RIMES

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CARE | SOUTH ASIA

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ACRONYMS

AAB	Agromet Advisory Bulletin
AARI	Ayub Agriculture Research Institute
ADPC	Asian Disaster Preparedness Center
AED	Agriculture Extension Department
AEZ	Agro-ecological Zone
AI	Artificial Intelligence
AITC	Agriculture Information and Training Center
AMISDP	Agro-Meteorological Information Systems Development Project
API	Application Programming Interface
BACD	Balochistan Agriculture and Cooperatives Department
BAMIS	Bangladesh Agro-Meteorological Information Service
BAT	British American Tobacco
BDT	Bangladesh Take
BIPAD	Building Information Platform Against Disaster
BIWTA	Bangladesh Inland Water Transport Authority
BLRI	Bangladesh Livestock Research Institute
BMD	Bangladesh Meteorological Department
BRRI	Bangladesh Rice Research Institute
BWCSRP	Bangladesh Weather and Climate Services Regional Project
BWDB	Bangladesh Water Development Board
CAF	Climate Application Forum
CAP	Common Alerting Protocol
CE	Capacity Enhancement
CEWRI	Climate Energy and Water Research Institute
CMIP	Coupled Model Intercomparison Project
CPP	Cyclone Preparedness Programme
CRS	Crop Reporting Service
CWG	Coordination Working Group
DA	Designated Account
DAE	Department of Agricultural Extension
DDM	Department of Disaster Management
DHM	Department of Hydrology and Meteorology
DLS	Department of Livestock Services
DMC	Disaster Management Committee
DoA	Department of Agriculture
DoF	Department of Fisheries
DoR	Department of Roads
DRM	Disaster Risk Management
DSS	Decision Support System
E&S	Environment and Social
EC	Executive Council
ECMWF	European Centre for Medium-Range Weather Forecasts
EFP	External Finance and Policy Wing
ENSO	El Nino Southern Oscillation
ESD	Environment and Social Development
ESM	Earth System Model
ETCCDI	Expert Team on Climate Change Detection and Indices
EUMETSAT	European Organisation for the Exploitation of Meteorological Satellites
FA	Financing Agreement
FFC	Federal Flood Commission
FFWC	Flood Forecasting and Warning Center
FGD	Focus Group Discussion

FM	Frequency Modulation
GCM	General Circulation Model
GDP	Gross Domestic Product
GEOGloWS	Group on Earth Observations Global Water Security
GESU	Geo-Environment and Social Unit
GIS	Geographic Information System
GloFAS	Global Flood Awareness System
HEIS	High-efficiency Irrigation System
HR	Human Resource
IBF	Impact-based Forecasting
ICKM	Information, Communication, and Knowledge Management
IITM	Indian Institute of Technology Madras
IMD	India Meteorological Department
IOD	Indian Ocean Dipole
ISR	Implementation Status Reporting?
IT	Information Technology
JJSA	June July August September
KII	Key Informant Interview
KPMG	Klynveld Peat Marwick Goerdeler
LDDP	Livestock and Dairy Development Project
MoA	Ministry of Aviation
MoALD	Ministry of Agriculture and Livestock Department
MoF	Ministry of Finance
MoLMAC	Ministry of Land Management, Agriculture and Cooperatives
MoNFSR	Ministry of National Food Security and Research
MoPDSI	Ministry of Planning, Development and Special Initiatives
MoWR	Ministry of Water Resources
MoU	Memorandum of Understanding
NAMC	National Agromet Centre
NAMIS	Nepal Agro-Meteorological Information Systems
NAO	North Atlantic Oscillation
NARC	Nepal Agricultural Research Council
NASA	National Aeronautics and Space Administration
NDRRMA	National Disaster Risk Reduction and Management Authority
NGO	Non-Governmental Organization
NLAS	National Livestock Advisory System
NMHS	National Meteorological and Hydrological Services
NWP	Numerical Weather Prediction
OBN	Observational Networks
ODK	Open Data Kit
OFWM	On Farm Water Management
OSM	OpenStreetMap
PAD	Punjab Agriculture Department
PCRWR	Pakistan Council of Research in Water Resources
PDMA	Provincial Disaster Management Authority
PIU	Project Implementation Unit
PMIS	Project Management Information System
PMD	Pakistan Meteorology Department
PSC	Project Steering Committee
RDAS	Regional Resilience Data and Analytics Services
RIMES	Regional Integrated Early Warning System
RMCB	Regional Meteorological Center of Balochistan

SAARC	South Asian Association for Regional Cooperation
SAC	SAARC Agriculture Centre
SAHF	South Asia Hydromet Forum
SAR	South Asian Region
SFP	Sectoral Focal Point
SID	Sindh Irrigation Department
SKHub	SAHF Knowledge Hub
SMS	Short Messaging Service
SNE	Stochastic Neighbor Embedding
SOE	Statement of Expenditure
SRP	Sindh Resilience Project
STEP	Systematic Tracking of Exchanges in Procurement
THB	Thai Baht
TV	Television
TWG	Technical Working Group
UI/UX	User Interface/User Experience
USD	US Dollar
WG	Working Group

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INTRODUCTION AND BASIC DATA		
Project Title	Climate Adaptation and Resilience for South Asia	
Project Development Objective (PDO)	To contribute to an enabling environment for climate-resilient policies and investments in select sectors and countries in South Asia	
Reporting Year	☐ 2020 ☐ 2021 ☐ 2022 ☒ 2023 ☐ 2024 ☐ 2025	
Reporting Semester	☒ 1st Semester ☐ 2nd Semester	
Country or Region	South Asia Region (Bangladesh, Nepal, Pakistan)	
Total estimate project cost (In Million US$)	39.5[1]	
Revised project cost (In Million US$)	-	
Project Components	Promoting Evidence-based Climate Smart Decision Making	**Cost US$ 10.00 M**
	Enhancing Policies, Standards and Capacities for Climate Resilient Development	**Cost US$ 24.00 M**
	Project Management and Specialized Support	**Cost US$ 5.50 M**

Utilization of Funds					
Total Grant Amount (in US$ Million)	**Disbursement Target for the Current Calendar Year 2022 (in US$ Million)**	**Disbursement during the semester (in US$)**		**Cumulative Disbursement up to the semester (in US$)**	**Cumulative Expenditure up to the semester (in US$)**
		TARGET	ACTUAL		
12,000,000	3,987,540	1,858,161	990,000	2,872,944	2,918,618

[1] Cost breakdown: 10.0 Million US$ allocated for Component 1 for which RIMES is responsible and 24.0 Million US$ allocated for Component 2 for which ADPC is responsible.

EXECUTIVE SUMMARY

The World Bank-funded Climate Adaptation and Resilience for South Asia (CARE) Project aims to contribute to translating climate-resilient policies into actions through enhanced regional cooperation and knowledge on climate resilience and adaptation, and development of standards and guidelines to facilitate climate-resilient planning and investments. The project has three components for implementation over 5 years, where Component 1: Promoting Evidence-based Climate Smart Decision-Making is being implemented by the Regional Integrated Multi-Hazard Early Warning System (RIMES). The period of performance is 10 July 2020 to 5 August 2025.

CARE Project Component 1 supports the World Bank's development objective to create an enabling environment for climate-resilient policies and investments across South Asia through the creation of a regional resilience data and analytics services (RDAS) platform and national decision-support systems (DSSs) for selected sectors of agriculture, water, road transport, and planning in Bangladesh, Nepal, and Pakistan. Component 1 also includes interventions for National Meteorological and Hydrological Services (NMHSs), to better respond to users' requirements, and capacity development of users to apply climate/weather information in plans and decisions.

Highlights

This bi-annual report, the 6th in the series from the project inception, is inclusive of the reporting period from 1 January to 30 June 2023. This bi-annual report captures the key project accomplishments against the milestones set in the restructured CARE Component 1, with the amendment to the Financing Agreement completed on 31 May 2023.

CARE Component 1 has been strengthened, through the restructuring, for a more comprehensive and sustainable approach at the end-to-end generation and application of climate information, for climate resilience of priority sectors. The restructured CARE Component 1 maintains Sub-components 1.1 and 1.2, with streamlined sectoral scope in the focus countries of Bangladesh, Nepal, and Pakistan; and reinforced Sub-component 1.3, through the integration of more capacity building activities for institutions and communities, to enable them to ingest climate information of various timescales/RDAS and DSSs products in plans and decisions.

Accomplishments in gray fonts were undertaken from January 2021 to December 2022. Those in green fonts were undertaken during this reporting period (i.e., January to June 2023), while those in blue fonts are systems that have been officially dropped from the restructured CARE Component 1

Sub-component 1.3 also incorporated mechanisms for enhancing capacities of NMHSs in the region, through the South Asia Hydromet Forum (SAHF).

Sub-Component 1.1 Expanding SAR Regional Resilience Data and Analytics Service (RDAS)

The RDAS prototype has been completed in November 2021 and was demonstrated to the Bank on 3 December 2021. Building on earlier work on system architecture and framework for handling data ingestion, processing, and analysis, and data/information presentation on the portal; data catalogue framework and database, and master data management system, for creating and maintaining a catalogue of resources to support data integration; data analytics, for Online Analytical Processing (OLAP) queries, computation, machine learning, generating reports and visualization; data and analytical services catalog using open-source tools; data and analytics visualization, for integrating climate, sectoral and other pertinent data into the system; and data access subsystems, for making data available to users, RIMES System Development Team has accomplished the following during this reporting period, thus, completing the RDAS prototype: i) literature review and documentation of existing regional/national datasets, and sensitivity/resilience of various crops to climate parameters, and exploration and downloading of relevant data resources, and metadata preparation; ii) development of comprehensive data and metadata catalog for sectoral data requirements both regionally and country-specific for Bangladesh, Nepal and Pakistan; iii) integration and analysis of climate (CMIP5), agriculture, social indicators, and other relevant datasets, including free and open source data points such as cropping extent data, livestock density, forest cover, etc., and water quality and watershed maps from SARCARE, soil moisture from Resource Watch, and satellite-based precipitation data from NASA; iv) development of visualization platform and interactive dashboard/portal for climate data (including geospatial datasets) and indicators, climate-agriculture indicators, potential impact and adaptation measures, and implementation of dynamic components for resolving issues relevant to the rendering of multiple components; v) creation of climate data API and mechanism for demonstrating the use of the APIs; and vi) creation of profile page, and generation of maps and dynamic components.

Building on the prototype, the development from January to June 2022 focused on i) stabilizing the core architecture and integrating more publicly available data sources into the platform; ii) integration of comprehensive data catalog; iii) integration of key indicators relevant to decision making in the water sector; iv) design of reference architecture; v) strengthening the backend for supporting the next phase of full RDAS development and for supporting a large user base through various system and data optimization techniques including the development of data bin or collections pages based on user sessions to effectively manage user specific data requests, use of AirFlow DAGs for data processing optimization, introduction of multicore code

process for faster data cleanup and processing, introduction of proxy manager for handling multiple containers running on a single server, introduction of time series web component for managing and visualizing large volumes of multi-dimensional data with different time dimensions, and a prototype for organizing all the data catalogs in a single page for efficient data access.

Further development of the system from July to December 2022 include (i) an interactive and comparative analysis module for 2 different datasets (e.g., specific climate parameter for a chosen period vs. corresponding impact map for the same region and period in a single frame); (ii) drought analytics, which integrated the SPI data for different periods to suggest drought years and hazard impacts on different sectors; and (iii) flood analytics (e.g., case study in Pakistan), which visualized the latest 2022 flood, province-wise rainfall intensity during a period of 3 months on a daily scale, suggesting the possibility of flooding.

As of June 2023, there are 203 datasets incorporated into RDAS, disaggregated into:

Sector: environment (41), agriculture (44), water (30), disaster (17), transport (11), economic (9), climate (24), social (12), admin (11), and not specified (4)
Coverage: global (128), regional (10), county (51), and not specified (14)
Readiness of use: downloaded (119), digitized (1), API link (10), not downloaded (39), and not specified (34)
Format: raster (90) and vector 61), other (18), and not specified (34)
Source: World Bank (7), universities (11), government (10), program/NGO (48), data provider (56), and not specified (26)

Priority work completed on RDAS, from January to June 2023, involved: i) continuous processing, importation/integration and visualization of various climate/sectoral data/models (e.g., OSM, CMIP6, GCMs, ACCESS-CS, IITM-ESM) from different sources into RDAS; ii) improvement of descriptive information on each data asset, including technical details such as data types, format, etc.; (iii) use of downscaled GCM models developed by NASA, clipped for the South Asian region; (iv) processing of 7 variables for 35 models and generation of The Expert Team on Climate Change Detection and Indices (ETCCDI) for 14 models; (v) integration of climate data with agriculture (AEZ) and water (GloFAS) sector data; (vi) identification and integration of additional indices; (vii) improved speed and efficiency in visualizing data; (viii) integration of monitoring tools; and (ix) generation of data for linkage with DSSs.

The RDAS can be accessed via http://rdas.rimes.int/.

Sub-Component 1.2 Strengthening national level decision support systems (DSS) for participating countries

[Bangladesh]

National sectoral experts (for planning and finance, agriculture, livestock, water resources, and transport) in Bangladesh have completed i) desk review reports (all sector), ii) user needs assessments materials (all sectors); iii) assessment outcomes reports (planning and finance, agriculture, and transport); and iv) recommendations and inputs to DSS report (transport). RIMES Technical Team and IT Expert have completed technical review of BAMIS, Online Road Network Portal, livestock and transport sectors. FloCAST, and Delta Portal), and prototype system development reports for DSSs for livestock and transport sectors.

The User Needs Assessment Outcomes Reports have been completed for livestock and water resources sectors. The Technical Inputs and Recommendations to Decision Support System Reports have been completed for the agriculture, livestock, water resources, finance and planning sectors in Bangladesh.

MoF and BPC: *DSS for climate planning and screening*, which includes a Climate Change Web Portal for the requirements of MoF and BPC. Other details on stakeholder requirements for the DSS shall be identified upon the completion of the technical review and user needs assessment.

CARE Component 1 has dropped this activity.

DAE: *Enhancement of BAMIS*, through i) customization of functionality to various user levels; ii) integration of localized information; iii) incorporation of climate projection data; iv) automation of processes vis-à-vis location and growth stage-specific crop-weather sensitivity and generation of advisories; v) threshold-based automated alerting mechanism; vi) decentralized advisory generation; vii) incorporation of localized information service delivery mechanism; viii) dynamic visualization of agromet data/information; ix) shifting of the entire system to open source web framework for scalability and sustainability; x) incorporation of local inputs from Upazila Agricultural Officers for automation of advisories generation; xi) multi-channel information/advisory dissemination mechanism (i.e., voice message, mobile applications, SAAO, lead farmers, call centers, digital display boards, etc.); and xii) systematic feedback collection and impact assessment mechanisms. Centering on evolving stakeholders' requirements and synergy with other projects, CARE work on BAMIS is proposed to be streamlined, in discussion with DAE, to focus on: i) demonstration of comprehensive agromet advisory service in select hotspot districts which can be brought under wider information/advisories/warnings dissemination, intensive capacity building activities, and comprehensive feedback collection and impact assessment; ii) enhancement of existing lead farmer database; iii) development of mobile application; iv) incorporating upazila weather forecasts customized by RIMES and BMD; v) development of monitoring system for kiosks in

upazilas; and vi) extension of voice message dissemination support for directly disseminating messages to extension officials and farmers.

The activity has been revised to *Support to BAMIS*, in view of other Bank-supported initiatives for DAE and for BAMIS. From January to June 2023, RIMES prioritized i) development architecture for farmers' database; ii) identification of attributes for farmer/beneficiary database and agromet advisory beneficiary categories (e.g., lead farmers, local service providers, disaster management committee members, etc.) in consultation with the SFP; iii) integration of farmers and local service providers database into the web-based system; iv) feedback collection from lead farmers who received the special advisories on heat stress and Cyclone Mocha; and v) onsite inspection of kiosks at DAE to identify needs for the kiosks monitoring/information dissemination system.

RIMES supported DAE in disseminating special advisories for heat stress to farmer-beneficiaries in 59 districts (22,145 lead farmer-beneficiaries) from 11 to 16 April 2023. RIMES further supported DAE in disseminating special advisories, ahead of Cyclone Mocha, on 10-13 May 2023, to 7,009 lead farmers in 14 districts.

DLS: *DSS for livestock management*, incorporating extreme events advisories, vaccination alerts, and heat stress alert. Initial components of the DSS have been identified, viz.: i) engine development for temperature-humidity index, vaccination module, and advisory services; ii) analytics and visualization; and iii) dissemination modules. Further stakeholder requirements identified for the DSS include i) capacity for generation of advisories integrating weather/climate parameters (temperature, rainfall, humidity, etc.) vis-à-vis animal health, growth and reproduction, milk production, diseases outbreak or pests infection, fodder production and quality, feed-grain availability, potential economic gains/losses; and vaccination alerts/requirements; ii) advisories have to be location-specific, threshold/index-based, and provides adaptive/response measures pre-, during, and post-events, and for long-term planning and decision making, and communicated via multiple channels; iii) integration of feedback mechanism for continuous improvement of the DSS; and iv) development of mobile application for progressive farmers.

The prototype for DSS for livestock has been completed in December 2021 with work undertaken on enhancement of DSS framework and finalization of data parameters, enhancement of data management module, and enhancement of DSS engine. Commencing work on full system development, RIMES Technical Team and IT Expert have integrated the following features into the DSS for DLS: i) automated data collection of station-observed and historical forecast data; ii) station-wise, three-hourly temperature forecast verification process; iii) maximum and minimum temperature bias correction using machine learning technique to improve accuracy of forecasts and visualize area-wise temperature forecast verification results at the

sub-district level; iv) bias grid of three-hourly temperatures and location-specific and area-wise bias-corrected temperatures; v) space-time clustering of FMD cases, visualization of year-, season-, and month-wise diseases clusters, and diseases cluster hotspots; vi) cluster methods and metadata information, and vii) feedback mechanism for guiding further enhancements.

Further work on the DSS from July to December 2022 focused on i) threshold-based alerts for heavy rainfall, wind gust, heat wave and cold wave; (ii) implementation of THI-based advisory generation for cattle; and (iii) disease analytics module with seasonal prediction integrated for FMD disease.

The experimental DSS for the livestock sector can be accessed via https://nlas-wb.rimes.int/

Completed work, during this semester, are: i) implementation of climatology-based monthly livestock advisory generation; ii) special advisory generation module; iii) district-wise CMIP6 climate projection visualization module; iv) climate projection maps grouped in thirty year-periods with decadal overlap for temperature (mean, maximum, minimum) and precipitation until 2100; v) analytics for livestock-relevant climate risk indices by year, season, and month; vi) district-wise land cover data relevant for livestock sector (e.g., tree area, water bodies, etc.); and vii) monthly passive surveillance data of disease cases record.

RIMES generated a *Special Bulletin for Heat Stress for Livestock* from the experimental NLAS. Voice messages pertaining the *Special Bulletin* were disseminated to 44,148 beneficiaries of DLS, including farmers and local extension officials in 13 districts from 11-16 April 2023. Initial reports from communities indicated that a number of farmers who received the *Special Bulletin* were able to implement measures that minimized reduction in milk production.

Moreover, voice messages relative to Special Advisories ahead of Cyclone Mocha were disseminated to 36,441 farmers in 13 districts from 11-13 May 2023.

Assessments are being undertaken by RIMES, for documenting farmers' experiences and lessons learnt in the receipt and application of NLAS-generated advisories. The next progress report will include results of these assessments.

LGED/RHD: *Improvement of the Online Road Network and Transport DSS*, through integration of dynamic climate and asset databases, risk information, and early warning. The transport DSS should be shared/common, system, comprehensive, builds on existing management information systems and integrates climate and transport information to be used by relevant units of LGED and RHD, municipalities, city corporations, union councils, ward commissioners, and villages for decision

making vis-à-vis climate-resilient road network, prompt evacuation during hazard/disaster events, and debris removal, among others. The proposed DSS includes: i) integration of hydrological, weather/climate, transport infrastructure information, ii) automated generation of relevant risk estimation on transport infrastructure based on climate risk-related standards/thresholds; iii) automated generation of advisory bulletins for pre-, during, and post-disaster periods, and for long-term preparedness, including construction-related recommendations, iv) distribution of bulletins to stakeholders in the transport sector through email and voice messages, mobile application and social media platforms; v) updating of existing alerting mechanisms with climate-related databases such as historical climate trends, climate change scenarios, climate hazard assessment and mapping, river stages and discharge data, etc.; vi) integration of fiscal impact assessments of climate variability and change; vii) integration of long-term economic loss analysis; viii) integration of cross-cutting data, e.g., rail and water transportation, etc.; ix) linkage between climate sensitive design parameters with climate projection and extreme weather events; x) satellite-based analysis to fill in gaps/limitations of RHD/LGED road databases; xi) integration of outputs from other relevant ongoing/future projects; and xii) development of mobile application.

A prototype system has been completed by RIMES Technical Team during this period, which includes i) framework based on outcomes of desk review, technical/user needs assessments, and consultations with the transport sector TWG; ii) system/database architecture with an exploratory layout of the transport DSS portal; iii) information flow and system components; iv) data analytics and visualization modules design; and v) dissemination mechanism of advisories and alerts.

Full system development work from July to December 2022 are i) integration of road infrastructure with weather data to generate map layers; ii) integration of climate projection data (decadal mean, maximum/minimum temperature, precipitation); iii) integration of CMIP6 to identify potential impacts of climate change on transport systems; iv) development of a tool to identify weather and climate conditions in specific road segments; v) integration of Google Earth Engine and GIS python tool/API to generate DSS analytics; and vi) enhancement of user interface and web components.

This activity has been dropped from CARE Component 1.

FFWC/BWDB: *Enhancement of FloCAST*, through i) extension of lead time for flash flood forecast; ii) dynamically integrating forecast products from various sources; iii) integrating voice message broadcasting for forecast/warning dissemination; iv) integration of different modeling schema and data used by FFWC into the system; v) differentiated access to the system by different users (i.e., public access to forecast information and advisories, and forecasters access to data and analytics); vi)

generation of future hydrological flux using climate projection data as forcing for understanding future flow scenarios in GMB basin; vii) integration with other relevant DSSs, viii) improvement of observed hydrological data collection through integration of API-based SMS receiving services; ix) integration/improvement of processes for efficient data collection, visualization, and analysis; x) dynamic visualization of key parameters for forecasting; xi) incorporation of analytics such as pre-processing of satellite-based rainfall data, automated flood frequency analysis toolkit, analysis and visualization of lag time for upstream basins, performance evaluation of forecasting systems, and exposure generation; xii) improvement in bulletin generation and dissemination through automated integration of model simulation forecasts; and xiii) integration with Data Exchange Platform (DataEx) to reduce development and computational efforts, and maintain synergy between systems.

In view FFWC requirements, and other initiatives supported by the Bank for FFWC, this activity has been revised to *Technical Support to FFWC*.

RIMES has completed the prototype for the FFWC DSS, which can be accessed through http://flocast.rimes.int/.

Inclusive of this reporting period, RIMES has completed i) FFWC DSS public facing page; and ii) Forecasters' analytics portal design.

MoWR/WARPO: *Enhancement of the Delta Portal*, through inclusion of multi-layered system framework including data, processing, and user interface layers; development of APIs, archiving mechanisms, and GIS and graphic engines for improved data processing. Further recommendations include i) integration of SDG action plan, 5-year plan, national long-term perspective, IMED result indices of various BDP projects to monitor and evaluate BPD 2100 goals, targets, and projects; ii) integration of statistical analysis of hydrological data, future trends of water events like flood, drought, river erosion, cyclone, storm surges, sea level rise, etc.; and iii) integration of future climate projection data to generate crucial information for long-term water resources planning and development.

This activity has been dropped from CARE Component 1.

[Nepal]

National sectoral experts (planning and finance, agriculture, transport, water resources, and disaster risk management) in Nepal have completed i) desk review reports (planning and finance, water resources-DHM, agriculture, and transport), and ii) user needs assessments materials (planning and finance, agriculture, transport). RIMES Technical Team and IT Expert have completed technical assessment report for

DHM Portal, and prototype system development reports for DSSs for DHM and NDRRMA.

The Reports on Desk Review and User Needs Assessment Materials (disaster management); and User Needs Assessment Outcomes and Technical Inputs and Recommendations to Decision Support System (transport and finance), have been completed.

The Agriculture Expert has completed the Reports on User Needs Assessment Outcomes and Technical Inputs and Recommendations to Decision Support System for Agriculture in Nepal.

MoF: *Improvement of Public Financial Management*, for climate budget allocation, expenditure tracking, sustainability monitoring, and assessment of investment results in climate-sensitive sectors. Details of the DSS required for MoF will be threshed upon formal endorsement of the Government of Nepal of CARE Project. MoF recommended the following, for integration into the DSS: i) development of activity-level Chart of Accounts; ii) development of institutional-level application for Public Budget and Expenditure; and iii) development of an API for sharing climate public budget and expenditure data.

This activity has been dropped from CARE Component 1.

DoR/DoLI: *DSS for resilient rural/local road network* that integrates i) existing climate hazard/risk assessment; ii) other relevant data and climate information of various timescales; iii) analytics and improved data management, sharing and accessibility of information; iv) identified/customized weather/climate thresholds for transport infrastructure and safety in the country; v) different phases of road sector activities, such as planning, design, construction, operation and maintenance; vi) hazard/risk maps arising from Component 2; and vii) integration with other MIS/DSSs in DoR/DoLI.

The prototype DSS for resilient rural/local road network, accessible through https://np-dor-test.rimes.int, has been completed in March 2023. Until June 2023, RIMES has integrated, into the system: i) datasets and visualization tools for weather (present day maximum rainfall, temperature, humidity, wind speed), and transport infrastructure (road, bridge, culvert, railway, ferry location; ii) climate impact analysis module; and iii) climate projection data visualization module.

DHM: *Enhancement of DHM Portal*, through development and integration of i) Flood Impact DSS for Babai river basin; ii) weather forecast verification and bias correction; iii) development of long-lead weather forecasting system; iv) development of nowcasting system; and iv) development of climate information products in the context of the National Framework for Climate Services. Initial work done for the DSS

for DHM include: i) system design along with languages and technology stack for development of impact-based forecasting system; preliminary analysis and identification of the system for the hydrology component; detailed analysis of the system for the meteorology component; ii) preliminary analysis of RIMES FloCAST system for impact-based forecasting; review of other existing flood systems; review of different impact modeling methods for calculating risk; design and development of enhanced FloCAST for DHM; development of integrated data acquisition platform; integration of hazard and exposure datasets and algorithm for generating hazard impacts; integration of forecast from DHM and ensemble forecast products; classification of various parameters according to appropriate thresholds; and customization of graphic user interface for the DSS; iii) updating and integration of HEC-RAS model in the existing system for integrating daily updates; updating of HEC-HMS model for water level and discharge level forecast for Babai river basin; improvement of data processing pipeline of FloCAST; and updating of raw rainfall forecast data; and iv) development of flood impact forecasting module; data analytics module: dashboard and visualization; and report generation and dissemination module. Work during this reporting period include recalibration of the daily time-step hydrological model to generate day-to-day forecast and development of an hourly time-step hydrological model to generate hourly forecasts and capture peak discharge in the Babai River Basin during monsoon period.

This activity is not anymore included in CARE Component 1.

MoALD: *Upgrading NAMIS*, by improving data flows and functionalities through integration of climate information (i.e., historical climate datasets, weather/climate observation, weather/climate watches, monthly and seasonal outlook, and climate change projections); vulnerability and risk analysis and mapping for agriculture and food security; and response options. Onward work for firming up stakeholders' requirements for upgrading NAMIS, and subsequently addressing such requirements, will be undertaken once the project is formalized. User needs assessment is to be undertaken upon the replacement of the Agriculture Expert.

The DSS prototype has been completed by RIMES in June 2023, accessible via https://next-gen-sesame.web.app/.

Key climate-informed products have been identified for MoALD, viz.: i) 7-Days Decision Guidance for Local Agriculture Authorities and Farmers (analysis of field observations during the previous week; forecast-based/potential conditions for the subsequent week); ii) Seasonal Decision Guidance; and iii) Long-Term Climate Adaptation (e.g., potential crop risk areas, in various time slices; recommendations for crops resilience). These climate-informed products will be the focus for onward work on the DSS for MoALD.

NDRRMA: *DSS for multi-hazard early warning*. Addressing demands from NDRRMA stakeholders, the DSS required for NDRRMA has evolved into a DSS for multi-hazard early warning which integrates i) customized information/warning for floods, landslides, forest fire, and lightning; ii) Common Alerting Protocol (CAP), and iii) relevant data/outputs from existing/ongoing hazard/risk assessments. Onward work on desk, technical review and user needs assessment will underpin the development of the DSS for NDRRMA, the full development thereof will be undertaken by the consulting firm.

A prototype DSS for NDRRMA has been completed by RIMES Technical Team during this period**.** Work undertaken include: i) development of forecast page which provides district level forecast with 10-day lead time for rainfall, maximum/minimum temperature, wind speed and humidity; ii) development of nowcasting and recent lightning page which captures lightning information for the last 5 minutes to the last hour, and prediction for the next 30-45 minutes; iii) development of statistics, reporting and feedback page which assesses the performance of various forecast products, provides district-wise disaster profile of different hazards, and collects real-time updates from district officials and end users on specific climate-related events/incidents; and iv) development of data panel page for custom advisory generation which supports integration and updating of localized data or custom advisories that can be processed and shared with users.

Full system development work, on the DSS for NDRRMA, from July to December 2022, are on i) migration of the current system (PHP/MySQL) to a new design template (ReactJS and Django with postgreSQL framework) to match the BIPAD design; and (ii) further improvement of the prototype mobile application to provide alert for priority hazards.

Access to the NDRRMA DSS prototype is through https://satark-2023.web.app/

Focus of work, for the NDRRMA DSS, from January to June 2023, has been on i) integration of threshold-based weather alerts; ii) implementation of lightning module prototype; iii) implementation of forest fire module prototype; iv) integration of flood module (station forecasts and advisory for 3 river basins); and v) integration of the dissemination module.

[Pakistan]

National sectoral experts (planning, finance, agriculture, and water resources) in Pakistan have completed i) desk review reports (all sectors); ii) user needs assessments materials (all sectors); iii) assessment outcomes reports (finance and agriculture); and iv) recommendations and inputs to DSS reports (finance, agriculture, and water resources); RIMES Technical Team and IT Expert have

completed technical assessment reports for SESAME and existing SID DSS; and prototype system development reports for SESAME for Punjab and Balochistan.

The reports on Desk Review and User Needs Assessment Materials for Agriculture in Balochistan have been completed. Moreover, the User Needs Assessment Outcomes and Technical Inputs and Recommendations to Decision Support System Reports for the Water Resources in Pakistan have been finalized.

The Agriculture Expert – Balochistan has completed the user needs assessment materials, and undertaking the user needs assessment in Balochistan.

MoF: *DSS for integrating climate change scenarios into public expenditures*, for enhancing MoF efforts at climate financing. Due to data sensitivity in MoF, a DSS for anticipating climate-related economic conditions has been recommended, to be lodged as part of MoPDSI's DSS, with access given to MoF.

The DSS for MoF has been officially dropped from CARE Component 1 activities. Per agreement with MoF, however, a module for the Ministry, for anticipating potential impacts of extreme events in Pakistan in the future, and the economic implications thereof, is being integrated into the MoPDSI DSS. Onward updates on the DSS module for MoF will be reported as part of the progress in MoPDSI DSS.

MoPDSI: *DSS for project appraisal*, inclusive of i) dashboard for integrating outputs of all DSSs developed for Pakistan for guiding MoPDSI's sector-specific initiatives; and ii) modules for estimating climate risks of development projects and integrating climate information into development plans; iii) dashboard for GHG emissions inventory in transportation sector and recommendations for low/neutral carbon energy options; iv) commodity prices and other relevant economic data from MoF's Statistics Division linked with status of crops grown in Pakistan for deducting economic impacts; and v) climate information and relevant economic data and analytics, for generating various reports weekly, monthly, and/or annually, as required.

Work on the MoPDSI DSS prototype, from July to December 2022, comprise of i) GDP and population gridded datasets at district level, in decadal resolution and 1 km spatial resolution for estimation of long-term impacts; (ii) exposure datasets, for assessing economic and human losses; and (iii) downscaled population and GDP datasets at annual temporal scale, for assessing different adaptation measures.

To better suit the requirements of MoPDSI and allied institutions in Pakistan, the DSS has been updated to *climate-informed planning DSS.*

The prototype of the MoPDSI DSS, accessible through **https://mopdsi.rimes.int**, has been completed by RIMES during this semester. This prototype integrated the following i) 10-days multi-parameter weather alert system; ii) interactive map per 10-

days weather forecast; iii) projection and assessment tool for analyzing risks based on various socioeconomic elements/parameters (population growth/change, gender analysis, etc.; iv) climate impact analysis module (hazard impacts assessment on population, GDP, etc.); and v) crop suitability analysis module under various climate projection scenarios.

SID: *Improving the existing SID DSS*, through the inclusion of i) drought risk management; ii) dynamic integration of weather forecasts for predicting forecast-based potential flood situations; iii) integration of vulnerability datasets for potential impact assessment; iv) inclusion of dissemination and alert mechanism; v) hydrological modeling for water availability forecasting and determination of Sindh's allocation per the Water Apportionment Accord (1991); vi) real-time operational model for barrages and canals of the Sindh irrigation system; vii) investigations of water table fluctuation in the irrigation system; viii) water table fluctuation maps; ix) hydraulic models for all main and branch canals of the Sindh Irrigation System; x) links between databases of relevant organizations such as PAD, IRSA, and WAPDA; xi) analytics vis-à-vis difference of irrigation water requirement and rainfall; xii) mechanism for optimizing reservoir operational data; xiii) mechanism for provision of alternative dry route/s, in case of channel flooding; xiv) provision of alternative water demand priorities and allocations to meet water shortages in years anticipated to be significantly drier than normal; xv) provision of irrigation area coverage and current unmet water demands; xvi) suggestions/response options for minimizing water losses; xvii) integration of projections of future consumption demands based on current trends and other relevant data; xviii) alert mechanisms integrated with early warning systems or disaster management authorities.

The capacities that would be prioritized for enhancing the existing DSS in SID will be identified during the presentation of assessment outcomes, and recommendations and inputs to DSS enhancement, with water sector stakeholders in Sindh.

This activity has been dropped from CARE Component 1.

PAD: *SESAME for Punjab*, integrating i) local climate and agriculture data for customizing SESAME products for the province; ii) advanced analytics for crop management; iii) pest management system for providing pests and diseases warning; iv) disaster management component for understanding agricultural risk vis-à-vis floods and droughts; market analytics for monitoring agricultural market situations; and v) varying requirements of different stakeholders (i.e., agricultural decision makers, policy makers, researchers, extension workers, and farmers).

The SESAME for Punjab prototype has been completed and ready for full development by the consulting firm.

Onward work on full system development for SESAME for Punjab from July to December 2022 integrated i) real-time meteorological parameters from

stations/observatories installed in Punjab; (ii) NWP models output (e.g., 3-day short range forecast model at 5 km resolution; 10-day medium range forecast model [ICON] at 13 km resolution; (iii) monthly weather outlook for Punjab districts; (iv) seasonal forecast products for next 3 months based on multi-model ensemble seasonal prediction; (v) crop calendar information for some districts in Punjab; (vi) agro-advisory for farmers based on Punjab's agroclimatic zones; and (vii) seasonal agro-climate outlook for different regions of Punjab.

The SESAME for Punjab, which can be viewed via http://sesame-pak.rimes.int/, has completed the following during this reporting period: i) crop profile module; ii) crop-specific thresholds for crop growth stage-wise advisories; iii) 10-day weather bulletin; and iv) partial irrigation advisories.

BACD: *SESAME customized for Balochistan*, the required customization for which shall be defined once the desk review, technical review and user needs assessment are completed.

Building on the existing SESAME systems/prototypes, **the prototype for SESAME for Balochistan has been completed** during this reporting period; **it can be accessed through http://sesame-pak.rimes.int/**

Continuing enhancements to the SESAME for Balochistan were carried out by RIMES during this reporting period.

[Facilitating use of DSSs in the Sectors]

Country- and sector-wise SFP consultations were undertaken as part of CARE project implementation discussions with partner government institutions.

The next SFP meeting is targeted regionally, by end of 2023.

Sub-Component 1.3 Trainings for climate-informed decision-making

The requirements for capacity building in accessing, understanding, and applying weather/climate information has been expressed cross-cuttingly by stakeholders in different sectors, from national to community levels, across the beneficiary countries. CARE Component 1 will address capacity building requirements of relevant stakeholders in 2024, upon completion of RDAS and sectoral DSSs.

[Stakeholder Engagement to Facilitate Uptake of Climate Information]

Climate Application Forums (CAF)

In Bangladesh and Pakistan, the CAFs were completed on 11 and 15 June 2023, respectively. In both countries, the CAFs were received positively by stakeholders, with about 90% of participants who responded to the survey indicating satisfaction of the events. Priority recommendations, to the CAFs, include i) more focus on user applications, ii) firming up sectoral preparatory measures; iii) mechanisms for converting plans/agreed points into actions, post-CAFs; and iv) earliest accessibility of RDAS/DSSs to all stakeholders.

In Pakistan, an immediate outcome of the CAF was expeditious revision of the seasonal outlook for the 2023 monsoon season, to incorporate recommendations from stakeholders. PMD issued the revised 2023 monsoon season outlook on 23 June 2023.

[Regional and National Training]

Training of recipient institutions in using RDAS and its products

Commencement of activities are targeted in 2024.

Training of recipient institutions in DSSs operations and maintenance

Commencement of activities are targeted in 2024.

Training of recipient institutions in DSSs products application

Commencement of activities are targeted in 2024.

[Iterative Enhancement of the Hydromet Services]

SAHF Annual Conferences

Activities are targeted to commence by second half of 2023.

Facilitating the continuity of Forecasters' Forum (FForum)

From SAHF's integration into CARE in April, until June 2023, 12 sessions of the FForum have been completed. Participating NMHSs particularly appreciated the FForum relevant to the detailed analysis it provided on Cyclone Mocha, which contributed to better preparation of country-specific forecasts/warnings by NMHSs.

Participating NMHSs articulated the requirement for similar sessions on extreme events, in future FForums, to guide forecasters in tailoring forecasts/warnings.

Supporting priority areas of the hydromet service delivery

The SAHF Working Groups (WGs) have been reconvened from 26 May to 6 June 2023, to review existing memberships and ToRs, and map strategies for strengthening the same.

Enhancements, to the SAHF Knowledge Hub (SKHub), have been introduced to strengthen its support to the NMHSs in the region on data visualization, ensemble forecast products, forecast verification skills assessment, and other NMHSs requirements.

Annual assessment of NMHSs capacities and gaps

Activities are scheduled to start next semester.

Facilitating strategic plans and decisions for the SAHF

Activities are scheduled to start next semester.

NARRATIVE REPORT

CARE Component 1 has been streamlined and strengthened, through its restructuring which was Completed on 31 May 2023. The restructuring is focused on responding to the requirements of countries for a holistic approach in the end-to-end generation and application of climate information. The restructured CARE Component 1 maintained its Sub-Component 1.1, streamlined the focus of Sub-Component 1.2, and reinforced Sub-Component 1.3, which assimilated an enhanced scope of capacity building activities to enable sectoral stakeholders to put in place climate-informed plans and decisions within a risk management framework, and integrated efforts at buttressing the NMHSs in the region, in various critical aspects to enhance the delivery of climate services, through the SAHF.

The revised scope of activities under Component 1, approved by the Bank, are provided below:

1.1 Expanding SAR Regional Resilience Data and Analytics Services
1.1.1 Develop the SAR Regional Resilience and Data Analytics Services (RDAS)
Developing and operationalizing the RDAS
Linking the RDAS to the SAHF Knowledge Hub and the DSSs
1.2 Strengthening national level sectoral DSSs
1.2.1 Developing/enhancing national sectoral DSSs
Bangladesh
DAE: Support to BAMIS
DLS: NLAS
FFWC: Technical support to FFWC
Nepal
DoR: Climate-Resilient Road Operations & Infrastructures DSS
MoALD: Upgrading NAMIS
NDRRMA: DSS for Multi-Hazard Early Warning
Pakistan
MoPDSI: Climate-Informed Planning DSS
PAD: SESAME for Punjab
BACD: SESAME for Balochistan
1.2.2 Facilitating use of DSSs in sectors
SFP Meetings
1.3 Supporting climate informed decision-making and scaling up South Asia Hydromet Forum
1.3.1 Stakeholder engagement to facilitate uptake of climate information
Climate Application Forums
Demonstration of climate information application in communities
1.3.2 Regional and national training
Training of recipient institutions in using RDAS and its products
Training of recipient institutions in DSSs operations & maintenance
Training of recipient institutions in DSSs products application
1.3.3 Iterative enhancement of the hydromet services
SAHF Annual Conferences
Facilitating the continuity of the Forecasters Forum
Supporting priority areas of the hydromet service delivery
Annual assessment of NMHSs capacities and gaps
Facilitating strategic plans and decisions for the SAHF

1.1 Programmatic Progress

Component 1: Promoting evidence-based climate-smart decision making

Outcome Statement 1: Regional cooperation and information for climate resilience enhanced

Outcome Indicator 1.1: *At least 70% users in select sectors satisfied with access to data, information, and/or analytics in Regional Resilience Data and Analytics Services (RDAS) platform (Percentage)*

Output Indicator 1.1.1: *A regional-level resilience data and analytics services platform (RDAS) developed and accessible (Number)*

Summary of activities contributing to overall progress and achievement of outcome 1.1 and output 1.1.1 is provided below. Color-coded ratings indicate progress status.

Activity/ Sub-activity	Status*	Remarks
1.1.1 Develop the SAR Regional Resilience and Data Analytics Services (RDAS)		
a) Developing and operationalizing the RDAS		
RDAS prototype completed	Jan21 – Dec21	Completed
RDAS user interface created and available to be connected with existing/new DSSs	Jan22 – Dec22	Completed
RDAS experimentally operational	Jan23 – Dec24	Accessible at https://rimes.rimes.int
RDAS fully connected to SAHF Knowledge Hub and DSSs supported by the project	Jul24 – Dec 24	
RDAS is fully operational	Jun24 – Aug25	
b) Linking the RDAS to the SAHF Knowledge Hub and the DSSs		

***Status Legend**				
Highly satisfactory: Intended deliverable(s) completion is (100-80%).	**Satisfactory:** Intended deliverable(s) completion is (60-80%).	**Unsatisfactory:** Intended deliverable(s) completion is (40-60%)	**Very unsatisfactory:** Intended deliverable(s) completion is <40%	**Not started:** Activity has not started based on approved work plan

Detailed progress, per activity, is provided below:

Activity 1.1.1
Develop the RDAS

Procurement

Completed

Consultations

The World Bank-led ISR Mission meeting, on 30 May 2023, reviewed progress on the RDAS, clarified the current scope of the system, appreciated key system features, and provided recommendations, including, but not limited to: i) the integration of impact-based forecasting, ii) analysis of historical trends and current observed conditions, iii) incorporation of other relevant global/regional datasets/tools (e.g., GEOGlOWS Streamflow Forecasting Tool), and iv) enhancing stakeholders' outreach.

Data Collection, Processing, and Analysis

Data Analysts, relevant to this reporting period, focused on requirements for data weather/climate-sectoral relationships including analysis of exposure/vulnerability, and analytics to support onward work on short- to long-term sectoral planning and decision-making of various sectors in both the RDAS and DSSs in focus countries and sectors.

The GIS Specialists, on the other hand, prioritized the acquisition, processing, and storage of priority datasets; the IT experts handled ensured the integration of large datasets through APIs.

As of June 2023, a total of 15 datasets have been added to the data catalog bringing the total to 203. Latest updates to the datasets have been classified according to:

- Sector: environment (41), agriculture (44), water (30), disaster (17), transport (11), economic (9), climate (24), social (12), admin (11), and not specified (4)
- Coverage: global (128), regional (10), county (51), and not specified (14)
- Readiness of use: downloaded (119), digitized (1), API link (10), not downloaded (39), and not specified (34)
- Format: raster (90) and vector 61), other (18), and not specified (34)
- Source: World Bank (7), universities (11), government (10), program/NGO (48), data provider (56), others (45), and not specified (26)

Detailed progress on the integration of data into RDAS is detailed in Appendix 1.

RDAS Development

Key areas in RDAS development, for this reporting period, include: i) continuous processing, importation/integration and visualization of various climate/sectoral data/models (e.g., OSM, CMIP6, GCMs, ACCESS-CS, IITM-ESM) from different sources; ii) improvement of descriptive information on each dataset, including technical details such as data types, format, etc.; (iii) integration of downscaled GCM models developed by NASA, clipped for SAR; (iv) processing of 7 variables for 35 models and generation of ETCCDI for 14 models; (v) integration of climate data with agriculture (AEZ) and water (GloFAS) sector data; (vi) identification and integration of additional indices; (vii) improvements in speed and efficiency in visualizing data; (viii) integration of monitoring tools; and (ix) generation of data for onward linking with DSSs.

Subsequent work will focus on the generation of key products identified by users from stakeholder consultations and engagements in the countries/region, e.g., Climate Application Forums, SFP/ISR meetings, and RDAS Community of Practice, among others.

The RDAS can be accessed through http://rdas.rimes.int/.

Outcome Indicator 1.2: *At least 70% users in select sectors satisfied with decision support systems and tools developed under the project (Percentage)*

Output Indicator 1.2.1: *At least 8 climate-informed decision-making tools and systems developed/enhanced in focus countries (Number)*

Output Indicator 1.2.1a: *At least 6 new climate-informed decision-making tools and systems developed (Number)*

Output Indicator 1.2.1b: *At least 2 existing sectoral decision-making tools and systems enhanced (Number)*

Output Indicator 1.2.2: *At least 4 gender-disaggregated data analytics developed that contributes to narrow the gender gap in climate change vulnerability (Number)*

Activities contributing to overall progress and achievement of outcome 1.2 and outputs 1.2.1 and 1.2.2 have been continuously undertaken. The national/sub-national DSSs, for climate-informing sectoral planning and decision-making, are expected to be completed by 2024.

The implementation strategy, for developing the DSSs, under outputs 1.2.1, will be phased, viz.:

- gradual releases of experimental information products
- testing of these experimental information products by a closed/select group of stakeholders
- refinement of information products based on feedback from these select stakeholders, and
- broadening the access of the information products to other relevant stakeholders, once sufficient refinements have been made.

The status of activities contributing to overall progress and achievement of output 1.2.1 and 1.2.2 follows.

Activity/ Sub-Activity	Status*	Remarks
1.2.1 Developing/enhancing national sectoral DSSs		
a) Support the BAMIS of the DAE		
Web-based database for farmers and local service providers developed, populated, and used in rapid information dissemination	Jul 23 – Dec 23	
Voice message dissemination system expanded for at least 30,000 more recipients	Jul 23 – Dec 23	
Monitoring system for agromet computer kiosks completed and handed over to DAE for installation in Upazillas	Jul 23 – Jan 24	
Develop an interactive mobile application for BAMIS	Jan 24 – Jun 24	
b) National Livestock Advisory Services (NLAS)		
DSS prototype completed	Jan21 – Jun23	Completed; Accessible at https://nlas-wb.rimes.int
DSS experimentally operational	Jul23 – Jun24	
Product 1: Special Decision Advisories for Extreme Events	Jul 23- Aug 23	
Product 2: Monthly Decision Guidance for Livestock Production	Jul 23- Nov 23	
Product 3: Long-term Adaptation Options	Jul 23- Feb 24	
DSS fully operational and linked to RDAS	Jul24 - Aug25	
Mobile application developed	Oct23 – Jun24	
DSS deployment/accessible to stakeholders	Oct24 – Aug25	
c) Technical support to FFWC		
DSS prototype completed	Jan21 – Jun23	Completed; Accessible at http://flocast.rimes.int
DSS experimentally operational	Jul23 – Jun24	
Product 1: Forecasters' Decision Support Panel	Jul 23- Dec 23	
Product 2: Decision Guidance Products for Users	Jul 23- Mar 24	
DSS fully operational and linked to RDAS	Jul24 - Aug25	
Mobile application developed	Oct23 – Jun24	
DSS deployment/accessible to stakeholders	Oct24 – Aug25	
d) Climate-Resilient Road Operations & Infrastructures DSS		
DSS prototype completed	Jan21 – Jun23	Completed; Accessible at https://np-dor-test.rimes.int
DSS experimentally operational	Jul23 – Jun24	
Product 1: Road Safety Alerts	Jul 23- Dec 23	
Product 2: Long-term Planning and Development	Jul 23- Mar 24	
DSS fully operational and linked to RDAS	Jul24 - Aug25	
Mobile application developed	Oct23 – Jun24	
DSS deployment/accessible to stakeholders	Oct24 – Aug25	
e) Upgrading NAMIS		
DSS prototype completed	Jan21 – Jun23	Completed; Accessible at https://next-gen-sesame.web.app
DSS experimentally operational	Jul23 – Jun24	
Product 1: 7-Days Decision Guidance	Jul 23- Aug 23	

Product 2: Seasonal Decision Guidance	Jul 23- Nov 23	
Product 3: Long-term Climate Adaptation	Jul 23- Feb 24	
DSS fully operational and linked to RDAS	Jul24 - Aug25	
Mobile application developed	Oct23 – Jun24	
DSS deployment/accessible to stakeholders	Oct24 – Aug25	
f) DSS for Multi-Hazard Early Warning		
DSS prototype completed	Jan21 – Jun23	Completed; Accessible at http://nepal-dss.rimes.int
DSS experimentally operational	Jul23 – Jun24	
Product 1: Lightning Alert	Jul23 – Aug 23	
Product 2: Flash Flood Decision Guidance	Jul23 – Jun24	
Product 3: Forest Fire Alerts	Jul23 – Apr 24	
Product 4: Landslide Impact Forecasting	Jul23 – Apr 24	
DSS fully operational and linked to RDAS	Jul24 - Aug25	
Mobile application developed	Oct23 – Jun24	
DSS deployment/accessible to stakeholders	Oct24 – Aug25	
g) Climate-Informed Planning DSS		
DSS prototype completed	Jan21 – Jun23	Completed; Accessible at https://mopdsi.rimes.int
DSS experimentally operational	Jul23 – Jun24	
Product 1: Crop Suitability to Observed Climate Trends and Projected Future Climate	Jul23 – Aug 23	
Product 2: Potential Losses and Damages from Extreme Climate Events in the Future	Jul23 – Nov 23	
Product 3: Crop Advisories for Punjab and Balochistan	Jul23 – Feb 24	
Product 4: Cleaning and Greening the Transport Sector	Jul23 – Feb 24	
Product 5: Climate Sensitivity of Development Projects	Jul23 – May 24	
DSS fully operational and linked to RDAS	Jul24 - Aug25	
Mobile application developed	Oct23 – Jun24	
DSS deployment/accessible to stakeholders	Oct24 – Aug25	
h) SESAME for PAD		
DSS prototype completed	Jan21 – Jun23	Completed; Accessible at https://sesame-pak.rimes.int
DSS experimentally operational	Jul23 – Jun24	
Product 1: 10-Days Decision Guidance	Jul23 – Aug 23	
Product 2: Monthly/Seasonal Decision Guidance for PAD, PAD extension services, farmers	Jul23 – Nov 23	
Product 3: Long-term Adaptation Options for PAD	Jul23 – Feb 24	
DSS fully operational and linked to RDAS	Jul24 - Aug25	
Mobile application developed	Oct23 – Jun24	
DSS deployment/accessible to stakeholders	Oct24 – Aug25	
i) SESAME for BACD		
DSS prototype completed	Jan21 – Jun23	Completed; Accessible at https://sesame-pak.rimes.int
DSS experimentally operational	Jul23 – Jun24	
Product 1: 7-Days Decision Guidance for Farmers	Jul23 – Aug 23	
Product 2: 7-Days Guidance for Decision Makers in BACD	Jul23 – Nov 23	
DSS fully operational and linked to RDAS	Jul24 - Aug25	
Mobile application developed	Oct23 – Jun24	
DSS deployment/accessible to stakeholders	Oct24 – Aug25	
1.2.2 Facilitating use of DSSs in sectors		
a) SFP Meetings	Jan 23 – Aug 25	

Country- and activity-wise progress is elaborated subsequently.


BANGLADESH

[BANGLADESH]

Procurement

All national positions in Bangladesh, targeted during this period, have been filled; additional staff identified to expedite onward work on systems development and capacity building activities are included in Activity 3.2's section on procurement.

Sectoral Focal Points

A total of 4 SFPs have been confirmed for Component 1, following the streamlining of CARE activities in Bangladesh. Table 1 identifies the SFPs in Bangladesh.

Table 1 List of sectoral focal points in Bangladesh as of 30 June 2023

Sector	Ministry/ Agency	Focal Point Details
Bangladesh		
Agriculture	**Department of Agricultural Extension (DAE)**	**Dr. Md. Shah Kamal Khan** Project Director, AMISDP *Commitment of support dated 21 Aug 2022* *MoU effective on 6 Dec 2022*
Livestock	**Department of Livestock Services (DLS)**	**Dr. ABM Mustanur Rahman** Deputy Project Director, LDDP, DLS *Commitment of support dated 24 Aug 2022* *MoU effective on 26 Jul 2022*
Water	**Flood Forecasting and Warning Center (FFWC), Bangladesh Water Development Board (BWDB)**	**Engr. Sardar Udoy Raihan** Executive Engineer *Commitment of support dated 14 Aug 2022*
Cross-cutting	**Bangladesh Meteorological Department (BMD)**	**Dr. Md. Shameem Hassan Bhuiyan** Meteorologist *Commitment of support dated 31 Oct 2022*

Work Plan

The following activities are prioritized in Bangladesh, under Component 1, post-restructuring:

- *Support to the BAMIS of the DAE,* through i) development of mobile application for BAMIS, ii) development of web-based database of farmers, farmer leaders, extension workers, and local service providers, iii) development of monitoring system for agromet computer kiosks, iv) expansion of voice message dissemination, and v) demonstration of end-to-end agromet service delivery
- *Development of the NLAS of the DLS,* to generate the following key priority products: i) Special Decision Advisories for Extreme Events; ii) Monthly Decision Guidance for Livestock Production; and iii) Long-term Adaptation Options
- *Technical Support to FFWC,* through enhancement and transformation of its existing web portal into a DSS.

The above activities shall be coordinated, for synergy, with other development initiatives including, but not limited to, the World bank-supported Livestock and Dairy Development Project (LDDP) and the Bangladesh Weather and Climate Services Regional Project (BWCSRP).

Activity 1.2.1a
Support to BAMIS

Consultations

Meetings were undertaken with relevant stakeholders in the agriculture sector. These include:

- Consultative meeting, on 9 January 2023, with AMISDP staff[2], elaborated plans/details/updates of the various CARE Component 1 interventions for DAE, including the kiosk monitoring system development process; data collection for building the database of farmers, farmer leaders, and extension workers; and mobile application development. DAE provided insights on integration of crop calendars in the mobile application, and expressed interest in forecast-based location-specific alerts for crops.
- Consultative meeting, on 12 March 2023, with Dr. Md. Shah Kamal Khan, Project Director, AMSIDP, finalized arrangements for the data collection process and template, and received recommendations for updating the old database and broadening the scope of the same, to include all Upazilas.
- The ISR Mission meeting, led by the World Bank, on 7 June 2023, reviewed the progress of the tools. The meeting also discussed the impacts of the special advisories that were disseminated to farmers ahead of Cyclone Mocha. Per initial feedback received by RIMES, some farmers had limited resources to implement preparedness measures, even as they understood the advisories. RIMES continues to obtain feedback from farmers, for completing a case study/analysis of responses of farmers to advisories received.

Desk Review

Completed

Technical Review

[2] *Dr. Md. Shah Kamal Khan, Project Director; Ms. Urmee Ahsan, Communication Officer; Mr. Ananta Sarker, Senior Monitoring and Evaluation Officer; and Mr. Sabuj Roy, Technical Officer.*

Completed

User Needs Assessment

Completed

Tools Development

The following have been completed, during this semester, to support the development of tools for BAMIS: i) development of farmers' database architecture; ii) identification of attributes for farmer/beneficiary database and agromet advisory beneficiary categories (e.g., lead farmers, local service providers, disaster management committee members, etc.); and iii) integration of farmers and local service providers database into the web-based system.

From 11 to 16 April 2023, where the temperatures rose to about 40°C in many parts of Bangladesh, RIMES assisted DAE in disseminating special advisories for heat stress to 59 districts (i.e. 22,145 lead farmer-recipients). RIMES further assisted DAE in disseminating special advisories, ahead of Cyclone Mocha, to 7,009 lead farmers in 14 districts from 10-13 May 2023.

To gain insights for further tools development, RIMES i) collected feedback from lead farmers on the courses of action they have taken after they received the special advisories on heat stress and Cyclone Mocha; and ii) conducted onsite inspection of DAE kiosks to identify/confirm needs for the kiosks monitoring/information dissemination system.

Activity 1.2.1b
Develop the NLAS

Consultations

Consultation meetings were carried out with DLS and other stakeholders in the livestock sector, including:

- Consultative meeting, on 4 June 2023 with the DLS SFP, explored options for advisories feedback collection utilizing the ODK tool in the LDDP project; agreed on the questionnaire for gathering farmers' feedback vis-à-vis their responses to the advisories they received; gleaned the experiences of the SFP in disseminating alerts to farmers relative to the heat stress and Cyclone Mocha;

and facilitated agreement to reform the TWG in view of the movement/retirement of members.

- The ISR Mission meeting, on 7 June 2023, reviewed the progress of the DSS for DLS and discussed feedback from recipients on the special advisories disseminated relevant to the heat wave and Cyclone Mocha. Key to the initial feedback received by RIMES was that the implementation of advisories was unclear to farmer-recipients due to lack of precedent (i.e. it was the first time for livestock farmers to receive such advisories). RIMES will address capacity building of farmers in ingesting climate-informed advisories, through capacity building activities on climate information application.

Desk Review

Completed

Technical Review

No relevant systems currently in DLS or in allied institutions

User Needs Assessment

Completed

DSS Development

Work on the NLAS, during this reporting period, focused on: (i) implementation of climatology-based monthly livestock advisory generation; (ii) special advisory generation module; (vi) district-wise CMIP6 climate projection data visualization module; (iii) climate projection maps grouped in thirty years with decadal overlapping for temperature (mean, maximum, minimum) and precipitation until 2100; (iv) analytics for livestock-relevant climate risk indices by year, season, and month; (v) district-wise land cover data relevant for livestock sector (e.g. tree area, water bodies etc.); and (vi) monthly passive surveillance data of disease cases.

A *Special Bulletin of Heat Stress for Livestock* was generated by the NLAS; voice messages, associated with the special bulletin, were disseminated to 44,148 DLS beneficiaries (i.e. farmers and local extension officials in 13 districts), from 11-16 April 2023. Initial feedback allude to i) efforts put in place by farmers, after receipt of advisories, that resulted in reduction of impacts to milk production; and ii) application of advisories, in the future, can be enhanced through the capacity building of farmers.

Further, voice messages, relevant to advisories ahead of Cyclone Mocha, from 11 to 13 May 2023, were disseminated to 36,441 farmers in 13 districts.

Assessment of stakeholders' utilization of advisories, for resources and risks management, is on-going.

In the next semester, the planned development focus on NLAS is to initiate the generation of: i) Special Decision Advisories for Extreme Events, such as heat/cold stress, flood, and FMD risk alerts; ii) Monthly Decision Guidance for Livestock Production; and iii) Long-Term Adaptation Options.

The system can be accessed through https://nlas-wb.rimes.int/.

Activity 1.2.1c
Technical Support to FFWC

Consultations

Consultation meetings were undertaken with FFWC and allied institutions for guiding the DSS development, including:

- Consultative meeting, on 25 April 2023, with the SFP and FFWC forecasters on the final recommendations, on the DSS full development, from CARE-engaged water sector expert. Based on the feedback from FFWC, the recommendation report was updated.
- The ISR Mission meeting, on 6 June 2023, with the World Bank team, reviewed the status of the DSS for FFWC, including its scope, and timeline for completion. The meeting also discussed the potential complementarity of the RIMES-developed DSS with the Bank's Jamuna Sustainable River Management Project (BJSRMP), and provided recommendations, including, use of satellite data/APIs, e.g., Sentinel/Planet products, for visualizing inundation, and GEOGloWS ECMWF Streamflow Model, etc., for onward system development. RIMES enthused that per agreement with FFWC, existing models in FFWC will be used. RIMES clarified that while currently, CARE and BJSRMP has limited complementarity, the future potential of the tool in the BJSRMP thrusts of investment planning, dynamic navigation, pre-disaster evacuation, insurance, etc. could be further discussed with the BJSSRMP Team, for upscaling of the RIMES-developed tool in the future through separate technical assistance engagements.

Desk Review

Completed

Technical Review

Completed

User Needs Assessment

Completed

DSS Development

The FFWC DSS prototype was completed by the RIMES. Work during this period included the development of i) FFWC DSS public facing page; and ii) Forecasters' analytics portal design.

Work, in the next semester, will focus on the development of key products from the FFWC DSS: i) Forecasters' Decision Support Panel (e.g., multi-model outputs comparison, real-time integration and analysis, review/modification and publication of reports/outlooks, automated bulletin dissemination); and ii) Decision Guidance Products for Users (e.g., 5-days/10-days decision guidance bulletin, hydrological drought situation report).

The prototype system for FFWC can be accessed through http://flocast.rimes.int/.

NEPAL

[NEPAL]

Procurement

The hiring process, for all national positions in Nepal, has been completed for this period. The procurement section under Activity 3.2 details additional staff required to fast-track DSSs development and implementation of capacity building activities for the next semester.

Sectoral Focal Points

A total of 4 SFPs in Nepal has been confirmed for CARE Component 1 based on the commitments of support received from stakeholders. DHM is included in the capacity building activities owing to its critical crosscutting role in the DSSs development for stakeholder sectors. Table 2 provides the status of SFPs in Nepal.

Table 2 List of sectoral focal points in Nepal as of 30 June 2023

Sector	Ministry/ Agency	Focal Point Details
Nepal		
Agriculture	**Ministry of Agriculture and Livestock Department (MoALD)**	Ongoing process: **Mr. Bishnu Hari Devkota** Senior Agriculture Extension Officer *Commitment of support dated 4 Nov 2022*
Transport	**Department of Roads (DoR)**	**Mrs. Pushpanjali Khanal** Unit Chief, GESU *Commitment of support dated 22 Sep 2022*
Disaster Risk Management	**National Disaster Risk Reduction and Management Authority (NDRRMA)**	**Mr. Rajendra Sharma** Undersecretary (Technical) *Commitment of support dated 31 Jul 2022*
Cross-cutting	**Department of Hydrology and Meteorology (DHM)**	**Dr. Indira Kadel** Senior Divisional Meteorologist

Work Plan

Prioritization of activities in Nepal were based on the official commitments from DoR, MoALD, and NDRRMA to support the development/enhancement and sustainability of their DSSs. Streamlined activities for Nepal under Component 1 are:

- *Development of the Climate-Resilient Road Operations and Infrastructures DSS* of the DoR, to generate: i) Road Safety Alerts; and ii) Long-term Planning and Development
- *Upgrading of the NAMIS* of the MoALD, to evolve: i) 7 Days Decision Guidance; ii) Seasonal Decision Guidance; and iii) Long-term Climate Adaptation

- *Development of the DSS for Multi-Hazard Early Warning* of the NDRRMA, to generate: i) Lightning Alerts; ii) Flash Flood Decision Guidance; iii) Forest Fire Alerts; and iv) Landslide Impact Forecasting

Further recommendations from the World Bank team in Nepal, during a consultative meeting on 29 June 2023, are: i) development of an integrated mobile application for the DSSs to maximize usability and ensure sustainability; the DSS should include accessibility features, such as easy to navigate maps, local language/dialects, etc., ii) integration of a data/information panel into each DSS, and access given to stakeholders to deposit relevant data/information, so that DSSs can also function as a central repository of relevant sectoral information, in addition to being a decision support tool.

Activity 1.2.1d Developing the Climate-Resilient Road Operations and Infrastructure DSS

Consultations

The following have been pursued during this semester:

- ISR Mission, on 12 June 2023, with the World Bank team, reviewed the progress of DSS for DoR and composition of the TWG for the transport sector in Nepal; discussed complementarity with other DSSs, such as that for NDRRMA, and work done by ADPC on hazard, vulnerability, and risk assessments and provided recommendations including the potential inclusion of a technical advisor to the TWG; elaborated on data sharing mechanisms to enhance effectiveness of the DSS; and alignment of the DSS with ongoing initiatives in the country, such as NDRRMA's and DHM's initiatives for the transport sector.
- Consultative meeting, on 27 June 2023 with DoR officials, provided guidance on the full development of the DSS for DoR. The meeting discussed the status of systems development; elaborated the approach on the co-development process (including identification of IT and domain experts in DoR as focal points for co-development); highlighted the planned capacity building activities for DoR officials and staff; identified key DSS products and pilot areas (Madhesh/Bagmati Province) for the DoR DSS; and agreed on the data acquisition/sharing modalities.

Desk Review

Completed

Technical Review

Completed

User Needs Assessment

Completed

DSS Development

The prototype DSS for the transport sector, completed in March 2023 by RIMES, integrated: i) datasets/visualization tools for weather (present day maximum rainfall, temperature, humidity, wind speed) and transport infrastructure (road, bridge, culvert, railway, ferry location; ii) climate impact analysis module; and iii) climate projection data visualization module.

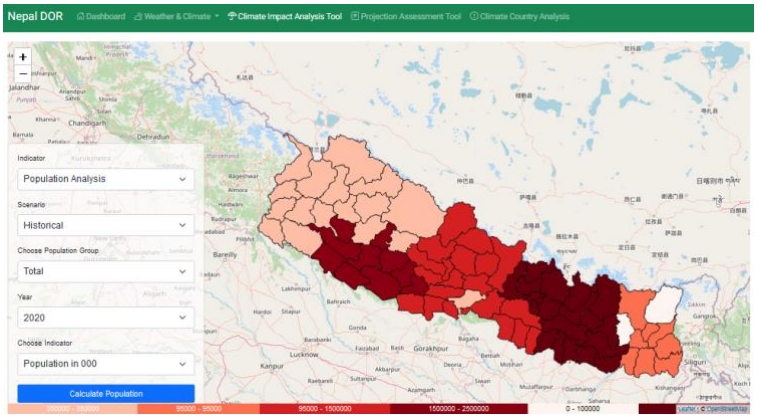

Figure 1. Climate Impact Analysis Tool

Full system development work, for next semester, will prioritize generation of key products identified for DoR, including i) Road Safety alerts (1-3 days lead time); and ii) Long-Term Planning and Development (e.g., sensitivities of road and bridges, recommendations for road/transport resilience).

The system for DoR can be accessed through https://np-dor-test.rimes.int.

Activity 1.2.1e
Upgrading NAMIS

Consultations

The following have been pursued during this semester:

- FGD, on 28 January 2023, with farmers from Tulasi-Mithila Municipality and NARC officials, discussed sectoral requirements for weather/climate information for improved agriculture activities. Key insights/highlights from the discussion include i) priority crops are, among others, wheat, mustard, maize, buckwheat, millet, chickpea, and rice; ii) key climate-related hazards affecting crops are drought, untimely rainfall, strong wind, unfavorable humidity, and cold wave; iii) waterlogging in some farms are partly due to lack of sufficient drainage facilities; iv) current most effective medium for information dissemination is radio news; v) farmers require twice-a-week agro-advisories delivered via radio/tv news; and vi) farmers require training on application of climate information/climate-informed agriculture advisories.

Figure 2. Focus group discussion with farmers from Tulasi-Mithila municipality and NARC officials on 28 January 2023

- FGD, on 29 January 2023, with farmers from Jaleshwor Municipality and officials from NARC, discussed information requirements for climate-informed farming. Key insights/highlights from the FGD include i) key crops, among others, are wheat, rice, legumes, and mustard; ii) climate-related hazards like untimely/heavy/deficit rainfall (and waterlogging, as secondary hazard to heavy rainfall combined with insufficient drainage facilities), strong wind,

cold/heatwave, and unfavorable humidity affect physiological stages of crops and often result to reduction in/loss of production; iii) farmers have varying capacities at accessing climate information – those with limited capacities prefer to receive climate-related advisories via radio/television news, while there are those who opt to receive climate-related advisories via mobile application; iv) farmers require twice-a-week or weekly agro-advisories, through various communication channels, preferably downscaled to local areas and in local languages/dialects; and v) farmers require training on application of climate-informed agro-advisories.

Figure 3. Focus group discussion with farmers from Jaleshwor municipality and NARC officials on 29 January 2023

- Consultative workshop, on 31 January 2023, with officials from MoALD, MoLMAC, Agriculture Development Directorate, and NARC, discussed FGD findings and validated the information obtained from farmers. MoALD appreciated the DSS and its potential in minimizing agriculture losses and maximizing agriculture opportunities. MoALD recommended the use of social media to address some challenges in information dissemination to end-users.

Figure 4. Consultative workshop with key agriculture stakeholders including MoALD, MoLMAC, NARC, and Agriculture Development Directorate on 31 January 2023

- Consultative meeting, on 27 June 2023 with MoALD and allied departments/institutions (including AITC), elaborated on the co-development

process for systems development; confirmed targeted DSS products for MoALD based on consultations and assessment outcomes; DSS integration into NAMIS; provision of DSS server; and provision of capacity building for MoALD in operating and maintaining the DSS and using its products. Recommendations from MoALD include i) integration of dates based on Julian and Nepalese calendars in the advisories; ii) online and offline access to the system; and iii) availability of DSSs information products in local languages/dialects. Agreed follow-up action are: i) nomination of focal points for systems development (IT and domain experts); ii) confirmation of pilot provinces; iii) identification of key crops in pilot province(s) to focus the DSSs advisories development on such crops; iv) grant of access, to RIMES, to the NAMIS; and v) updated work plan and implementation plan.

Desk Review

Completed

Technical Review

RIMES will carry out technical assessment of the NAMIS upon official grant of access to RIMES, by MoALD, to the system. As NAMIS has been non-operational for about 8 months by end of June 2023, MoALD committed that it will request AITC to re-operationalize the system, and to grant access to RIMES once re-operationalization has been done.

User Needs Assessment

User needs assessments, carried out by the CARE-engaged Agriculture Expert, from 28 to 29 January 2023 involved i) FGDs with 25 farmers each from Ratu Irrigation Farmers Users Group in Dhanusa District and Jaleshwor Nath Farmers Group in Mahottari District, ii) KIIs with 10 specialists and government representatives from MoALD, DoA, AITC, and NARC, and iii) provincial consultation workshop with 27 officials/stakeholders from various tiers of agriculture-relevant government institutions.

Key information/findings/recommendations from the assessments are:

- Major crops grown in communities in Madhesh province are rice, wheat, maize, oil seeds and legumes; prevalence of insects and pests occur when temperatures between 27° to 30° Celsius persist
- Key climate-related hazards in the province are drought, heavy/deficit rainfall, flood, strong wind and cold wave
- Key climate-related impacts in agriculture in the province are due to highly variable weather/climate; unavailability of timely agricultural inputs; and non-implementation of preparedness measures on the part of agricultural actors

- Most farmers select crop varieties for planting based on availability of planting materials, without considering potential weather/climate conditions; only a few lead farmers coordinate with agricultural institutions for selection of optimum varieties for the period
- The cropping calendar varies according to preference, interest, and environmental conditions; use of weather and climate information in agriculture can shift/cause variability to the planting date of crops, choice of crop varieties for planting, harvesting time, agronomic practices like top dressing, application of pesticides, irrigation, etc.
- Key weather/climate-related information needed by farmers are associated with temperature (daily, 3-days, 7-days, monthly, seasonal); rainfall including intensity and duration (3-days, 7-days, monthly, seasonal); humidity; and occurrence of hazards like hailstorm, flood (15-days prior), and drought (prior to planting season)
- Long-term forecasting is needed for selection of crops, and determining blocks and zones for planting specific crops; mid-term forecasting for selection of varieties, planning to plant particular crops; and short-term forecasting for decisions on when to plant, actions to be taken to save crops/optimize production, etc.
- Weather and climate information (and advisories, if any) are received by farmers via social media, mainly Facebook, news from radio and TV, on a daily and weekly basis. Forecasts/early warnings received are not timely and with high uncertainty, limiting proper appreciation and use of forecasts/early warnings/advisories at the local level. Actions to be taken in view of the anticipated weather/climate-related events are not elaborated in the early warning/advisories.
- Optimum periods, where weather-related advisories will make most impacts, are during seed selection, planting/sowing, harvesting, and prior to key agricultural/agronomic operations like irrigation, etc. Weather-related advisories are particularly beneficial before and during the monsoon season (i.e. in time for Jestha, Asar, Kartik, Mangsir, Chaitra and Baisakh), and preferably with 4-5 days lead time; end-users prefer to receive information through SMS, mobile applications (online/offline), AITC email, and Facebook
- Most effective mechanism for providing feedback would be via AITC toll-free number, telephone, Facebook messenger, and SMS
- Advisories should be enhanced to integrate potential losses and damages information, and information on proper mechanisms and required resources to transform information into action

Figure 5. Provincial consultation workshop with various agriculture stakeholders on 31 January 2023

Technical inputs to the design and development of the DSS are:

- Downscaled weather/climate-related risk information, preferably up to district/municipal level, with lead time of 3 to 7 days for short to medium range forecast-based risk information; and 15 t0 30 days for long-range risk information
- Upgrading of Agromet Advisory Bulletin (AAB) through: i) integration of thresholds-based advisories for different stages of crops' growth; and ii) timely dissemination of advisories. Capacity building of agriculture authorities and farmers on localizing and utilizing advisories, respectively, is also recommended.
- Mechanisms for receipt, by farmers, of advisories should be ensured, and should be redundant and robust
- Integration of weather/climate information in policy and program level, to support agricultural decisions on the ground; this can be done through the customization of weather/climate-related risk information to the requirements of agriculture officials, and capacitating them in utilizing the same in policies and programs
- RIMES work on the DSS for MoALD should be integrated into the NAMIS

Detailed findings and recommendations of the user needs assessment and recommendations/ inputs to DSS are provided in Appendix 2.

DSS Development

The DSS prototype has been completed by RIMES in June 2023. Work towards completion of key priority products for MoALD will continue in the next semester: i) 7-Days Decision Guidance for Local Agriculture Authorities and Farmers (analysis of field observations during the previous week; forecast-based/potential conditions for the subsequent week); ii) Seasonal Decision Guidance; and iii) Long-Term Climate Adaptation (e.g., potential crop risk areas, in various time slices; recommendations for crops resilience).

The DSS prototype for MoALD can be accessed through https://next-gen-sesame.web.app/.

Activity 1.2.1f Developing the DSS for Multi-Hazard Early Warning

Consultations

The following consultations have been undertaken with NDRRMA, for this semester:

- Consultative meeting, on 27 February 2023, with Mr. Jyoti Khanal, Senior Management Information Specialist, Mr. Arun Poudel, IT Specialist, and Mr. Ashok Sharma, MIS Specialist, discussed the progress of the DSS, updated on access to the BIPAD portal, and agreed on the way forward, viz.: i) BIPAD's Git access will be provided to RIMES, and ii) regular meetings between RIMES and NDRRMA will be on the last Thursday of every month.
- Consultative meeting, on 3 May 2023, with Mr. Rajendra Sharma, Undersecretary and CARE SFP, Mr. Jyothi Khanal, Senior Management Information Specialist, and Mr. Arun Poudel, IT Specialist, discussed the status of the DSS and mobile application development, and NDRRMA's specific products/information requirements from the DSS. NDRMMA emphasized the importance of the integration of local/community languages and location-specific decision guidance into advisories and bulletins, local validation of global datasets to ensure reliability, coordination with DHM and other local data providers/sources, and access for different levels of users. RIMES elaborated on the proposed features of the mobile application such as integration of local language voiceover and messaging platform; utilization of forecast products from various data providers and generation of thresholds, guidance/advisories/decision options by the DSS; integration of the DSS into the BIPAD; and identification of demonstration sites for testing the DSS products.
- Consultative meeting, on 30 June 2023, with Mr. Rajendra Sharma, Undersecretary and SFP, and Mr. Jyoti Khanal, Senior Management Information Specialist, presented the main features of the DSS and its targeted products, the development in CAP, information requirements from NDRRMA; and elaborated on the approach for the DSS co-development, which aims to integrate NDRRMA into the tool development process to foster ownership and sustainability of the tool. For ensuring maximum usability, ownership, and sustainability, NDRRMA emphasized that the systems development should build on/complement the existing BIPAD and available data within, as the latter is the central information system for NDRRMA. RIMES requested identification of focal points (IT and domain expertise) in NDRRMA for the DSS co-development, and access to BIPAD's database in addition to the system

architecture. RIMES assured NDRRMA that it will be closely working with the latter, to maximize project impacts.

Desk Review

Completed

Technical Review

Assessment of the BIPAD database will be carried out by RIMES' IT Expert in Nepal.

User Needs Assessment

Consultations with NDRRMA officials and other relevant stakeholders were carried out to finalize key products to be generated by the DSS.

DSS Development

During this reporting period, work on the NDRRMA DSS involved i) integration of threshold-based weather alerts; ii) implementation of lightning module prototype (displays observed lightning data, situation report); iii) implementation of forest fire module prototype (displays observed forest fire data); iv) integration of flood module (station forecasts and advisory for 3 river basins); and v) integration of the dissemination module.

Further work on the full system development, for the next semester, will focus on the development/enhancement of i) Lightning Alert; ii) Flash Flood Decision Guidance; iii) Forest Fire Alerts; and iv) Landslide Impact Forecasting.

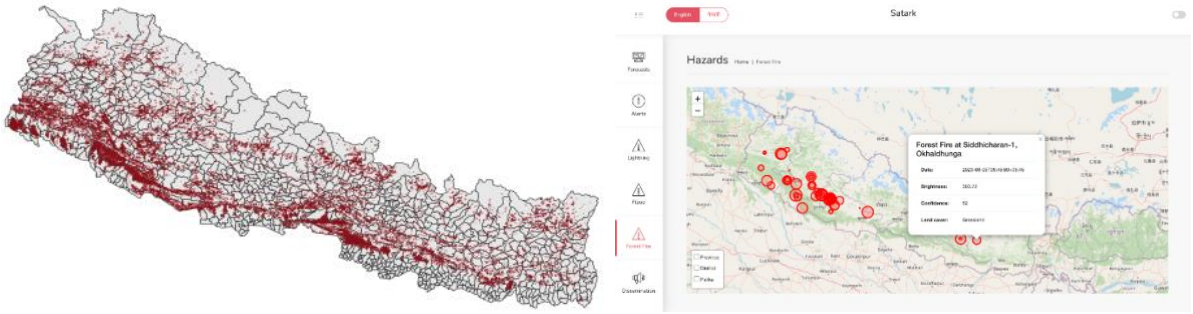

Figure 6. Forest fire hotspots in Nepal (left) and forest fire events visualized on the DSS (right)

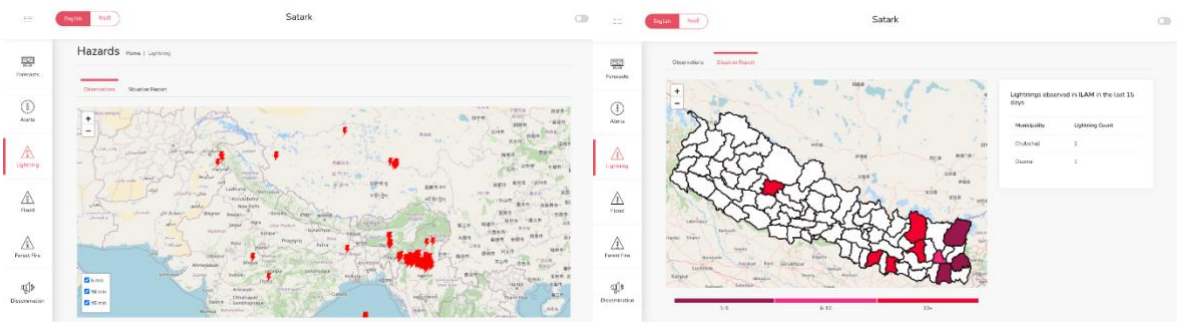

Figure 7. Observed lightning data (left) and Lightning situation report (right)

The NDRRMA DSS can be accessed through https://satark-2023.web.app/.

PAKISTAN

[PAKISTAN]

Procurement

Staffing requirements for Pakistan during this reporting period have been filled; details of additional staff for immediate onboarding next semester, following the restructuring process, are provided in the procurement section under Activity 3.2.

Sectoral Focal Points

A total of 5 SFPs for Pakistan have been confirmed for Component 1. While only 4 institutions provided their official commitments of support on the development and sustainability of the DSS and other CARE Component 1 activities, a focal point from MoF has been identified per earlier agreement with the institution that a module in the MoPDSI DSS be integrated for catering to MoF's requirements.

Table 3 provides the status of SFPs in Pakistan.

Table 3 List of sectoral focal points in Pakistan as of 30 June 2023

Sector	Ministry/ Agency	Focal Point Details
Pakistan		
Planning *(Convener of SFP in Pakistan)*	**Ministry of Planning, Development and Special Initiatives (MoPDSI)**	**Mr. Jawad Rabbani** Deputy Chief (Secretary. CARE PSC) *Commitment of support dated 30 Sep 2022*
Finance	**Ministry of Finance (MoF)**	**Ms. Mariam Ayub** Section Officer-EFP-III, Finance Division
Agriculture	**Punjab Agriculture Department (PAD)**	**Mr. Rana Mahmood Akhtar** Chief, Planning and Evaluation Cell *Commitment of support dated 4 Nov 2022*
	Balochistan Agriculture and Cooperatives Department (BACD)	**Mr. Juma Khan Tareen** Director Plant Protection Agriculture, Agriculture Research Institute Quetta *Commitment of support dated 31 Oct 2022*
Cross-cutting	**Pakistan Meteorological Department (PMD)**	**Mr. Mahr Sahidzad Khan** Director General *Commitment of support dated 1 Nov 2022*

Work Plan

For Pakistan, the DSS development work will focus on the planning sector at the Federal level, and agriculture sectors in Punjab and Balochistan. A module for MoF will be lodged within the MoPDSI DSS. Since further development of the DSS for SID will be undertaken by the Sindh Resilience Project (SRP), this activity will no longer be pursued under Component 1. Priority activities for Pakistan finalized for Component 1 are:

- *Development of the Climate-Informed Planning DSS,* to generate key products for MoPDSI: i) Crop Suitability to Observed Climate Trends and Projected Future Climate; ii) Potential Losses and Damages from Extreme Climate Events in the Future; iii) Crop Advisories for Punjab and Balochistan; iv) Cleaning and Greening the Transport Sector; and iv) Climate Sensitivity of Development Projects.
- *Development of the SESAME for Punjab,* to generate key products for PAD: i) 3-10 Days Decision Guidance for PAD, PAD Extension Service, and farmers; ii) Monthly/Seasonal Decision Guidance for PAD, PAD Extension Services, and farmers; and iv) Long-term Adaptation Options for PAD. Key crops identified for Punjab are cotton and rice.
- *Development of SESAME for Balochistan,* to generate key products for BACD: i) 7-Days Decision Guidance; and ii) 7-Days Guidance for Decision Makers in BACD. Key crops identified for Balochistan are apple and tomato.

Activity 1.2.1g Developing Climate-Informed Planning DSS

Consultations

Consultation meetings were carried out with MoPDSI for guiding the DSSs development during this reporting period. These involve:

- Coordination meeting, on 11 January 2023, with Mr. Jawad Rabbani, Deputy Chief, Environment and Climate Change, MoPDSI, and SFP for CARE, discussed progress of sectoral experts on user needs assessment activities/reports for MoPDSI, MoF, water sector in Sindh, and agriculture sector in Balochistan. RIMES elaborated that the assessments were preliminary activities to identify the general focus of the DSSs. This will be further firmed up through activities during the co-development process, e.g., consultations, expert inputs, and recommendations for refinement by sectoral institutions and RIMES expert team.
- Coordination meeting, on 1 March 2023, with Mr. Jawad Rabbani, and Mr. Yasir Gul Khan, Assistant Chief, Environment and Climate Change, MoPDSI, discussed the prototype development, user engagement, and project implementation strategies.

- Coordination meeting, on 8 March 2023, with Ms. Nadia Rehman, Member, Climate Change and Food Security, briefed on the status of project activities; elaborated on the implementation strategies and DSS co-development process, including requirements for focal points in each institution (IT and domain expertise); obtained insights on the key products for all DSSs in Pakistan; and discussed sustainability mechanisms, including deployment of an onsite server for each DSS and capacity building of key staff for DSS operations and maintenance and DSS products application.
- Consultative meetings, from 27-31 March 2023, with key officials of MoPDSI, PMD, MoF, Ministry of National Food Security and Research (MoNFSR), Ministry of Water Resources (MoWR), Ministry of Aviation (MoA), Punjab Agriculture Department and its allied offices, and farmers, demonstrated the DSSs, elaborating on the status and onward work on the systems, including key products, data/input requirements, data acquisition modalities, implementation strategy and co-development process, nomination of focal points for development, feedback mechanism, and planned capacity building activities for partner institutions and end-users.

Figure 8. Meeting with key stakeholders in Pakistan (Top): MoPDSI; Bottom (L-R) PMD and MoNFSR

Desk Review

Completed

Technical Review

No relevant systems currently in MoPDSI or in allied institutions

User Needs Assessment

The user needs assessment was not completed by the Consultant within the contract period, and its inclusive extensions. In lieu of this activity, RIMES completed a consultation/scoping mission with MoPDSI and allied institutions, on 27 to 31 March, and assessed the mandates of MoPDSI, to ascertain the institution's climate-informed information requirements. These information requirements and target DSS products are detailed in the Mission Outcomes Report, relevant to the said consultation/scoping mission.

On the other hand, the Consultant for Clean and Green Energy, Transport Sector, is on the process of gathering data that will feed into the analysis of carbon emissions from the transport sector in Pakistan.

DSS Development

The prototype of the MoPDSI DSS was completed by RIMES during this semester. This prototype integrated the following i) 10-days multi-parameter weather alert system; ii) interactive map per 10-days weather forecast; iii) projection and assessment tool for analyzing risks based on various socio-economic elements/parameters (population growth/change, gender analysis, etc.; iv) climate impact analysis module (hazard impacts assessment on population, GDP, etc.); and v) crop suitability analysis module under various climate projection scenarios.

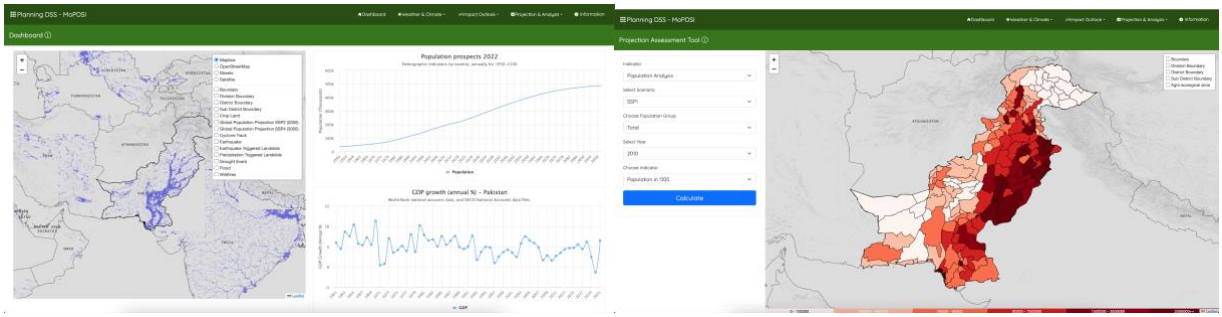

Figure 9. Dashboard of MoPDSI System (left) and Projection Assessment Tools (right)

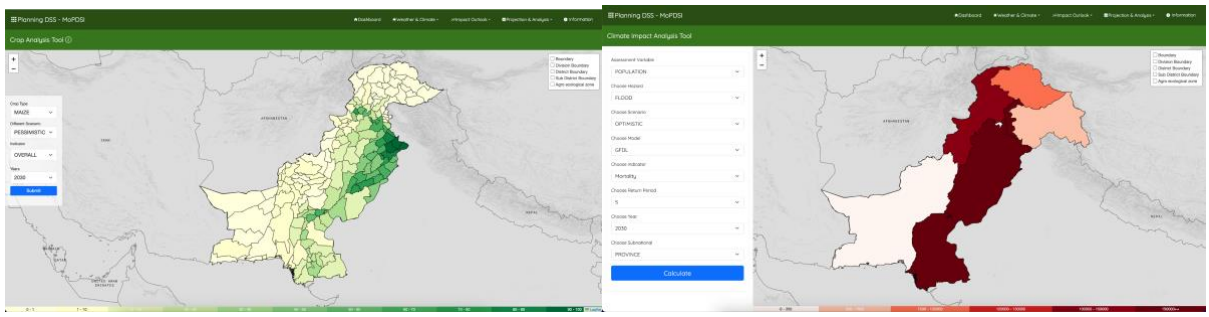

Figure 10. Crop Analysis Tool (left) and Climate Impact Tools (right)

Further work on the DSS will focus on the completion of priority products identified for MoPDSI: i) Crop Suitability to Observed Climate Trends and Projected Future

Climate; ii) Potential Losses and Damages from Extreme Climate Events in the Future, iii) Climate Sensitivity of Development Projects, iv) Cleaning and Greening the Transport Sector, and v) Crop Advisories for Punjab and Balochistan.

The system can be accessed via *https://mopdsi.rimes.int.*

Activity 1.2.1h
Developing SESAME for Punjab

Consultations

Consultation meetings were carried out with key stakeholders in the agriculture sector in Punjab, for guiding customization/full development of the DSS. These include:

- Consultative meeting, on 30 March 2023, with key officials of PAD, demonstrated the DSS and discussed the way forward for full system development, including specific products, data acquisition modalities, and identification of potential area/s for demonstration of application of climate-informed advisories, among others.
- Consultative meeting, on 31 March 2023 with extension workers of PAD and relevant farmer groups, demonstrated the DSS and discussed specific products, dissemination mechanisms, data acquisition modalities, pilot testing of DSS products, and capacity building of extension workers and farmers in using the DSS and its products.

Desk Review

Completed

Technical Review

Completed

User Needs Assessment

Completed

DSS Development

DSS development work for this period integrated: (i) crop profile module; ii) crop-specific thresholds for crop growth stage-wise advisories; iii) 10-day weather bulletin; and iv) partial irrigation advisories.

Onward work planned for next semester will focus on the generation of key products targeted for PAD: i) 3 to 10 Days Decision Guide (e.g., agriculture support outlook; extension services outlook; farming decisions outlook); ii) Monthly/Seasonal Guide (e.g., agriculture support outlook; extension services outlook; farming decisions outlook); and (iii) Long-term Adaptation Option.

The DSS for Punjab can be accessed via http://sesame-pak.rimes.int/.

Activity 1.2.1i Developing SESAME for Balochistan

Consultations

The following are the highlights from the various meetings with the agriculture sector, in Balochistan, during this reporting period:

- Consultative meeting, on 24 May 2023, with Mr. Umaid Khokar, Secretary of Agriculture, Mr. Juma Khan Tareen, SFP for CARE and Director, Plant Protection Agriculture, Agriculture Research Institute, Quetta, and Mr. Abdul Ghafoor Buzdar, Staff Officer of Secretary, demonstrated the key features of the DSS; discussed potential DSS products tailored to the department's and farmers' specific information needs/requirements; elaborated on data acquisition modalities, processes and mechanisms for the DSS co-development, strategies and milestones for full systems development; and identified potential areas for demonstration of DSS products application.
- Consultative meeting, on 25 May 2023 with extension workers and farmers in Balochistan, presented the DSS to receive feedback and recommendations for refinement/full development; highlighted information requirements and inputs

required from extension workers; and clarified appropriate dissemination mechanisms to institutional decision makers and farmers, among others.

- KII, on 25 May 2023 with Mr. Mukhtar Ahmad, Director and Mr. Muhammad Aslam, Weather Forecaster, PMD's Regional Meteorological Center in Balochistan (RMCB), discussed the weather forecasting system and dissemination systems in PMD, issues on climate change and early warning, and DSS development. The discussion focused on: i) availability of, and challenges in, historical and real-time weather and climate data; ii) current information dissemination mechanisms which include email, WhatsApp, and website; iii) available (online) weather-crop bulletins from PMD's NAMC (i.e. weekly and monthly weather crop bulletins for Pakistan); v) absence of robust feedback mechanism, from the ground, for evaluating effectivity of the bulletins and for guiding system enhancements; vi) absence of direct/robust linkage between PMD and farmers, and limited coordination between PMD and beneficiary departments; and vii) development of mobile application to potentially enhance effectivity of information dissemination.
- KII, on 25 May 2023 with Mr. Amanullah Rind, Director, PDMA, discussed the mechanisms for early warning and measures taken for managing weather/climate-related risks. The meeting gleaned i) PDMA's strong coordination with other departments on disaster management/disaster risk management; ii) PDMA's dissemination of early warning information through WhatsApp; iii) limited understanding of PDMA staff of weather/climate information and their potential impacts on agriculture; iv) PDMA's direct linkage with farmers; and v) automation of early warning processes, including sector-specific analysis of risks, through the DSS, could aid in ensuring quicker and more efficient responses.
- KII, on 25 May 2023, with Mr. Muhammad Akhter Buzdar, Director General and Mr. Basit, Reporting Officer, Department of Agriculture Statistics and Crop Reporting Services (CRS) of Balochistan, discussed activities of the department including use of remote sensing to estimate cropping structure, crop calendars, and crop extent. Highlights from the discussion are: i) remote sensing system is in place, but less effective on orchards; gaps between information gathered manually and through remote sensing may take some time to address; ii) data on crops is provided to the Directorate for onward dissemination; iii) requirement of strengthening linkage with farmers; and iv) limited understanding of staff on weather/climate/climate change and impacts on agriculture; and v) current linkage with PMD is weak; forecasts/early warnings are not received regularly.
- KII, on 25 May 2023, with Mr. Juma Khan Tareen, Director, Plant Protection, Department of Agriculture Research of Balochistan, and CARE SFP, discussed the impacts of floods and droughts in farming, and the need for drought-resistant varieties, in the long-term, to reduce impacts of climate change; and the need for an efficient system to disseminate threat/risk alerts and weather

warnings to farmers, fishermen, transporters, and other stakeholders. The KII highlighted the absence of robust mechanism that connects farmers to the early warning system, and where activities in CARE Component 1 is important.

- KII, on 3 June 2023, with the community of farmers in Hanna, Urak Valley, Quetta, discussed damages to agriculture, particularly to the apple orchards and land, during the 2022 flood, and other relevant hazard events. Farmers highlighted the need for an effective early warning system to ensure safety of lives and assets, and for guiding farming decisions. The discussion underscored the lack of an effective early warning for farming, and the limited skill of farmers to apply climate information, whether in the short- or long-term. Moreover, there is no platform that links PDMA and agriculture departments for planning anticipatory actions in the agriculture sector.
- KII, on 6 June 2023, with Mr. Abdur Razaq Khilji, Director General, Irrigation Department of Balochistan, discussed various issues including the lack of effective early warning, and coordination mechanism for early warning, in the irrigation sector; and the absence of mechanism for data sharing with PMD. The discussion also highlighted the way forward for the DSS development and operationalization, which will involve, *inter alia*, strong coordination among different sections under the agriculture directorate.
- KII, on 6 June 2023, with Mr. Sabir, Deputy Director, Market Committee, Agriculture Extension Department (AED) of Balochistan, discussed issues related to Agriculture Extension Department activities and establishment of the DSS. The meeting underscored established capacities, in the Department, that can be put to use in the implementation of CARE Component 1, to include, the Department's mechanism for demonstration sites, and expertise on management of some insects. On the other hand, the discussion brought forward coordination issues and weak capacity of staff in anticipating potential impacts from weather/climate events, and putting in place appropriate preparatory measures. These are priority intervention areas which CARE Component 1 can address.
- KII, on 6 June 2023, with Mr. Umer Farooq, Conservator and Focal Person, Monitoring and Evaluation, Department of Forest and Wildlife of Balochistan discussed the current absence of relevant, actionable and effective early warning; weak coordination mechanism with the Agriculture Department; and limited understanding of staff of climate/climate change impacts on crops, livestock, and food security.

Desk Review

Completed

Technical Review

No relevant systems currently in MoPDSI or in allied institutions

User Needs Assessment

The assessment was carried out through KIIs and FGDs by the CARE-engaged Agriculture Expert in Balochistan, in June 2023, with various stakeholders including Department of Irrigation, Department of Agriculture Extension, Department of Forest and Wildfire, PMD, PDMA, Department of Agriculture Statistics and Crop Reporting Services, Department of Agricultural Research, and farmer communities.

Key information/findings from the assessment are:

- PMD and PDMA do not have robust and effective mechanisms for receiving feedback from stakeholders, for assessing the effectiveness of information disseminated and for guiding improvements in the early warning system
- PMD and PDMA has weak coordination with departments like the Agriculture Extension Department
- There is no robust data sharing mechanism between PMD and Irrigation Department
- Coordination and interaction between Agriculture Extension Department and farmers are weak
- There is no organized weather/climate information collection, analysis, storage, and dissemination at AED
- Farmers, in general, are not satisfied with the current early warning system, as there is no information customized for the agriculture sector. Moreover, farmers have limited understanding and skills on applying climate information, as these currently do not include options/measures for addressing potential impacts.

The assessment articulated the following recommendations:

- Operationalizing an effective and sustainable DSS mechanism for enhancing the resilience of farmers, and building the capacity of agriculture-related institutions for better management of weather/climate-related risks
- Documentation of indigenous farming risk knowledge and farmers' responses (or lack thereof), to guide the DSS development
- Establishing effective data sharing and coordination mechanisms among relevant departments
- Enhancing the authenticity and quality of relevant data/information shared with stakeholders
- Ensuring appropriate/effective communication/dissemination of risk information/warnings, such that end-users, including those in remote areas, could receive relevant advisories.

Detailed findings and recommendations of the user needs assessment are provided in Appendix 3.

DSS Development

Continuing enhancements to the system were carried out by RIMES during this period.

Onward work, for the next semester, will focus on the generation of priority products identified for BACD: i) 7 Days Decision Guidance for Farmers; and ii) 7 Days Decision Guidance for Decision Makers.

The DSS for Balochistan can be accessed via http://sesame-pak.rimes.int/.

Activity 1.2.2 Facilitating the Use of DSSs In the Sectors

SFP Meeting

No stand-alone SFP meeting was organised, for this semester, in Bangladesh, Nepal, and Pakistan. Series of consultations with SFPs in CARE Component 1 partner government institutions were carried out in discussions pertaining to DSSs products development/refinement, and other relevant activities in CARE Component 1.

RIMES targets to convene a regional SFP meeting, back-to-back with other regional events, by end of 2023.

Outcome Indicator 1.3: *At least 70% trainees in select sectors satisfied with training provided by RIMES under the project based on its relevance, coherence, effectiveness, impact, and sustainability (Percentage)*

Outcome Indicator 1.3a: *At least 70% trainees in select sectors satisfied with training provided under the project based on its relevance, coherence, effectiveness, impact, and sustainability (Percentage)*

Output Indicator 1.3.1: *At least 1,650 Government officials trained in targeted units/departments to apply climate resilient standards and data analytics in policies, planning, and investments (Number)*

Output Indicator 1.3.1.a: *At least 50% women are trained among the staffs trained within targeted units/departments (Percentage)*

Activities contributing to overall progress and achievement of outcome 1.3 are provided below.

Activity/ Sub-Activity	Status*	Remarks
1.3.1 Stakeholder engagement to facilitate uptake of climate information		
a) Climate Application Forums	Apr23 – Jul25	
b) Demonstration of climate information application in communities	Oct23 – Jun24	
1.3.2 Regional and national training		
a) Training of recipient institutions in using RDAS and its products	Jul23 – Jun25	
b) Training of recipient institutions in DSSs operations & maintenance	Oct24 – Jun25	
c) Training of recipient institutions in DSSs products application	Oct24 – Jun25	
1.3.4 Iterative enhancement of the hydromet services		
a) SAHF Annual Conferences	Oct24 – Jul25	
b) Facilitating the continuity of the Forecasters Forum	Apr23 – Jul25	Completed 16 meetings
c) Supporting priority areas of the hydromet service delivery	Oct24 – Jul25	Convened 6 out of 7 Working Groups in SAR; ongoing work on SAHF Knowledge Hub
d) Annual assessment of NMHSs capacities and gaps	Oct24 – Jul25	
e) Facilitating strategic plans and decisions for the SAHF	Oct24 – Jul25	

Activity 1.3.1 Stakeholder Engagement to Facilitate Uptake of Climate Information

Climate Application Forums

The 1st Climate Application Forums in Bangladesh and Pakistan were organized on 11 and 15 June 2023, respectively. The Forums brought together the national meteorological and hydrological services (NMHSs) and various sectoral users of climate information for multi-timescales preparedness planning and decision-making. The Forums i) reviewed the performance of NMHSs forecasts of various timescales for the previous season; ii) reviewed users experiences in applying climate information in plans and decisions, gleaned good practices and lessons learnt and obtained recommendations for enhancing both climate generation and application; iii) presented NMHSs forecast products (including enhancements based on previous recommendations) for the subsequent season; and iv) guided users in putting in place anticipatory preparedness measures based on NMHSs-generated forecasts/climate information.

In Bangladesh, a total of 52 officials from various institutions/organizations/ communities participated in the forum, including, BMD, FFWC, DAE, DLS, Bangladesh Inland Water Transport Authority (BIWTA), Department of Fisheries (DoF), Bangladesh Rice Research Institute (BRRI), Bangladesh Livestock Research Institute (BLRI), Department of Disaster Management (DDM), SAARC Agriculture Center (SAC), Save the Children, German Red Cross, Islamic Relief, United Purpose, Food and Agriculture Organization (FAO), and British American Tobacco (BAT).

Forum sessions, among others, analyzed the performances of BMD and FFWC forecasts, shared forecast products for the next season, discussed ground experiences of various groups, viz: women, youth, farmers, and extension officials, and presented user-centric development of the DSS for DLS and tools/technical assistance to support the BAMIS of the DAE.

Highlights from the Climate Application Forum in Bangladesh are provided hereunder:

- Mr. Md. Azizur Rahman, Director, BMD, presented the case study on the forecasts generated by BMD on Cyclone Mocha. The case study underscored the reduced losses in various sectors, due to the high accuracy of

forecasts/warning generated by BMD and timely dissemination thereof. In particular, the risk information/warnings associated with Cyclone Mocha were disseminated by DAE to 7,009 lead farmers; by DLS to 36,441beneficiaries; and by DDM to 8,081 CPP volunteers and DMC members in the coastal zone.

- Dr. Mustanur Rahman of the Department of Livestock Services, and Deputy Project Director, LDDP, presented the current capacity of the NLAS. He focused on DLS' experience on the advisory generation and dissemination, from the DSS, relevant to the heatwave event in April 2023. Per initial survey conducted by DLS, a number of farmers acted upon the advisories, which led to savings of about BDT 2,452 per cattle per week, by following precautionary measures like supporting ventilation, and spraying water on sheds, among others.
- Performance of the observed and forecasted climate of the 2022 summer monsoon went well according to Mr. Kh. Hafizur Rahman, Meteorologist, BMD; while Mr. S.M. Quamrul Hassan, Meteorologist, BMD, presented the outlook for the 2023 Southwest Monsoon season (June to September).
- Mr. Sarder Udoy Raihan, Executive Engineer, FFWC, underscored the performance of the 5-day forecast model and observation data from the Brahmaputra basin, which was good/satisfactory for up to 48 hours of lead time. He added that the model, with the medium-range forecast customized by RIMES, performed well during the 2022 monsoon, and exhibited high levels of accuracy within 13 days of lead time. Key recommendations from FFWC were for: i) an integrated approach for improving BMD short-range rainfall forecasts and FFWC water level forecast for the flash flood region in Bangladesh, ii) improvement/integration of sub-basin sub-seasonal rainfall forecasts, for relevant regions/areas such as Teasta, Manu, and Khowai, and iii) integration of more observation data and climate projections to better capture year-on-year, and future potential variability in flood behavior.
- Key recommendations from the panel discussion included: i) improvement of forecast/early warning dissemination to reach last-mile recipients; ii) utilization of capacity of DAE staff in forecast dissemination; iii) capacity building on forecast interpretation/translation for lead groups (farmers, volunteers, youth, extension officials, media); iv) increased lead time for dissemination of severe weather events for efficient implementation of disaster preparedness activities; and v) enhancement of mass awareness to prevent use of inaccurate/false forecasts from unauthorized information sources.
- Key outcomes of the working group activity participated by various stakeholders from agriculture, water resources, health, humanitarian response, food security, among others, were forecast-based potential sectoral impacts outlooks and associated preparedness measures as per BMD's outlook for the JJAS, 2023 season. Sample advisories for specific sectors are provided in Appendix 4.
- RIMES received 31 survey responses from CAF participants in Bangladesh. Of which, 28 or 90% conveyed satisfaction of the first CAF. Among the

recommendations from participants, for onward CAFs, are: i) more sessions on user applications; ii) engagement of other/more stakeholders/organizations working on climate/climate change issues, especially media, in subsequent CAFs; iii) more focus on interpretation of seasonal and sub-seasonal forecasts, including uncertainty of the products, for user-specific sectors. Moreover, stakeholders i) appreciated the linkage between forecast and sectoral planning for taking informed decisions in the CAF; ii) acknowledged the contribution of the CAF in bridging knowledge of forecast information/climate products and their sectoral applications, as well as in the interaction/coordination among various pertinent organizations.

The report of the CAF in Bangladesh is provided in Appendix 4.

Figure 11. Participants of the Climate Application Forum in Dhaka, Bangladesh (left) and Dr. Muhammad Abul Mallik, BMD Meteorologist, presenting the case study on the extreme weather event Cyclone "Mocha" (right)

In Pakistan, a total of 128 officials from PMD, MoPDSI, MoF, Ministry of Water Resources (MoWR), Ministry of National Food Security and Research (MoNSFR), Climate Energy and Water Research Institute (CEWRI), Federal Flood Commission (FFC), Pakistan Council of Research in Water Resources (PCRWR), National Agricultural Research Centre (NARC), Pakistan Agricultural Research Council (PARC), Ministry of Aviation (MoA), PAD, Ayub Agricultural Research Institute (AARI), On Farm Water Management (OFWM), World Bank, and RIMES, among others, reviewed the previous seasons' forecast performances (2022 Southwest Monsoon, 2022-2023 Winter Monsoon, 2023 Pre-Monsoon); evaluated the climate outlook for the 2023 Southwest Monsoon Season; discussed forecast-based sectoral potential impacts and preparedness measures; and reviewed the RDAS and DSSs for Pakistan.

Below are the Climate Application Forum key take-away points in Pakistan:

- Mr. Mehr Sahibzad Khan, Director General, PMD, highlighted the need for reliable forecasting, noting the impacts of the 2022 flood event; acknowledged the benefits in various sectors of the timely prediction of Cyclone Biparjoy in June 2023; and recognized the importance of collective insights, collaborative efforts, and shared knowledge of participants in the preparation of appropriate measures for the effective management of weather/climate-related risks.

- Mr. Ahmed Kamal, Chairman, FFC, proposed the establishment of 5 regional forecasting centers by PMD for enhancing visibility of weather forecasts, enabling more localized and accurate predictions, and bolstering medium to long-range forecasting capabilities in the country; and emphasized the importance of the Flood Forecasting and Protection System for Pakistan in minimizing devastating impacts of floods and fortifying resilience of communities against such natural hazards.
- Dr. Shahzada Adnan, PMD, emphasized the importance of strengthening the early warning and dissemination mechanisms at PMD to minimize the impact of prolonged and intense heat waves on crop growth and livestock and the compounding effect of high temperatures and diminished winter rainfall on Rabi season crops, among others. He noted that meticulous selection and rigorous evaluation of each model for every season (both wet and dry years), rather than indiscriminately incorporating all models, and determination of sufficient lead time for seasonal forecasts, should prioritized for enhancing forecasts.
- Dr. Naveed Iqbal, PCRWR, shared valuable lessons from the 2022 floods and emphasized the need for adopting basin-wide management measures that recognize the linkages between upstream and downstream areas. He suggested a paradigm shift from a reactive to a proactive approach, advocating a departure from traditional infrastructure development towards climate proofing and climate financing (prioritizing development and management of water resources at the catchment and watershed levels); implementation of rainwater harvesting as key strategy for both surface and sub-surface water storage to address water scarcity issues and enhance water availability during dry periods; and maintenance of a robust drainage system, with focus on Sindh region, to effectively channel excess water and mitigate risks associated with floods.
- Dr. Bashir Ahmad, Director, CEWRI, NARC, highlighted the importance of efficient use of irrigation water, i.e., transitioning from the traditional surface irrigation methods to more advanced systems such as the Regulated Deficit Irrigation (RDI), drip irrigation, and sprinkler irrigation, to conserve water resources and foster sustainability in the agriculture sector. He suggested that incentives for local manufacturing and production of High-Efficiency Irrigation Systems (HEIS) could be provided, in addition to extending incentives for farmers, to promote adoption of water-efficient practices.
- Dr. Faisal Saeed, PMD, provided insights on monsoon dynamics, and prevailing regional climate drivers, and their potential impacts on the climate in South Asia and in Pakistan. He presented the seasonal outlook for the 2023 Southwest Monsoon season in Pakistan, which suggests below normal rainfall for most areas, and normal to above normal temperatures over the country.
- Key recommendations from the sessions and panel discussion are integration into the seasonal outlook of: i) percentages of departures from normal, area-

specific normal conditions; and ii) comprehensive categorization of potential risks (critical, medium, low) and preparedness measures relevant to the seasonal outlook. The CAF also recommended i) enhanced exchange of information (data, models, expert opinions), among stakeholders, to foster collaboration, and ii) prioritization of comprehensive measures addressing impacts of the monsoon on agriculture, water resources, and other sectors.

- As an immediate outcome of the CAF, Mr. Mehr Sahibzad Khan, Director General, PMD, instructed PMD scientists to immediately revise the seasonal outlook for the 2023 Monsoon season and immediately re-issue the same to stakeholders. The revised seasonal outlook was issued by PMD on 23 June 2023.
- CAF participant survey indicated that 92%, of 52 participants who completed the survey, was satisfied with the first CAF in Pakistan. Key participants' feedback, from the survey, are inclusive of: i) participants' appreciation for PMD's acceptance of the recommendations to share the seasonal forecast in simple and in national/local language, with province-wise rainfall percentages; ii) the CAF contributed to bridging the gap between academia, decision makers and end users in climate information application; iii) participants gained knowledge and understanding of climate science, seasonal outlook for 2023 and potential impacts particularly on agriculture and water resources sectors; iv) more agriculture-focused information should be presented in subsequent CAFs; v) establishment of a working group for transforming agreed points into actions, post-CAFs; v) inclusion of disaster management and adaptation planning components in the CAF for preparedness measures, and vii) accessibility of RDAS/DSSs to all stakeholders.

Detailed report, of the CAF in Pakistan, is provided in Appendix 5.

Demonstration of Climate Information Application in Communities

Activities are expected to commence at the end of this year.

Activity 1.3.2
Regional and National Trainings

Training of Recipient Institutions in Using RDAS and Its products

Activities are expected to commence in Year 2024.

Training of Recipient Institutions in DSSs Operations and Maintenance

Activities are expected to commence in Year 2024.

Training of Recipient Institutions in DSSs Products Application

Activities are expected to commence in Year 2024.

Activity 1.3.3
Iterative Enhancement of the Hydromet Services

SAHF Annual Conferences

Activities are expected to commence by end of 2023.

Facilitating the Continuity of the Forecasters Forum

Continuation of the weekly FForums, under CARE, was initiated in April 2023. A total of 12 weekly sessions, involving operational forecasters from NMHSs in the region, had been completed since the FForums integration into CARE.

Among others, a key outcome of the FForums within this reporting period was the appreciation of NMHS participants of the detailed analyses provided by the FForum on Cyclone Mocha, which have been beneficial to the NMHSs in the region in preparing country-specific forecasts/warnings. Moreover, the accuracy of the series of forecasts, from the genesis to the dissipation of Cyclone Mocha, were evaluated by the experts and participants, including the uncertainties faced in predicting its behavior.

The participants recognized the need for similar discussions on extreme events in the future, for sharing insights and experiences, and to guide country-specific tailoring of forecasts/warnings.
The following recommendations, relevant to the FForums, were put forward by NMHSs:

- Integration of special review sessions on the Monsoon 2023, to discuss specific extreme weather hazards that caused significant impacts, or has the potential of causing significant impacts, over the region
- Progressively introducing probabilistic forecasts from ensembles of operational models available for the region facilitated through the Knowledge Hub, and regional high-resolution satellite products accessed through the European Organization for the Exploration of Meteorological Satellites (EUMETSAT) collaboration
- Special lecture series, including research paper discussions and expert presentations, as part of the FForums to promote continuous learning, foster collaboration, facilitate exchange of ideas and experiences among forecasters, contribute to the improvement of forecasting practices, and enhance overall expertise of participating NMHSs.

Detailed progress report, of the FForum, is in Appendix 6.

Supporting Priority Areas of the Hydromet Service Delivery

The SAHF Working Groups (WGs), represented by various NMHS officials in the region (Bangladesh, Bhutan, India, Maldives, Pakistan, and Sri Lanka) were convened from 22 May to 6 June 2023, following its integration into CARE. There are 4 WGs (i.e. Impact-based Forecasting [IBF]), Numerical Weather Prediction [NWP], Observational Networks [OBN], and Capacity Enhancement [CE]) in place that function under the guidance of the SAHF Executive Council (EC).

Per demand by member NMHSs and per guidance of the EC, the existing WGs are being strengthened to provide appropriate technical guidance to NMHSs, and focus on regional thematic perspectives, while NMHSs focus on country-specific requirements.

Key recommendations for strengthening the SAHF process, under CARE, are:

- Piloting and implementing IBF in countries where IBF has not been started/implemented, and enhancing the IBF implementation in countries where it has been introduced/commenced. SAHF to provide regional/country-specific IBF training, and where relevant, NWP trainings for NMHSs
- Building capacity, of NMHSs, in communication and engagement with stakeholders to ensure effective dissemination of forecast information and for meeting specific information needs of key sectors such as disaster management, agriculture, health and urban planning
- Strengthening of observation networks, including weather stations, rain gauges, river gauges; and enhancing data sharing to include satellite data, and transboundary weather, climate, and water information
- Promoting data exchange among countries in the region through DataEx

- Integrating and harmonizing multiple forecasting models used across the region, for more accurate predictions, through DataEx
- Enhancing the technical skills of NMHSs personnel through comprehensive training programs implemented by regional training centers in IMD and PMD
- Fostering collaboration among NMHSs, research institutions, and international organizations to achieve action items listed above

Detailed discussions and priorities for each country are provided in Appendix 7.

Moreover, the SAHF Knowledge Hub (SKHub), a one-stop online resource for NMHSs in SAR for data visualization, ensemble forecast products, forecast verification skills assessment, continued education and on-the-job training, online forum discussions, and conference call support, further supports the NMHSs. The system includes 2 modules: Forecasters Workbench and Forecasters Visualization.

Enhancements to the SKHub, during this semester, are:

- Learning Management System: customization of the tool to user-specific requirements, including registration of users to a specific course and creation/customization of courses by expert/resource persons.
- Resource Person Roster: The development of database of resource persons and interactive interface for registration as experts has started. The development will support knowledge sharing, enhance collaboration and allow access to guidance/inputs from resource persons/experts.
- E-Library: The collection of free and open books, resource materials, journals, and publications is being expanded.
- Chatbot: The interactive Chatbot is being improved to an AI Bot to provide seamless access to resources and information.
- Data Analytics and visualization:
    - Forecast graphic modules have been updated in the system, enabling users to visualize their custom geospatial data on the forecast map generated by the graphics engine.
    - Elevation, and associated metadata, has been collected from over 1000 stations of the SAHF member countries to eventually support climate modeling and analysis.
- Forecast Verification: Point-to-grid verification module has been integrated into the system to provide more accurate and reliable predictions.

Technical report on the SAHF Knowledge Hub is in Appendix 8.

Annual Assessment of NMHSs Capacities and Gaps

Activities are expected to commence by end of 2023.

Facilitating Strategic Plans and Decisions for the SAHF

Activities are expected to commence by end of 2023.

Component 3: Project Management and Implementation Support

For this semester, the activities focused on the finalization of the project restructuring documents, including revision of the results framework and monitoring plan, workplan and budget for the remainder of the project; completion of financial audit for 2022, IUFR for the semester ending June 2023, and completion and submission of SOEs; review of deliverables by the consulting firm for enhancing RIMES HR, procurement, and finance systems; continuing enhancements of the PMIS; coordination with ADPC on relevant work; and documentation, monitoring, and reporting of key project accomplishments.

Activity 3.1
Enhancement of HR, Procurement, and Finance Systems

Procurement

Completed

Workplan

KPMG has submitted several revisions of the RIMES' Institutional Development Plan; Manuals on Accounting and Finance, Procurement, and Human Resources/Personnel and Administration; and has submitted a draft Monitoring and Evaluation Plan relevant to RIMES capacity building implementation.

RIMES is on final review of KPMG's outputs, for negotiating the contract cost in view of RIMES decision not to proceed further with the engagement with KPMG on Institutional Capacity Building.

Activity 3.2
Project Implementation Support, Documentation, Monitoring, Evaluation, and Reporting

Coordination

Coordination, guidance, and implementation of in-country activities were facilitated through joint consultation meetings with stakeholders, joint organization of national events, monthly CWG meetings, etc. Key meetings undertaken with the World Bank and ADPC during this period are:

- ISR mission, from 30 May to 12 June 2023, reviewed the project's performance e.g., coordination mechanism, progress of activities, status of systems development, procurement, finance, environment and social risks, among others, and discussed implementation strategies for the streamlined activities, to ensure optimal use of resources and maximize project impacts.
- Monthly CWG meetings with ADPC discussed complementary areas of work, bottleneck areas in project implementation, and data/information sharing, as relevant.

Documentation

Accomplishments, from 1 January to 30 June 2023, are provided below:

Activity	Accomplishments/Updates
Annual Procurement Plan	Latest version submitted to, and approved by, the Bank on 23 June 2023
Documentation of regular meetings to monitor the status of project implementation and streamline national, regional, and IAs coordination	• CWG Meetings • RIMES PIU Meetings

Reports on the details and status of coordination and progress of project activities	• Regional and country-specific activity reports
	  • 4 meeting reports (Climate Application Forums in Bangladesh and Pakistan; FForums; WG Meetings)
	• Bi-annual report: January to June 2023
	• Technical Reports
	  • 1 on data catalog and data development
	  • 1 on SAHF Knowledge Hub
	• Sectoral assessment reports

	• 2 assessment outcomes report for agriculture (1 for Nepal and 1 for Pakistan)

ICKM

For this reporting period, activities related to ICKM focused on documentation/publication of project activities on the CARE Component 1 Facebook platform (https://www.facebook.com/careforsouthasia), such as the Climate Application Forums in Bangladesh and Pakistan held on 11 and 15 June 2023, respectively; and preparation of ICKM documents including briefs, RDAS communications and outreach plan, and RDAS video script. The ICKM Specialist position has been vacant since April; the hiring process is ongoing.

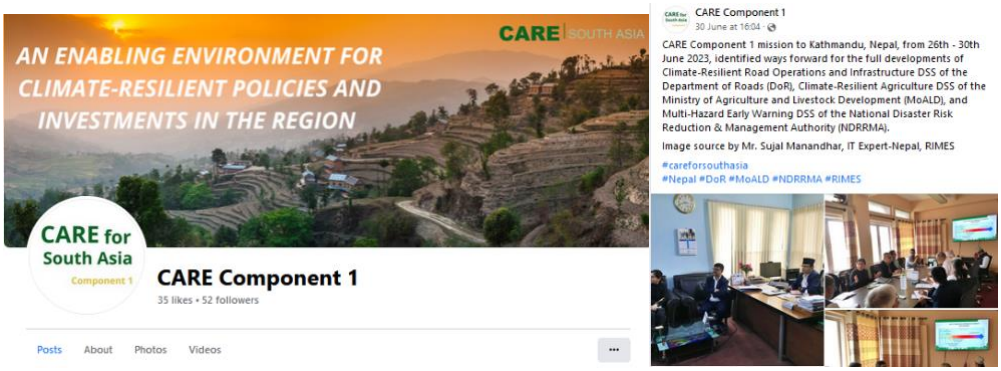

Figure 12. CARE Component 1 activities documented on social media (Facebook)

Procurement

- **Staffing.** Following the completion of the CARE Component 1 restructuring, the project staff has been streamlined to hasten the delivery of project outputs/outcomes. Around 24 regional staffs and 48 country staffs (Bangladesh [14], Nepal [18], and Pakistan [16]) are expected to be onboarded immediately.

  As of June 2023, the project has 37 staffs, viz.:

  - **PIU Staff (12/25):** Project Director, Project Coordinator, Finance Management Officer, Project Accountant, Procurement Specialist, Procurement Officer, Administrative Assistant (Regional), M&E Specialist, Country Program Lead (Bangladesh), Project Associate (Pakistan), consultant for financial audit, and consultant on Review and Enhancement of RIMES' Governance and Business Processes.

Staff for onboarding next semester are: Finance Management Specialist, ESD Specialist, ICKM Specialist, Administrative Assistant (Regional), Country Coordinator (Bangladesh), 2 Country Program Leads (Nepal and Pakistan), 3 Administrative Assistants (National), National Adviser (Pakistan), and consultant for video production.

- **Sectoral Team (10/21):** NWP Expert, 2 IBF Specialists, 3 Data Analysts (Regional), 2 GIS Specialists (National), Agriculture Expert, and Transport Expert.

  Staff for onboarding next semester include: Climate Scientist, GIS Specialist (Nepal), Data Analyst (Regional), Climate Impacts Expert – Livestock, Climate Impacts Expert – Transport, 3 Climate Impacts Expert – Agriculture, Climate Impacts Expert – DRM, Hydrologist/Flood Modeling Expert, and CAP Developer/Communication Platform Developer.

- **Capacity Development Team (1/11):** Training Coordinator (Regional).

  The following are staff for onboarding in the next semester: Capacity Building Specialist (Regional), 3 Capacity Building Officers (National), 3 Forecasting Experts (International), and 3 Conferences and Events Coordinator (National).

- **System Development Team (14/58):** Digital Systems and Data Integrator, Systems Development Lead, DSS Lead, Web Programmer, Native App Developer, 5 Full Stack Developers (Regional), 2 Full Stack Developers (National), and 2 IT Experts (National).

  Staff for onboarding next semester are: Regional: 2 Full Stack Developers, Data Visualization Expert, 2 UI/UX Designers, Software Designer, Data Analyst, Web Programmer, AI/ML Expert, Quality Control Expert, Mobile App Developer, Network & System Administrator, System Administrator, Graphic Designer, and Web Developer; National: 1 IT Expert (Pakistan), 15 Full Stack Developers, 3 Data Visualization Experts, 2 UI/UX Designers, 3 Quality Control Experts, and 5 Mobile App Developers.

- **Office.** Country offices in Nepal and Pakistan are in place, while arrangements for the relocation of the regional office is ongoing. Procurement of office furniture and equipment in the countries have been completed.
- **Procurement of Goods.** Procurement of computing equipment for RDAS activities – Cloud Service, data procurement for RDAS, and consultant for video production are under implementation.

- **Mission.** On 8 June 2023, a procurement mission was organized by Ms. Neena Shrestha, World Bank Procurement Analyst, to discuss i) RIMES' compliance with World Bank procurement regulations, ii) issues/outcomes from the procurement review on 15 March 2023, iii) updates on current procurement activities/plan, iv) STEP issues related to the contract management module, and v) RIMES procurement manual and other relevant documents/processes. The mission also facilitated a training course on the Contract Management Module in STEP. The Bank acknowledged RIMES' significant progress in keeping the STEP processes up-to-date. The Bank advised RIMES that a person assigned as Contract Manager in STEP shall keep track of the progress of consultants'/suppliers' deliverables/outputs, and shall authorize payments per the signed contracts. Further discussions included potential copyright issues related to RIMES draft procurement manual vis-à-vis relevant portions of the Bank's Procurement Regulations document.

Budget and Finance

- **Budget, Disbursement and Expenditure.** Following the restructuring of project activities from Year 2023 onwards, an initial budget plan for 2023-25 has been prepared and submitted to the Bank in April. Minor revisions to the proposed budget plan, in terms of further streamlining of project staff, is being incorporated for resubmission to the Bank. Actual expenditure from 1 January to 30 June 2023 covered staff and consultant salaries, local travel and meeting costs. The project budget against expenditure from 1 January to 30 June 2023 is provided in Table 4. Variances in excess of 10% from actual expenditures are attributed to the delay in receipt of funds from the World Bank and restructuring of the budget for 2023-25.
- **Reporting.** RIMES submitted the IUFR ending December 2022 to the Bank on 13 January 2023; audited financial statement for the Year 2022 is for submission to the Bank.

Table 4 Component-wise Project Costs as on 30 June 2023

	Component Description	Original Budget (A)	Total Actual Expenditure (B)	Estimated Commitments (C)	Available budget D = (A-B-C)
1	Component **1.1** RDAS	3,500,000	747,402	-	2,752,598
2	Component **1.2** National DSS	5,500,000	1,311,975	71,375	3,616,650
	Bangladesh	1,601,998	520,089	3,125	1,078,784
	Nepal	1,764,284	401,811	8,250	1,354,233
	Pakistan	1,633,718	390,075	60,000	1,183,643
3	Component **1.3** Supporting Climate	1,500,000	34,589	-	1,465,411
	Bangladesh	5,00,000	11,776		488,224

	Nepal	5,00,000	10,262		489,738
	Pakistan	5,00,000	12,551		487,449
4	**Component 3**: Project Management	2,000,000	824,652	113,355	1,061,993
	Total	**12,000,000**	**2,918,618**	**184,730**	**8,896,652**

Table 5 Project budget against expenditure from 1 January to 30 June 2023

Description	Planned	Actual	Variance		Forecast For the next 6 mos.
			Amount	%	
Individual Consultants	691,275	249,912	441,363	64%	1,043,370
Consulting Firms	212,626	21,406	191,219	90%	200,000
Non-consulting services	200,000	-	200,000	100%	-
Goods	366,105	12,008	354,097	97%	215,000
Training	-	5,751	(5,751)	-	137,402
Operating Costs	149,228	51,784	97,444	65%	262,979
PIU Staff	108,927	108,005	922	1%	108,928
RTI Staff	130,000	93,589	36,411	28%	161,700
Total	**1,858,161**	**542,455**	**1,315,706**	**71%**	**2,129,379**

- **Mission.** The Financial Management (FM) mission to RIMES, from 5-7 June 2023, i) reviewed the progress of RIMES FM arrangements, including budget planning and execution, accounting and reporting, resource management, internal controls, and external audits; ii) obtained updates on the previous ISR Mission agreed actions on FM, iii) assessed the status of funds flow and disbursement; iv) assessed the status of FM mitigation measures proposed as part of the restructuring (including hiring of FMS, updates on PMIS finance modules and project operational manual); v) assessed and updated the FM performance and FM risk rating for the project; vi) provided an overview of FM functions and FM training and guidance to RIMES FM staff; and vii) assessed the status of the implementation plan. The mission acknowledged RIMES' efforts on resolving key FM issues such as reconciliation of expenditures with the bank statement and book of accounts, maintenance of a separate book of account for CARE, modifications made to the PMIS, compliance with the submission of an IUFR and external audit, stepping up on FM capacity, and improved records management.
- **Financing Agreement.** The amendment letter to the Financing Agreement, between the World Bank and RIMES, on CARE Component 1, was completed on 31 May 2023, approving the project restructuring. The CARE Component 1

restructuring provided resolution/clarification to issues related to incremental operating costs, eligibility of part-time staff costs, FA and disbursement guidelines, claiming of reimbursements, and processing of payments via the CARE DA (USD and THB accounts).

Environment and Social Management

The ISR mission, with the World Bank E&S team on 2 June 2023, identified/confirmed low risks for streamlined/additional activities under Component 1. There were neither complaints nor grievances received as of this reporting period. Hiring process for the ESD Specialist is ongoing.

Monitoring, Reporting and Evaluation

- **M&E system.** Regular review and reporting mechanisms and tools used during the period, to assess outputs and outcomes, and their timelines, are the monthly PIU meetings with regional and national staffs; monthly CWG meetings with ADPC; weekly/monthly technical review of all systems with systems development team; monthly progress reports and deliverables; bilateral stakeholder consultation meetings; World Bank meetings; surveys; etc.

- **ISR Mission.** Bilateral meetings between RIMES and World Bank CARE Task Teams, from 30 May to 12 June 2023, i) discussed follow-up/agreed actions, as per the Aide Memoir dated October 2022; ii) assessed progress of activities and systems; iii) addressed challenges in coordination and implementation; and iv) discussed strategies for ensuring timely delivery of project outputs.

- **Project MIS.** Further enhancements to the PMIS, per recommendations from the World Bank and feedback from the CARE Component 1 PIU, are i) disaggregation of time spent, on various activities/projects, of all RIMES staff; ii) project-based accounting to allow tracking of revenues and expenditures (e.g., importing of general ledger data from the SUN system into the MIS for internal quality control and minimizing errors); iii) summary table for budget and expenditures based on imported data; and iv) contract record of consultants and vendors (adding and viewing new contract, viewing payment data and adding transactions, performance evaluation). Further work on the PMIS for the next semester shall focus on i) data analytics and visualization, to comprehensively reflect/present progress on the Home (dashboard) page; ii) additional requirements for finance module such as fixed assets register module, including recording of assets procured under the project; iii) invoice register module, to track project commitments and payments; iv) integration

of HR and administrative requirements; v) enhancements to the procurement modules; and vi) refinement of existing modules. The MIS user manual is being updated, as new features to the MIS are added.

Activity 3.3
External Audit and Evaluation

Audit for the fiscal year 2022 (1 January to 31 December 2022), undertaken by KPMG, is for submission to the Bank.

1.2 Summary of Results

PDO Indicators by Objectives / Outcomes

Outcome Statement 1: Regional cooperation and information for climate resilience enhanced

Outcome Indicator 1.1: *Users in select sectors satisfied with access to data, information, and/or analytics in Regional Resilience Data and Analytics Services (RDAS) platform (Percentage)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	70.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Outcome Indicator 1.2: *Users in select sectors satisfied with decision support systems and tools developed under the project (Percentage)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	70.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Outcome Indicator 1.3: *Trainees in select sectors satisfied with training provided by RIMES under the project based on its relevance, coherence, effectiveness, impact, and sustainability (Percentage)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	70.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Intermediate Results/ Outputs as per TOC

Output Indicator 1.1.1: *A regional-level resilience data and analytics services platform (RDAS) developed and accessible (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	3.00	3.00	5.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Output Indicator 1.2.1: *Climate-informed decision-making tools and systems developed/ enhanced in focus countries (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	10.00	40.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Output Indicator 1.2.1.a: *New climate-informed decision-making tools and systems developed (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	8.00	32.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Output Indicator 1.2.1.b: *Existing sectoral decision-making tools and systems enhanced (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	2.00	8.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Output Indicator 1.2.2: *Gender-disaggregated data analytics developed that contributes to narrow the gender gap in climate change vulnerability (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	4.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Output Indicator 1.3.1: *Government officials trained by RIMES in targeted units/ departments to apply climate resilient standards and data analytics in policies, planning and investments (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	180.00	1,650.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Output Indicator 1.3.1: *Government officials trained by RIMES in targeted units/ departments in Bangladesh to apply climate resilient standards and data analytics in policies, planning and investments (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	52.00	495.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Output Indicator 1.3.1: *Government officials trained by RIMES in targeted units/ departments in Nepal to apply climate resilient standards and data analytics in policies, planning and investments (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	420.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Output Indicator 1.3.1: *Government officials trained by RIMES in targeted units/ departments in Pakistan to apply climate resilient standards and data analytics in policies, planning and investments (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	128.00	385.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Output Indicator 1.3.1: *Government officials trained by RIMES in targeted units/ departments in South Asia to apply climate resilient standards and data analytics in policies, planning and investments (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	350.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

Output Indicator 1.3.1.a: *Women are trained among the staffs trained within targeted units/departments (Percentage)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	50.00
Date	12 May 2020	31 Dec 2022	30 Jun 2023	12 May 2025
Remarks				

FINANCIAL PROGRESS

Image: unsplash.com

2. Financial Progress

Year-wise allocation and utilization of grant

Financial Year	Provision in Original approved PAD	Allocation as per Approved Annual Work Plan	Released Amount	Expenditure incurred	Expenditure as % of Annual Work Plan Allocation
2020	514,270	514,270	499,374	370,022	72%
2021	2,306,250	1,250,498	1,383,570	1,164,685	93%
2022	3,275,776	875,776	-	841,456	96%
2023	3,018,865	3,987,539	990,000	542,455	14%
2024	2,001,315	3,315,625			
2025	883,524	2,056,292			
Total	**12,000,000**	**12,000,000**	**2,872,944**	**2,918,618**	

Component-wise allocation and utilization of grant

#	Component Description	Contribution from (US$ Million)			Authorized Budget for Semester 2 of Year 2022 (A)	Actual expenditure for Semester 2 of Year 2022 (B)	Cumulative Expenditure (C)	Balance (D= (A-B))
		WB	DFID	Total				
1	Component 1: Promoting Evidence-based Climate Smart Decision Making	10.00		10.00	3.44	0.39	2.09	3.05
2	Sub-component 1.1: SAR Regional Resilience Data and Analytics Services (RDAS)	3.50		3.50	1.41	0.20	0.75	1.21
3	Sub-component 1.2: Strengthening national level sectoral decision-support systems for resilient development	5.00		5.00	1.51	0.18	1.31	1.33
4	Sub-component 1.3: Technical capacity building of users	1.50		1.50	0.52	0.01	0.03	0.51
5	Component 3: Project Management and	2.00		2.00	0.55	0.15	0.83	0.40

	Specialized Support							
	Total Budget	**12.00**		**12.00**	**3.99**	**0.54**	**2.92**	**3.45**


OTHER
PROGRESS
AREAS

3. Risks and Assumptions

Risk Category	Risk Level			Describe mitigation measure
	Rating at Approval	Previous Rating	Current Rating	
Political and Governance	Substantial	Substantial	Substantial	Aside from employing its own mechanisms for managing political and governance risks, RIMES has requested the Bank for intercession, as required in relevant circumstances.
Macroeconomic	Low	Low	Low	
Sector Strategies and Policies	Moderate	Moderate	Moderate	Co-development with stakeholders/recipient institutions to ensure ownership and sustainability.
Technical Design of Project	Moderate	Moderate	Moderate	The restructured CARE Component 1 has incorporated capacity building of stakeholders, and enhancing capacities of NMHSs to respond to user requirements, to comprehensively address all the pillars in the climate services value chain. This approach is targeted at maximizing project impacts, compared to isolated efforts at only specific pillars.
Institutional Capacity for Implementation and Sustainability	Moderate	Moderate	Substantial	Key experts, in RIMES Technical Team, have been focusing on the DSSs development, meanwhile that there have been delays in procurement (i.e. some positions have to be re-advertised several times due to lack of suitable candidates). Government partners are being engaged closely to obtain comments on onward DSSs development, and integrate the DSSs and other activities in CARE Component 1, into the institutions.
Fiduciary	Substantial	Substantial	Substantial	Progress, in resolving key FM issues and maintaining sound FM practices, has been significant in RIMES. The FM practices are continued to be firmed up, with new processes established to ensure proper execution of procedures and documentation. In procurement, RIMES is up-to-date in uploading post review contracts in STEP. To ensure that RIMES abides with appropriate procurement procedures, CARE

				procurement staff regularly consults with the Bank's procurement officials.
Environment and Social	Moderate	Moderate	Moderate	Low risk identified for streamlined activities under Component 1.
Stakeholders	Substantial	Substantial	Substantial	Stakeholders are engaged closely for better integration of CARE into institutions.
Overall	Moderate	Moderate	Moderate	RIMES regularly assesses project bottlenecks and risks, for putting in place measures to mitigate risks.

4. Performance Issues

Check key reasons for shortfalls in output delivery, output quality and Development Objective Achievement

☐	Country project team performance	☐	PIU performance
☒	Difficulties in inter-agency coordination	☐	Inadequate cost estimates
☐	Lack of implementing partner commitment/ ownership	☐	Inadequate project design
☐	Implementing agency policy changes	☐	Funding shortfall
☐	Budget processing (revision/ disbursement, etc.) delays	☐	Unexpected change in external environment
☐	Community/ political opposition	☒	HR difficulties (recruitment, contracts)
☐	Others		

5. Issues and Actions

ISSUES	ACTIONS
Changes in SFPs/key government officials in stakeholder institutions and coordination protocols	Orientation of new SFPs/key government officials on the project; reorientation of coordination mechanisms; RIMES pursues regular consultations with stakeholders
Political pressures from project partners to accommodate staff external to project requirements	Communicated to government partners the scope of, and limitations in, CARE; the Bank was requested to intercede on relevant matters
Farmer data collection process requested by DAE, to support the development of robust farmers' database for advisories dissemination	Piggy-backing of the survey on other project activities and phasing the survey, starting in 1 upazilla on pilot basis
Feedback mechanism	RIMES frequently follows-up with stakeholders to obtain feedback/recommendations on project activities/DSSs development, e.g., coordinating with LDDP, DLS to leverage their ODK tool and ground presence in Bangladesh
Unavailability of local domain experts for guiding onward development of DSSs	RIMES technical team providing support to local team, pending onboarding of local staff/domain experts

6. Integration of Cross-cutting Issues

NMHSs are central to CARE Component 1 work, being the source of both historical and forecast weather/climate data. The restructured CARE has taken this forward, through the integration of NMHSs-focused interventions that respond to user requirements.

7. Stakeholders Participation and Involvement

DSSs development/enhancement is being pursued, on co-development basis, with partner government institutions. Moreover, RIMES will engage and train focal staff (IT and domain experts) within the institutions, throughout the development process, to support the operationalization and sustainability of the DSSs.

8. Compliance with Safeguard, Procurement, Financial Management

There are no issues to be reported during this semester.

9. Lessons Learned

Context and implementing environment	The progress of project implementation is partly driven by the objectivism, appreciation, and commitment of government focal point(s) vis-à-vis the project. Among others, robust mechanisms for maintaining the objectivity of government focal points, in various aspects of project implementation, should be in place.
Project strategy and design	In May, RIMES disseminated advisories relevant to Cyclone Mocha, from the DLS DSS, to DLS farmer beneficiaries. Initial feedback received by RIMES suggests that some farmers, even as they understood the advisories, were unable to put in place preparedness measures due to limitations in resources. Projects, in the future, can propose mechanisms for providing support to farmers to mobilize advisories-based preparedness actions (within a risk management framework), to maximize impacts of climate/weather-informed advisories.
Advocacy, communications, and capacity building	Design of DSS product prototypes have to be conceptualized and presented to stakeholders at the earliest possible time, to engage users and obtain feedback as soon as possible. For many stakeholders in CARE Component 1, pinpointing specific features required in the DSSs was a challenge. Hence, RIMES has to consolidate discussions, review mandates, and others relevant, to put forward prototype products to initiate comments/feedback from stakeholders.
Gender inclusion	
Implementation and institutional arrangements	
Any other areas	

10. Planned Activities for Next Semester

Sub-component 1.1: Expanding SAR RDAS

- RDAS full system development: Solution architecture, data analytics and visualization module

Sub-component 1.2: Strengthening national level sectoral DSSs

- Desk review and user needs assessment (completion of pending activities/reports)

- Technical assessment of DSSs (completion of pending activities/reports)
- DSS development: development/refinement of experimental products
- SFP regional meeting

Sub-component 1.3: Supporting climate-informed decision-making and scaling up SAHF

- Climate Application Forums
- Demonstration of climate information application in communities
- SAHF annual conference
- Facilitating the continuity of the Forecasters Forum
- Supporting priority areas of the hydromet service
- Annual assessment of NMHSs capacities and gaps

Component 3: Project management and implementation support

- Enhancement of HR, procurement and finance systems
- Documentation, dissemination/ knowledge-sharing
- Project implementation support, monitoring, evaluation, and reporting
- Financial audit for Year 2022

11.Appendices

1. Technical progress report on data catalog and data development
2. Assessment outcomes report for agriculture sector, Nepal
3. Assessment outcomes report for agriculture sector in Balochistan, Pakistan
4. Meeting report on Climate Application Forum in Bangladesh
5. Meeting report on Climate Application Forum in Pakistan
6. Report on Forecasters' Forum
7. Reports on SAHF Working Group Meetings
8. Technical progress report on SAHF Knowledge Hub
9. Procurement Plan as of 30 June 2023

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