session, the program reinforced key messages through creative expression. The event concluded with a Q&A session, ensuring that each child left with a stronger understanding of disaster preparedness. By equipping young minds with vital knowledge, RIMES continues to foster a culture of resilience, empowering future generations to respond effectively to natural hazards.

Commemorating the 2004 Indian Ocean Tsunami

RIMES joined Thailand's Ministry of Foreign Affairs in commemorating two decades since the 2004 Indian Ocean Tsunami occurred.

RIMES Director General, A.R. Subbiah, took part as a panelist in the discussion "Towards Multi-Hazard Early Warning Systems," sharing insights on building resilient and effective early warning systems.

RIMES also hosted an exhibit highlighting its innovative services and decision support systems that empower communities to prepare for and respond to natural hazards.
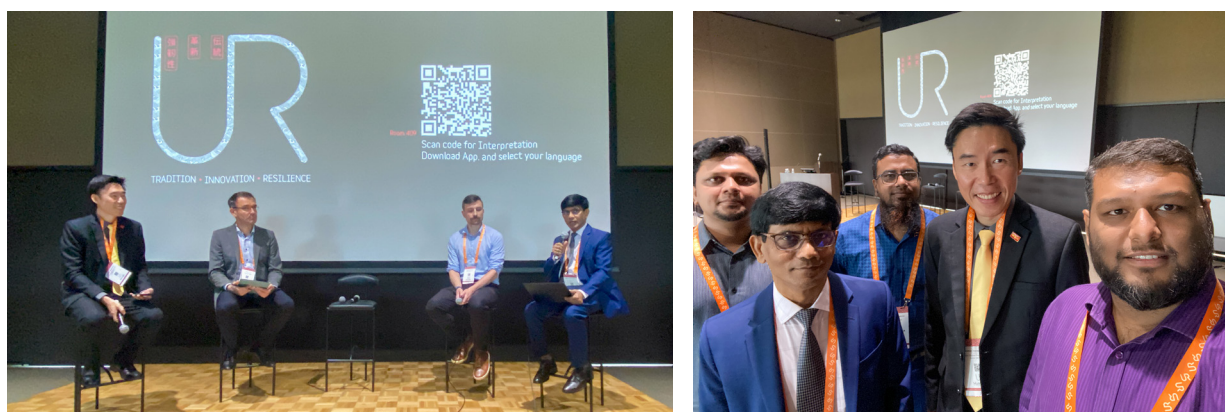

Participation to the Understanding Risk Forum 2024 in Japan

RIMES participated for the first time in the Understanding Risk Forum 2024 (UR24) held on June 16-21 in Himeji, Japan. RIMES sent two staff members and sponsored two from the Department of DDM-Bangladesh.

Netai Chandra Dey Sarker, Director of DDM, served as a panelist during the Session 1: Empowering Communities: Bridging Innovation and Tradition for Effective Early Warning Systems in the Asia Pacific. He discussed about using data and information to guide early warning actions from the national all the way to the local levels and major challenges related to early warning at the local level. Also in the panelists were experts from NASA, JRC, WMO who talked about the innovations and challenges to overcome in early warning system.

Meanwhile, RIMES's Md. Faqrul Arefin and Md. Mobinur Rahman presented the "AI-Driven Flood Warning and Anticipatory Action," showcasing automated voice message broadcasting system using AI. Experts from JBA Consulting and The Netherlands Red Cross – 510 also shared their respective works.

RIMES delegation and participation at the Understanding Risk 2024 Forum held in Japan

Participation to the Asia-Pacific Ministerial Conference on Disaster Risk Reduction (APMCDRR)

RIMES was proudly represented by Raihanul Haque Khan, Mark Marcos, Peter Khalil Ferrer, and Samia Jahan Chowdhury to the APMCDRR held on 14-18 October 2024 in Metro Manila, Philippines.

Dr. Seth Vannareth, Permanent Representative of Cambodia to WMO and RIMES representative, spoke on the Regional Cooperation to Amplify Early Warning for All (EW4All) Investments panel. She underscored the transformative power of regional partnerships in advancing Cambodia's national EWS. Dr. Vannareth highlighted the benefits of these partnerships, including access to advanced tools like myDEWETRA and DWAT, enhanced inter-ministerial coordination, and capacity-building for long-term resilience. Through platforms like RIMES, she noted that countries can share resources, leverage cutting-edge technologies, and fortify local disaster preparedness.

APMCDRR serves as the key platform to strengthen regional cooperation for the implementation of the Sendai Framework for Disaster Risk Reduction 2015-2030.

RIMES delegation and participation at the APMCDRR held in the Philippines
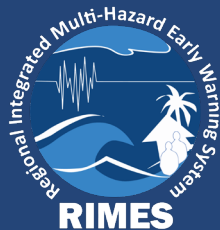
REGIONAL INTEGRATED MULTI-HAZARD EARLY WARNING SYSTEM

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