CARE | SOUTH ASIA

4th Bi-Annual Progress Report

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ACRONYMS

AADT	Annual Average Daily Traffic
ADP	Annual Development Programme
ADPC	Asian Disaster Preparedness Center
AMIS	Agriculture Management Information System
AMISDP	Agro-Meteorological Information System Development Project
AMS	ADP Management System
API	Application Programming Interface
ARIQ	Agriculture Research Institute Quetta
AWS	Automatic Weather Station
BAD	Balochistan Agriculture Department
BADC	Bangladesh Agricultural Development Corporation
BAMIS	Bangladesh Agro-Meteorological Information System
BARC	Bangladesh Agricultural Research Council
BARI	Bangladesh Agricultural Research Institute
BAU	Bangladesh Agricultural University
BBA	Bangladesh Bridge Authority
BDP	Bangladesh Delta Plan
BFD	Bangladesh Forest Department
BIPAD	Building Information Platform Against Disaster
BIWTA	Bangladesh Inland Water Transport Authority
BLRI	Bangladesh Livestock Research Institute
BMD	Bangladesh Meteorological Department
BPC	Bangladesh Planning Commission
BRCHP	Building Resilience to Climate-related Hazards Project
BRRI	Bangladesh Rice Research Institute
BSC	Bangladesh Shipping Corporation
BWDB	Bangladesh Water Development Board
CAP?	Common Alerting Protocol
CARE	Climate Adaptation Resilience
CCFF	Climate Change Financing Framework
CCRIP	Coastal Climate Resilient Infrastructure Project
CCMD	Climate Change Management Division
CEGIS	Center for Environmental and Geographic Information Services
CMIP	Coupled Model Intercomparison Project
CPEIR	Climate Public Expenditure and Institutional Review
CReLIC	Climate Resilient Local Infrastructure Center
CWG	Coordination Working Group
CWSSA	Chittagong Water Supply and Sanitation Authority
DAE	Department of Agricultural Extension
DBHWD	Department Bangladesh Haor and Wetland Development
DDG	Deputy Director General
DDM	Department of Disaster Management
DFID	Department for International Development
DHM	Department Hydrology and Meteorology
DLS	Department of Livestock Services
DoE	Department of Environment
DoED	Department
DoF	Department of Fisheries
DoLI	Department of Local Infrastructure
DoR	Department of Road
DoS	Department of Shipping
DPHE	Department of Public Health Engineering

DRIP	Disaster and Climate Risk Information Platform
DSS	Decision Support System
DWASA	Dhaka Water Supply and Sanitation Authority
DWRI	Department of Water Resources and Irrigation
ECMWF	European Centre for Medium-Range Weather Forecasts
EFP	External Finance and Policy Wing
EOC	Emergency Operations Center
EoI	Expression of Interest
ERD	Economic Relations Division
ESD	Environmental and Social Development
ETCCDI	Expert Team on Climate Change Detection and Indices
EWS	Early Warning System
FFWC	Flood Forecasting and Warning Center
FGD	Focus Group Discussion
FloCAST	Flood Forecasting and Warning Systems
FMS	Finance Management Specialist
GBM	Ganges, Brahmaputra and Meghna
GCISC	Global Climate Impact Studies Centre
GED	General Economics Division
GESU	Geo-environment and Social Unit
GHG	Greenhouse Gas
GIS	Geographic Information System
GISC	Global Impact Studies Center
GRM	Grievance Redress Mechanism
HEC-HMS	Hydrologic Engineering Center-Hydrologic Modeling System
HR	Human Resources
IBF	Impact-Based Forecasting
ICKM	Information, Communication and Knowledge Management
ICT	Information and Communications Technology
IECC	International Economic Cooperation Coordination
IMD	India Meteorological Department
iPAS	Intelligent Project Automation System
IRSA	Indus River System Authority
IT	Information Technology
IUFR	Interim Unaudited Financial Report
IWM	Institute of Water Modeling
IWFM?	Institute of Water and Flood Management
IWRM?	Integrated Water Resource Management
JRC	Joint Rivers Commission
KII	Key Informant Interview
KPMG	Klynveld Peat Marwick Goerdeler
KWSSA	Khulna Water Supply and Sanitation Authority
LFI	Low Flow Index
LDDP	Livestock and Dairy Development Project
LGED	Local Government Engineering Department
LSD	Lumpy Skin Disease
LSP	Languages for Specific Purposes
M&E	Monitoring and Evaluation
MIS	Management Information System
MoA	Ministry of Agriculture
MoALD	Ministry of Agriculture and Livestock Development
MoD	Ministry of Defense

MoDMR	Ministry of Disaster Management and Relief
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MoF	Ministry of Finance
MoFAGA	Ministry of Federal Affairs and General Administration
MoFE	Ministry of Forests and Environment
MoFL	Ministry of Fisheries and Livestock
MoP	Ministry of Planning
MoPDSI	Ministry of Planning, Development and Special Initiatives
MoPIT	Ministry of Physical Infrastructure and Transport
MoPSIWT	Ministry of Ports, Shipping and Inland Water Transport
MoRTB	Ministry of Roads, Transport and Bridges
MoU	Memorandum of Understanding
MoWR	Ministry of Water Resources
NAMIS	Nepal Agriculture Management Information System
NARS	National Agricultural Research System
NASA	National Aeronautics and Space Administration
NCMRWF	National Centre for Medium Range Weather Forecasting
NDRRMA	National Disaster Risk Reduction and Management Authority
NDVI	Normalized Difference Vegetation Index
NGO	Non-governmental Organization
NMHS	National Meteorological and Hydrological Services
NPC	National Planning Commission
OLAP	Online Analytical Processing
PAD	Punjab Agriculture Department
PBS	Pakistan Bureau of Statistics
PDO	Project Development Objective
PIU	Project Implementing Unit
PMD	Pakistan Meteorological Department
PMIS	Project Management Information System
PPCR?	Pilot Program for Climate Resilience
RCIP	Rural Connectivity Improvement Project
RDAS	Regional Data Analytics Services
REST	Representational State Transfer
RFQ	Request for Quotations
RHD	Roads and Highways Department
RIMES	Regional Integrated Early Warning System
RRI	River Research Institute
SAAO	Sub-Assistant Agricultural Officer
SAARC	South Asian Association for Regional Cooperation
SAHF	South Asia Hydromet Forum
SAP	Systems Application and Products
SAR	South Asian Region
SDG	Sustainable Development Goal
SDPP	Strengthening Digital Processing of Projects
SDU?	System Development Unit
SEP?	Sectoral Expert Unit
SESAME	Specialized Expert System for Agro-Meteorological Early Warning
SEU?	Sectoral Expert Unit
SFP	Sectoral Focal Point
SIBDP	Support to Bangladesh Delta Plan Implementation
SID	Sindh Irrigation Department
SMS	Short Messaging Service
SJS	Senior Joint Secretary
SOE	Statement of Expenditure
SPEI	Standardized Precipitation Evapotranspiration Index

SPN	Special Procurement Notice
SPI	Standardized Precipitation Index
SQL	Structured Query Language
SRCTIP	Strategic Road Connectivity and Trade Improvement Project
SRP	Sindh Resilience Project
STEP	Systematic Tracking of Exchanges in Procurement
ToR	Terms of Reference
ToT	Training of Trainers
TWG	Technical Working Group
UNDP	United Nations Development Programme
WARPO	Water Resources Planning Organization
WB	World Bank
WECS	Water and Energy Commission Secretariat

CARE SOUTH ASIA

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RIMES

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	$3,275,776	1,647,344	0	1,882,944	1,776,130

[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 in 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 decision-support systems (DSSs) for selected sectors of agriculture, water, road transport, planning and finance in Bangladesh, Nepal, and Pakistan. This component also includes capacity development of users of these systems and their products. The RDAS is a cloud-based open-access platform for acquiring, storing, managing, processing, analyzing, visualizing, and reporting data, for use in screening climate risks to inform investments. The DSSs are sector-specific systems, linked to the RDAS, and used to assist users in sectoral planning and decision-making.

Highlights

This is the fourth bi-annual report for the project and covers the reporting period from 1 January to 30 June 2022[2]. The highlights, capturing key project accomplishments, indicated hereunder are presented against Component 1's three (3) sub-components: i) 1.1 Expanding SAR Regional Resilience Data and Analytics Service; ii) Strengthening national level decision support systems for participating countries; and iii) Trainings for climate-informed decision making. Challenges and lessons learnt are also synthesized in this Executive Summary.

[2] Accomplishments in gray fonts were undertaken from January 2021 to December 2021. Those in black fonts were undertaken during this reporting period (i.e. January to June 2022), while those in green bold fonts are priority prototype systems completed during the reporting period.

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.

The RDAS prototype is ready for public demonstration/launching and for full development. For the current phase of the development the focus was primarily on bringing stability to the core architecture and integrating more publicly available data sources into the platform. In addition the focus was also on; ii) integration of the comprehensive data catalog under the RDAS portal; ii) integration of key indicators relevant to decision making in the water sector; iii) design of a reference architecture for the RDAS system.

To further strengthen the backend to support the next phase of full RDAS development and in anticipation of the large user base of the RDAS system several

system and data optimization techniques are introduced in the system. This includes developing Data Bin or collections pages based on the user sessions to effectively manage user specific data requests. The system uses the AirFlow DAGs mechanism which is a pipeline method for data processing optimization by collecting tasks together organized with dependencies and relationships and defining execution procedures. Introduction of the multicore code process for faster data cleanup and processing. A Proxy manager is introduced as well to handle multiple containers running on a single server.

A Time series web component for managing and visualizing large volumes of multidimensional data with different time dimensions. Prototype to put all the data catalogs in a single page for easier user access to all data at one go as shown in the figure.

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, FloCAST, and Delta Portal), and prototype system development reports for DSSs for livestock and transport sectors.

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.

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.

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.

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.

The transport DSS prototype can be accessed via http://tdss-wb.rimes.int/app/home.

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.

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.

[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.

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.

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.

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.

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.

NDRRMA: DSS for resilient road planning, for rating municipalities and identifying those that require more assistance in integrating resilience in road plans. 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.

Access to the NDRRMA DSS prototype is through http://nepal-dss.rimes.int/Login/login_form.

[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.

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.

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.

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.

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.

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

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.

Challenges encountered

The protracted COVID-19 pandemic, and associated restrictions, is a key impediment in undertaking KIIs, FGDs and other mechanisms for data collection for firming up appreciation of capacities, gaps, and recommendations/inputs to DSS development/enhancement in priority sectors in focus countries. While RIMES' efforts at engaging stakeholders remotely have been relentless, activities that require to be undertaken face-to-face need to be pushed back. Contracts of most sectoral experts, across Bangladesh, Nepal and Pakistan, have to be extended until end of 2021 for pursuing pending data gathering activities/completing the deliverables. Moreover, changes in SFPs pose challenges to the project; new SFPs have to be engaged and initiated into CARE Component 1, for their appreciation of the inclusive activities, target outputs, associated potential benefits, and

requirements from the SFPs to pursue such activities, outputs, and potential benefits.

In Nepal, the extended delay in the government's formal decision to accept the project hampered the engagement and consultation processes with the stakeholders. There is hesitance on the part of the government agencies/institutions to engage with the project team.

In Bangladesh, big floods from May to June 2022 posed difficulties in arranging meetings and workshops with water sector stakeholders, due to priority engagements in flood risk management activities. In the agriculture sector, the MoA's lengthy vetting process on the MoU between RIMES and DAE, resulted in delay.

As the MoF in Nepal acquiesced to guide and coordinate, and be part of, CARE Project only by end of May 2022, RIMES formal/official engagement with sectoral stakeholders remain impeded in the first 5 months of the semester.

Lessons learned

The project, encompassing several years of implementation, should be equipped with flexibility to adjust to changing stakeholder requirements. Moreover, consultations with stakeholder institutions in focus countries identify areas which can address both climate change mitigation and adaptation; future projects can be designed to tackle both issues.

Establishment of Technical Working Groups (TWGs) improved cooperation and coordination, among stakeholders, in providing strategic and technical guidance and support to the DSSs development.

Projects have to be funded immediately after assessments. The long project preparation period, against a backdrop of, among others, changing government officials and priorities, have implications on the project design, implementation processes, and sustainability of interventions. For ensuring project relevance, a robust mechanism for accommodating evolving users' requirements is a must.

For timely sealing government commitment and ownership, sustainability plans have to be developed and proposed to, and acceded by stakeholder government institutions during the project requirement assessments/project development stage itself.

NARRATIVE REPORT

1.1 PROGRAMMATIC PROGRESS

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

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

Intermediate Outcome Indicator 1.1: *Improved access to regional climate information and analytics for climate-informed decision making in select sectors (score-based) (Number)*

Summary of activities contributing to overall progress and achievement of outcome 1.1 are given below. Color-coded ratings indicate progress status.

Activity/ Sub-activity	Status*	Remarks
1.1.1 Preliminary Activities		
1.1.1.1 Assessment of existing data portals	Jul20 – Oct20	Completed
1.1.1.2 Sector-specific data analysis	Jan21 – Jun25	Identified climate-water linkages in decision context in water sector
1.1.1.3 Data collection and digitization	Jan21 – Jun25	Identified 157 data points in focus sectors
1.1.2 RDAS Prototype System		
1.1.2.1 RDAS prototype system development	Nov20 – Dec21	Completed
1.1.2.2 Technical support	Sep21 – Dec22	Ongoing
1.1.3 RDAS Full System		
1.1.3.1 Solution architectural design	Apr21 – Jun22	Integrated catalog & key agriculture & water indicators; further activities and expansion will be carried out once RDAS team is onboard
1.1.3.2 Development of data management module	Jul21 – Dec22	Initial activity started through prototype; further activities and expansion will be carried out once RDAS development team is onboard
1.1.3.3 Development of data analytics module	Jan22 – Sep23	Activity will commence once RDAS development team is onboard
1.1.3.4 Development of data visualization and interface module	Oct21 – Mar23	Activity will commence once RDAS development team is onboard
1.1.3.5 Development of dissemination module	Apr23 – Dec23	
1.1.3.6 System Audit	Oct23 – Sep24	
1.1.3.7 Preparation of RDAS user guide and technical manual	Jan24 – Jun24	
1.1.3.8 RDAS deployment	Jul24 – Sep24	
1.1.3.10 Post RDAS deployment support	Oct24 - Jun25	

***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 Preliminary activities:

Procurement

Data Analysts, Mr. Dibesh Shrestha (water sector) and Mr. Saroj Kumar Pradha (transport sector), onboarded in May; procurement for Data Analysts for planning and finance and agriculture sectors are on-going.

Sectoral data analysis

Analysis of decision contexts in relation to water resources sector in Bangladesh, Nepal and Pakistan for developing climate-water linkages and identifying most relevant indices was carried out by the Data Analyst for water sector. Details on this activity include:

- Literature review and exploration of existing water resources-related data from various statistical reports and documents
- Analysis of decision contexts in the water sector in the 3 focus countries, viz.:
    - drought and flood risk management (surface/ground water availability, water productivity, water quality, sedimentation, agriculture, irrigation, water infrastructures, river bank erosion)
    - management of salinity and water logging (water productivity, crop yield, degraded area due to salinity, sea level rise, water quality)
    - climate risk management (climate variability, water availability, temperature rise, heat waves, water demand and productivity, heavy rainfall, infrastructures' sensitivity to climate parameters),
    - water allocation and management (hydrometeorological hazard information [design parameters, thresholds, dynamic maps], current and future hydrology, and statistical analysis [for extremes])
- Identification of climate-water linkages in the context of drought/flood risk/salinity management decision variables/indicators (e.g., water storage/levels in reservoirs, river inflows, water allocation, irrigation water supply and timely availability, crop water requirements, number of dry days, early recession of monsoon rain, intensity/frequency of extreme rainfall, degraded area due to salinity, etc.) and climatic/hydrological indices (SPI, Aridity

Index, Standardized Precipitation Evapotranspiration Index [SPEI], Low Flow Index [LFI], Standardized Streamflow Index [SSI], ETCCDI, salinity index, etc.)

- Identification of climate-water linkages in the context of climatic/hydrological indicators/indices (e.g., shift in seasonal rainfall patterns, changes in rainfall amount/duration, warm spell duration index, heat wave indices, temperature rise, river flow variability, changes in water storage volume, baseflow, crop water management, etc.)
- Quantification of the impact of climatic factors/variability expressed in terms of climatic/hydrological or decision indicators/variables (e.g., severity of drought in terms of standardized precipitation index [SPI] and impacts on agriculture productivity or reduction in water storage

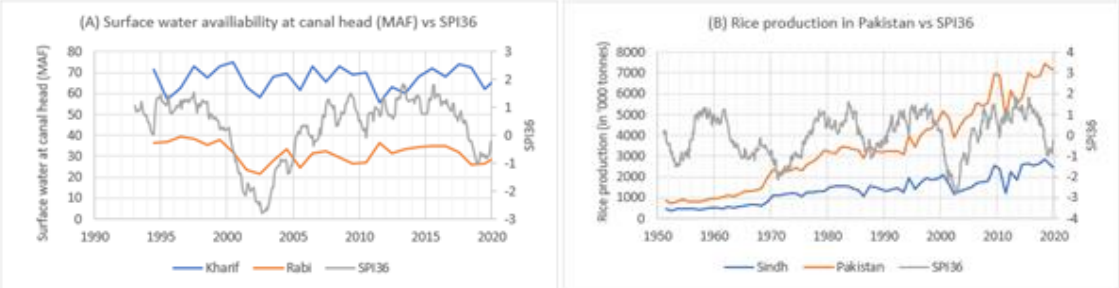

Figure 1. Relationship between drought and (a) surface water availability and (b) rice production in Pakistan (Data source: AMIS, 2022; Pakistan Bureau of Statistics)

Technical report on the climate-water linkages and decision context in the water sector Appendix 1.

Data collection and review

Work undertaken by GIS Specialists for this reporting period include:

- Regular consultations for understanding architecture of existing data catalogs at sectoral institutions
- Further review of existing literature and data sources for integration to the catalog
- Continuous assessment of existing datasets to ensure conformance with spatial data standards and interoperability with other datasets
- Continuous collection, updating and documentation of various regional/national weather/climate and sectoral datasets (e.g., public domain, primary/secondary data), including user-/predefined metadata
- Geospatial processing of collected datasets (e.g., preparation of NDVI, soil datasets to be deployed on SESAME)

Data catalog

As of end of June 2022, a total of 157 data points have been documented in the data catalog; these are relevant to various sectors, countries, data type, data readiness, etc. These have been classified according to:

- Sector: environment (42), agriculture (31), water (22), disaster (15), transport (11), economic (11), climate (10), social (7), admin (3), and not specified (5)
- Coverage: global (72), regional (10), county (25), and not specified (50)
- Readiness of use: downloaded (39), not downloaded (32), and not specified (86)
- Format: raster (61) and vector (32)
- Source: World Bank (6), universities (4), government (9), program/NGO (50), data provider (43), and others (45)

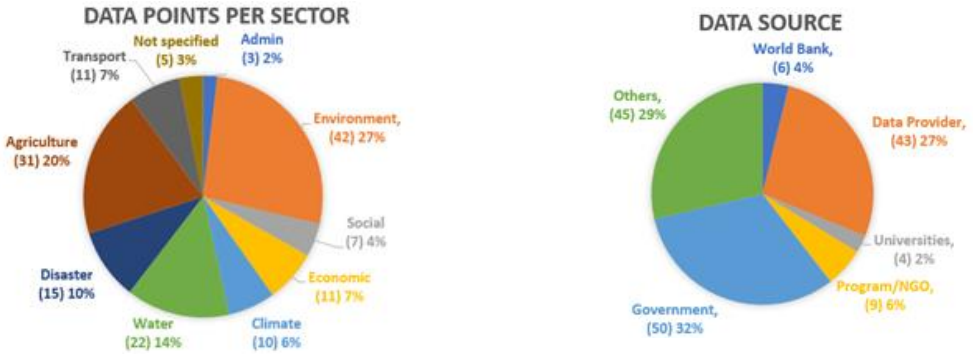

Figure 2. Classification of data points according to sector and data source

Technical report on the regional data catalog is provided in Appendix 2.

Activity 1.1.2
RDAS Prototype System

Procurement

Completed

RDAS Prototype System Development

The RDAS prototype system development primarily focused on strengthening the backend architecture. The system was developed to integrate climate data of any format and structure, making it easier to upgrade from CMIP5 to CMIP6 projection scenarios. The system also integrated an automated indices generation and computation process called CLIMPACT, which allows users to dynamically convert historical and projected climate data (rainfall and temperature) to climate indices that are critical for the climate-sensitive sectors like agriculture and water resources. This phase of development also included development of some sectoral sensitivity algorithms particularly for agriculture and water resources. Further, the system is integrated with a comprehensive data catalog, metadata information collected from various sources, and details of these data. The system has been enhanced with a large number of spatial and analytical global and regional data that are freely/openly available.

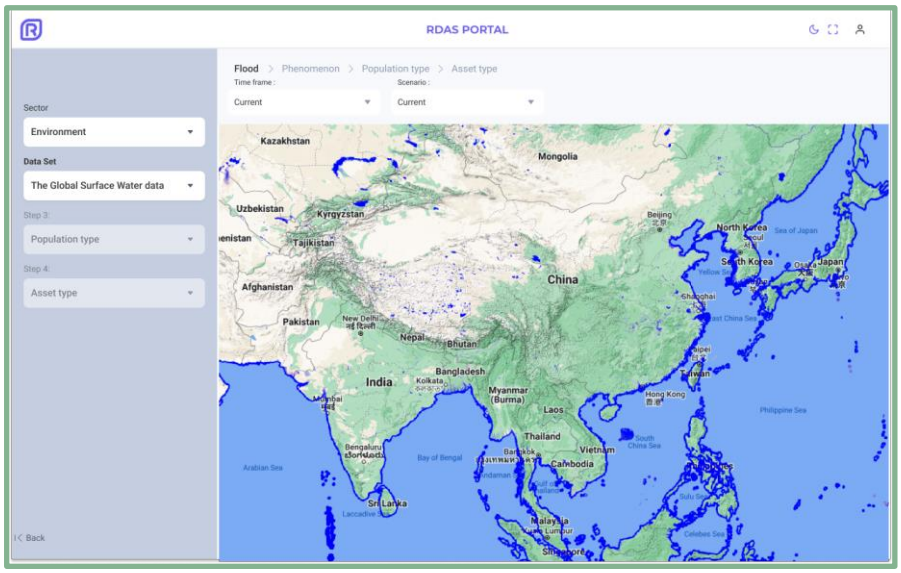

Figure 3. RDAS Portal

Activity 1.1.3
RDAS Full System

Procurement

Pending the Bank's approval on RIMES proposal to develop the RDAS internally for ensuring system relevance and sustainability, evaluation of EoIs report vis-à-vis consulting firm in support of RDAS development has been completed. Preparation of ToRs for Computing Equipment for RDAS activities – Cloud Service, and for procuring regional datasets is underway.

RDAS Full System Development

The RDAS prototype development phase provided a strong backbone of the RDAS system that makes it scalable and flexible for integrating a wide range of data, either structured or unstructured. Building on this phase of development and based on the recent recommendations from the technical team, the RDAS full development phase would focus on the following:

a) Dashboard development for the presentation of data in different forms including summary, analytics, graphs etc.
b) Sector specific models and algorithms development and computation of sectoral and climate indices association
c) Visualization of CMIP6 and sectoral data in spatial and time series formats including derived information
d) Sectoral impact and adaptation visualization at different administrative and basin levels
e) Dynamic Report generation process for impact and adaptation strategies

Building on the prototype, and moving towards the above-identified RDAS full development direction, 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.

The RDAS development team, once onboard, shall build on currently completed work. The full development of RDAS will hinge on regular and continuous consultations with larger regional technical team and stakeholders to obtain feedback and recommendations on the development and improvement of the functionality of the RDAS.

Output Indicator 1.1.1: *A regional-level resilience data and analytics services platform (RDAS) developed and accessible (Yes/No)*

Activities contributing to overall progress and achievement of output 1.1.1 have been continuously undertaken. The completion of the RDAS is expected in Year 2024.

Activity/ Sub-Activity	Status*	Remarks
1.1.1 RDAS full system		
1.1.3.8 RDAS deployment	Jul24 – Sep24	

Intermediate Outcome Indicator 1.2: *National-level decision-making and planning tools are better climate risk informed in select sectors (Yes/No)*

Activities contributing to overall progress and achievement of outcome 1.2 have been undertaken. Completion of tools, for climate-informing national-level decision-making and planning, is expected to begin in Year 2023.

Activity/ Sub-Activity	Status*	Remarks
1.2.2 Development of DSS for Ministry of Planning, Development and Reforms -Pakistan		
1.2.2.7 System transfer and deployment	Jul23 – Sep24	
1.2.3 Development of DSS for Ministry of Finance -Pakistan		
1.2.3.7 System transfer and deployment	Jul23 – Sep23	
1.2.4 Development of SESAME -Punjab, Pakistan (Priority system)		
1.2.4.8 System transfer and deployment	Jul23 – Sep23	
1.2.5 Improving DSS for Sindh Irrigation Department -Pakistan		
1.2.5.9 System transfer and deployment	Jan24 – Mar24	
1.2.6 Upgrading BAMIS for Agriculture - Bangladesh		
1.2.6.9 System transfer and deployment	Jul23 – Sep23	
1.2.7 Improving DSS for Livestock Subsector -Bangladesh (Priority system)		
1.2.7.9 System transfer and deployment	Jul23 – Sep23	
1.2.8 Upgrading the Online Road Network Portal -Bangladesh		
1.2.8.9 System transfer and deployment	Jul23 – Sep23	
1.2.9 Enhancement of FloCAST -Bangladesh		
1.2.9.9 System transfer and deployment	Jan24 – Mar24	
1.2.10 Enhancement of the Delta Portal -Bangladesh		
1.2.10.8 System transfer and deployment	Jul23 – Sep23	
1.2.11 Development of Portal for Finance, ERD and Planning -Bangladesh		

1.2.11.7 System transfer and deployment	Jul23 – Sep23
1.2.12 Supporting DHM -Nepal (Priority system)	
1.2.12.8 System transfer and deployment	Oct23 – Dec23
1.2.13 Upgrading NAMIS -Nepal	
1.2.13.9 System transfer and deployment	Oct23 – Dec23
1.2.14 Development of DSS for Transport Sector -Nepal	
1.2.14.7 System transfer and deployment	Apr23 – Jun23
1.2.15 Enhancing the Public Finance Management System for MoF - Nepal	
1.2.15.8 System transfer and deployment	Jul23 – Sep23
1.2.16 Enhancing the DSS for NDRRMA -Nepal	
1.2.16.8 System transfer and deployment	Jan24 – Sep24

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

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

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

Summary of activities contributing to overall progress and achievement of output 1.2.1 is given below.

Activity/ Sub-Activity	Status*	Remarks
1.2.1 Preparatory Activities		
1.2.1.1 High level scoping meetings with World Bank	Jul20 – Sep20	Completed
1.2.1.2 Stakeholder mapping, inception meetings, and agency meetings	Jul20 – Nov20	Completed
1.2.1.3 In-depth assessment of users' investment planning and decision-making processes, and information product and service needs	Jul20 – Jun22	Pending completion all user needs assessments; various KIIs, FGDs, and technical consultations conducted by sectoral experts to assess user needs
1.2.1.4 Meeting for presentation of assessment outcomes	Apr21 – Jun22	Validation workshops being planned to present assessment outcomes and DSS recommendations for stakeholder confirmation; workshop for livestock sector organized in March 2022
1.2.1.5 Meeting for soft launch of priority DSS systems	Oct21 – Dec21	Following demonstration of 4 priority systems to WB in Dec'21, prototypes for RDAS and DSS for Livestock sector in Bangladesh were publicly demonstrated in March 2022
1.2.1.6 Technical meeting on RDAS and DSS systems	Nov20 – Jun25	National SFP meetings in Pakistan and Nepal held in March 2022 to obtain stakeholder feedback and recommendations

1.2.2 Development of DSS for Ministry of Planning, Development and Special Initiatives -Pakistan		
1.2.2.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Dec22	Desk review report & UNA material completed; ongoing assessment outcomes report
1.2.2.2 Development of DSS framework and finalization of data parameters	Apr21 – Sep22	Ongoing consultations with MoPDSI; full system development pending onboarding of DSS development team
1.2.2.3 Development of data management module	Apr21 – Sep23	Activity will commence once DSS development team is onboard
1.2.2.4 Development of DSS engine and data visualization and report generation modules	Jul21 – Mar24	Activity will commence once DSS development team is onboard
1.2.2.5 System audit	Jan23 – Jun24	
1.2.2.6 Preparation user guide and technical manual	Jan23 – Jun24	
1.2.2.7 System transfer and deployment	Jul23 – Sep24	
1.2.3 Development of DSS for Ministry of Finance -Pakistan		
1.2.3.1 Assessment of user needs (refer to Activity 1.2.1.3)	Dec20 – Dec21	Desk review, UNA materials, assessment outcomes & recommendations reports completed
1.2.3.2 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Pending MoF confirmation for a separate DSS & onboarding of DSS development team
1.2.3.3 Development of data management module	Apr21 – Dec22	Activities will commence once DSS development team is onboard
1.2.3.4 Development of DSS engine and data visualization and report generation modules	Jul21 – Dec22	Activities will commence once DSS development team is onboard
1.2.3.5 System audit	Jan23 – Mar23	
1.2.3.6 Preparation user guide and technical manual	Jan23 – Jun23	
1.2.3.7 System transfer and deployment	Jul23 – Sep23	
1.2.4 Development of SESAME -Punjab (Priority system) and Balochistan, Pakistan		
1.2.4.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review, \UNA materials, assessment outcomes and recommendations reports for Punjab completed
1.2.4.2 Development of DSS framework and finalization of data parameters	Dec20 – Jun22	Completed DSS prototypes for Punjab & Balochistan; completed DSS framework
1.2.4.3 Development of data management module	Apr21 – Dec22	PMD weather forecast data integrated
1.2.4.4 Development of DSS engine	Jul21 – Dec22	Crop database and crop calendar developed; further analytics shall be developed
1.2.4.5 Development of dissemination module	Apr22 – Dec22	Activities will commence once DSS development team is onboard
1.2.4.6 System audit	Jan23 – Mar23	
1.2.4.7 Preparation user guide and technical manual	Jan23 – Jun23	
1.2.4.8 System transfer and deployment	Jul23 – Sep23	
1.2.5 Improving DSS for Sindh Irrigation Department -Pakistan		
1.2.5.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Dec21	Desk review & UNA materials completed; draft

		recommendations report for review
1.2.5.2 Technical assessment of existing DSS with the SID	Nov20 – Apr21	Completed
1.2.5.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Ongoing consultations; further actions once DSS development team is onboard
1.2.5.4 Enhancement of data management module	Apr21 – Dec22	Further enhancement upon onboarding of DSS development team
1.2.5.5 Development of DSS engine	Jul21 – Jun23	Further enhancement upon onboarding of DSS development team
1.2.5.6 Development of web-based dissemination system	Jan23 – Sep23	
1.2.5.7 System audit	Oct23 – Dec23	
1.2.5.8 Preparation of user guide and technical manual	Jul23 – Dec23	
1.2.5.9 System transfer and deployment	Jan24- May24	
1.2.6 Upgrading BAMIS for Agriculture -Bangladesh		
1.2.6.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Dec21	Desk review, UNA materials & assessment outcomes reports completed; ongoing draft of recommendations report
1.2.6.2 Technical assessment of BAMIS	Sep20 – Apr21	Completed
1.2.6.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Ongoing initial consultations; further design and development once DSS team is onboard
1.2.6.4 Enhancement of data management module	Apr21 – Dec22	Ongoing initial consultations; further design and development once DSS team is onboard
1.2.6.5 Development of DSS engine	Jul21 – Jun23	Ongoing initial consultations; further design and development once DSS team is onboard
1.2.6.6 Development of dissemination module	Jan23 – Jun23	
1.2.6.7 System audit	Apr23 – Jun23	
1.2.6.8 Preparation of user guide and technical manual	Jan23 – Jun23	
1.2.6.9 System transfer and deployment	Jul23 – Sep23	
1.2.7 Improving DSS for Livestock Subsector -Bangladesh (Priority system)		
1.2.7.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Dec21	Desk review & UNA completed; ongoing preparation of assessment outcomes & recommendations reports
1.2.7.2 Technical assessment of DSS for Livestock Subsector	Aug20 – Apr21	Completed
1.2.7.3 Enhancement of DSS framework and finalization of data parameter	Dec20 – Jun22	Completed DSS prototype; completed design of framework; ongoing preparation of technical design document
1.2.7.4 Enhancement of data management module	Apr21 – Dec22	Completed data management module and testing of bias correction methods
1.2.7.5 Development of DSS engine	Jul21 – Dec22	Activity started under prototype system development on visualization & feedback mechanism

1.2.7.6 Development of dissemination module	Jan23 – Jun23	
1.2.7.7 System audit	Apr23 – Jun23	
1.2.7.8 Preparation of user guide and technical manual	Jan23 – Jun23	
1.2.7.9 System transfer and deployment	Jul23 – Sep23	
1.2.8 Upgrading the Online Road Network Portal -Bangladesh		
1.2.8.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review, UNA materials, assessment outcomes & recommendations reports completed
1.2.8.2 Technical assessment of Online Road Network portal	Mar21 – Dec21	Completed
1.2.8.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Activity started under prototype system development; further activities after onboarding of DSS development team
1.2.8.4 Enhancement of data management module	Apr21 – Dec22	Initial activity started; further activities upon onboarding of DSS development team
1.2.8.5 Enhancement of DSS engine	Jul21 – Dec22	Further activities upon onboarding of DSS development team
1.2.8.6 Development of web-based dissemination module	Jan23 – Jun23	
1.2.8.7 System audit	Apr23 – Jun23	
1.2.8.8 Preparation of user guide and technical manual	Jan23 – Jun23	
1.2.8.9 System transfer and deployment	Jul23 – Sep23	
1.2.9 Enhancement of FloCAST -Bangladesh		
1.2.9.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review & UNA materials reports completed; ongoing draft of assessment & recommendations reports
1.2.9.2 Technical assessment of FloCAST	Dec20 – Sep21	Completed
1.2.9.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Initial activity started; further activities upon onboarding of DSS development team
1.2.9.4 Enhancement of data management module	Apr21 – Dec22	Initial activity started; further activities upon onboarding of DSS development team
1.2.9.5 Development of DSS engine	Jul21 – Jun23	Further activities upon onboarding of DSS development team
1.2.9.6 Development of dissemination module	Jan23 – Sep23	
1.2.9.7 System audit	Oct23 – Dec23	
1.2.9.8 Preparation of user guide and technical manual	Jul23 – Dec23	
1.2.9.9 System transfer and deployment	Jan24 – Mar24	
1.2.10 Enhancement of the Delta Portal -Bangladesh		
1.2.10.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review & UNA materials reports completed; ongoing draft of assessment & recommendations reports
1.2.10.2 Technical assessment of the Delta Portal	Jan21 – Sep21	Completed
1.2.10.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Initial activity started; further activities upon onboarding of DSS development team

1.2.10.4 Enhancement of data management module	Apr21 – Dec22	Initial activity started; further activities upon onboarding of DSS development team
1.2.10.5 Development of DSS engine	Jul21 – Dec22	Further activities upon onboarding of DSS development team
1.2.10.6 System audit	Apr23 – Jun23	
1.2.10.7 Preparation of user guide and technical manual	Jul23 – Sep23	
1.2.10.8 System transfer and deployment	Jul23 – Sep23	
1.2.11 Development of Portal for Finance, ERD and Planning -Bangladesh		
1.2.11.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Dec21	Desk review, UNA materials & assessment outcomes completed; ongoing draft of recommendations report
1.2.11.2 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Initial activities started; further development upon onboarding of DSS development team
1.2.11.3 Development of data management module	Apr21 – Dec22	Initial activities started; further development upon onboarding of DSS development team
1.2.11.4 Development of portal interface	Jul21 – Dec22	Further activities upon onboarding of DSS development team
1.2.11.5 System audit	Jan23 – Mar23	
1.2.11.6 Preparation user guide and technical manual	Jan23 – Jun23	
1.2.11.7 System transfer and deployment	Jul23 – Sep23	
1.2.12 Supporting DHM -Nepal (Priority system)		
1.2.12.1 Assessment of DHM's hydrological and climate collection and data management system, and climate products (refer to 1.2.1.3)	Dec20 – Jun22	Desk review completed; ongoing consultations
1.2.12.2 Technical assessment of DHM hydrological forecasting portal	Jul20 – Apr21	Completed
1.2.12.3 Enhancement of DSS framework and finalization of data parameter	Dec20 – Jun22	Completed DSS prototype; DHM priority: improvement of flood forecasting system
1.2.12.4 Enhancement of data management module	Dec20 – Dec22	Initial activities started; further development upon onboarding of DSS development team
1.2.12.5 Enhancement of DSS engine and dissemination module	Oct21 – Jun23	Completed daily/hourly hydrological time step; further development upon onboarding of DSS development team
1.2.12.6 System audit	Jul23 – Sep23	
1.2.12.7 Preparation of user guide and technical manual	Jul23 – Sep23	
1.2.12.8 System transfer and deployment	Oct23 – Dec23	
1.2.13 Upgrading NAMIS -Nepal		
1.2.13.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review & UNA materials completed; ongoing consultations
1.2.13.2 Technical assessment of NAMIS	Oct20 – Jun22	Pending access to NAMIS portal
1.2.13.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Pending onboarding of DSS development team
1.2.13.4 Enhancement of data management module	Apr21 – Dec22	Pending onboarding of DSS development team

1.2.13.5 Enhancement of DSS engine	Jul21 – Dec22	
1.2.13.6 Enhancement of dissemination module	Oct22 – Jun23	
1.2.13.7 System audit	Jul23 – Sep23	
1.2.13.8 Preparation of user guide and technical manual	Apr23 – Sep23	
1.2.13.9 System transfer and deployment	Oct23 – Dec23	
1.2.14 Development of DSS for Transport Sector -Nepal		
1.2.14.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review & UNA materials completed; ongoing consultations
1.2.14.2 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Initial activities started; further development upon onboarding of DSS development team
1.2.14.3 Development of data management module	Apr21 – Dec22	Initial activities started; further development upon onboarding of DSS development team
1.2.14.4 Development of DSS engine	Jul21 – Dec22	Further development upon onboarding of DSS development team
1.2.14.5 System audit	Jan23 – Mar23	
1.2.14.6 Preparation user guide and technical manual	Oct22 – Mar23	
1.2.14.7 System transfer and deployment	Apr23 – Jun23	
1.2.15 Enhancing the Public Finance Management System for MoF - Nepal		
1.2.15.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review & UNA materials completed; ongoing consultations
1.2.15.2 Technical assessment of existing portal	Apr21 – Jun22	Pending access to MoF system
1.2.15.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Pending onboarding of DSS development team
1.2.15.4 Development of data management module	Apr21 – Dec22	Pending onboarding of DSS development team
1.2.15.5 Development of DSS engine	Jul21 – Dec22	Pending onboarding of DSS development team
1.2.15.6 System audit	Jan23 – Mar23	
1.2.15.7 Preparation of user guide and technical manual	Jan23 – Jun23	
1.2.15.8 System transfer and deployment	Jul23 – Sep23	
1.2.16 Enhancing the DSS for NDRRMA -Nepal		
1.2.16.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Ongoing desk review & stakeholder consultations
1.2.16.2 Technical assessment of NDRRMA portal	Feb21 – Jun22	Pending access to NDRRMA BIPAD portal
1.2.16.3 Development of DSS framework and finalization of data parameters	Apr21 – Dec22	Completed prototype of lightning module; further activities after onboarding of DSS team
1.2.16.4 Enhancement of data management module	May21 – Jun23	Initial activity started; further activities after onboarding of DSS team
1.2.16.5 Enhancement of DSS engine and dissemination module	Jul21 – Jun24	Initial activity started; further activities after onboarding of DSS team
1.2.16.6 System audit	Jul22 – Jun24	
1.2.16.7 Preparation of user guide and technical manual	Jul23 – Jun24	
1.2.16.8 System transfer and deployment	Jan24 – Sep24	

Detailed progress of each activity is elaborated, country-wise. Details of ongoing activities under 1.2.1 Preparatory Activities, are included in the country-specific progress narrative.


PAKISTAN

[PAKISTAN]

Procurement

Recruitment of Project Associate is almost completed; recruitment of 2 national sectoral expert positions, i) Transport Expert (Clean and Green Energy) and ii) Agriculture Expert for Balochistan, is underway. All other positions for national sectoral experts in Pakistan have been filled. Pending Bank's advice on RIMES' proposal to internally develop the DSSs, the process for evaluating EoIs for the DSS consulting firm has been completed.

Sectoral focal points

A total of 6 SFPs have been confirmed for Pakistan under CARE Component 1. New sectoral focal points (SFPs) have been identified for MoPDSI and PMD. Table 1 provides the status of SFPs in Pakistan.

Table 1 List of sectoral focal points in Pakistan as of 30 June 2022

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)
Finance	**Ministry of Finance (MoF)**	**Ms. Mariam Ayub** Senior Officer cum Deputy Secretary, EFP-III
Agriculture	**Punjab Agriculture Department (PAD)**	**Mr. Rana Mahmood Akhtar** Chief, Planning and Evaluation Cell
	Balochistan Agriculture Department (BAD)	**Mr. Juma Khan Tareen** Director Plant Protection Agriculture, Agriculture Research Institute Quetta
Water	**Sindh Irrigation Department (SID)**	**Mr. Ehsan Leghari** General Manager, SIDA
Cross-cutting	**Pakistan Meteorological Department (PMD)**	**Mr. Mahr Sahidzad Khan** Director General

Work Plan

The National SFP Coordination meeting in Pakistan, organized by RIMES and ADPC, in collaboration with the Bank, on 22 March 2022, presented the project's progress since October 2021 and discussed implementation strategies and synergies across the sectors and components to avoid duplication with other government projects. Participants from 8 institutions including MoPDSI, MoF, MoWR, SID, BID, PAD, ARIQ/BAD, and PMD provided feedback and recommendations on implementation

and key priorities for Component 1. Highlights during discussion on implementation strategy include:

- Common understanding of DSSs, by stakeholders/stakeholder institutions, to ensure appreciation of data requirements, and institutionalization and ownership of the process of DSSs development/enhancement and the DSSs themselves
- Continuous updating of data in DSSs to ensure relevance, where reliability of data depends on quality of data being shared by stakeholders
- Coordination with Global Climate Impact Studies Centre (GCISC) for acquisition of climate change data for incorporation into the DSSs
- Data available with PMD through its early warning system on floods and droughts should be value-added and further disseminated through relevant DSSs for timely and appropriate actions by planners/decision-makers/end-users
- Integration of all DSSs into MoPDSI DSS
- Capacity building of relevant staff of beneficiary institutions to ensure DSSs sustainability post-project implementation

Figure 4. National SFP meeting in Pakistan held on 22 March 2022

Activity 1.2.2
Development of DSS for MoPDSI

Consultations

Consultation meetings were carried out with MoPDSI for guiding the DSSs development during this reporting period, including:

- National SFP meeting, on 22 March 2022, collectively reviewed project updates and shared recommendations for improving implementation and guiding DSSs development. Mr. Iftikhar ul Hassan Gilani, SJS, MoPDSI emphasized that

policies, frameworks, studies and reports formulated under the project should be implementable. RIMES shared, per outcomes of initial assessments, that the DSS for MoPDSI is recommended to i) integrate climate information in project assessments, as this is not currently practiced in project planning and appraisal processes, ii) host relevant information on climate change indicators that should be easily accessible and easy to use, and iii) integrate dashboards of other sectoral DSSs developed for Pakistan under the project

- Coordination meeting, on 21 April 2022, with new SFP for MoPDSI, Mr. Jawad Rabbani, discussed overall progress of CARE activities and future coordination mechanism such as bi-weekly meetings at MoPDSI, for sharing coordination updates and outcomes/recommendations prepared by sectoral experts following user needs assessments, and consultations on the way forward
- Consultative meeting, on 23 May 2022, with Global Impact Studies Center to learn the models of analyses that GCISC uses for studies on climate change and related themes, and how the analyses results can be utilized in relevant DSSs development/enhancement
- Coordination meeting, on 29 June 2022, with focal point for Planning, Mr. Jawad Rabbani, discussed sharing of work plans and implementation plans with all the stakeholders departments and firming up of sustainability plans for DSSs for all sectors

Desk Review

Completed

Technical Review

The technical assessment of iPAS shall be undertaken upon confirmation of MoPDSI to integrate the DSS into the iPAS.

User Needs Assessment

Following RIMES' approval of the user needs assessment materials, the Planning Expert conducted several assessment activities involving over 18 key stakeholders including Member FS, CC & Nutrition, Member PSD, Energy section, PIA section, PIP section, etc. Initial outcomes and recommendations from completed activities include:

- DSS for MoPDSI to integrate dashboards of all sectoral DSSs being developed under CARE in Pakistan
- DSS to have a module for estimating climate risks of development projects and integrating climate information into development plans (MoPDSI to decide whether tool will be stand-alone or part of iPAS)
- DSS to provide climate data and relevant climate-thematic modeling to assist in policy making
- DSS to have an inventory of GHGs in transportation (automobiles)
- DSS development/enhancement to encourage better coordination and data sharing among stakeholders/stakeholder institutions

DSS Development

Development of the MoPDSI DSS shall be undertaken by the DSS development team, once on-board.

Activity 1.2.3
Development of DSS for MoF

Consultations

Consultations were undertaken with the MoF as part of the user needs assessment process. Aside from the user needs assessment process, the MoF was consulted, viz.:

- National SFP meeting, on 22 March 2022, presented project updates and informed that MoF's MIS, the Systems Application and Products (SAP), is yet to integrate climate risk assessment relevant to projects and that no DSS or financial risk assessment tool, in the context of climate change, is currently in place. MoF appreciated the project team's efforts while RIMES noted a key recommendation from Ms. Mariam Ayub, Section Officer EFP III, Finance Division and MoF SFP, to integrate the MoF DSS with the MoPDSI DSS.

Desk Review

Completed

Technical Review

The technical assessment of the SAP shall be carried out as may be required, by RIMES, with assistance from the Finance Expert.

User Needs Assessment

Following review and comments by RIMES, the assessment outcomes and recommendations and inputs to DSS reports have been revised by the Finance Expert. The same includes the following key information/findings/recommendations:

- Fiscal risk assessment for climate hazards should be made essential for new investments/projects
- CPEIR and CCFF should be further developed under CARE
- Climate-sensitive sectors needs to be highlighted
- MoPDSI should integrate climate change in the PC forms
- Climate expenditure data may be processed at regular intervals
- MoPDSI can collect and house data from agriculture, water, climate change, and other relevant sectors for facilitating in-depth analysis of climate-related risks across sectors
- Anticipating climate-moderated/climate-induced economic conditions, the DSS is recommended to be lodged as part of MoPDSI's DSS, with access given to MoF

Detailed outcomes and recommendations of the revised user needs assessment and technical inputs to the DSS are provided in Appendices 3 and 4.

DSS Development

The DSS development team, once on-board and upon confirmation of MoF to lodge the DSS as part of MoPDSI's DSS or as a stand alone system, shall commence development of the system.

Activity 1.2.4a Development of SESAME for Punjab (Priority system)

Consultations

The following are the highlights from the various meetings with the agriculture sector, within the reporting period:

- National SFP meeting, on 22 March 2022, presented project updates and recommendations for guiding the DSS development. Building on the completed prototype for SESAME for Punjab, RIMES shared its current work on the framework and further development plans for the system, which will be guided by the assessment outcomes. On Mr. Rana Mahmood Akhtar's (PAD SFP) inquiry on the level of information that will be made available to farmers, RIMES responded that the DSS will have several layers and that it will be available to policy and decision makers at a broader level, and for farmers at refined levels. RIMES added that climate-related information provided by PMD will be refined based on the needs of different users.
- Coordination with focal point of PAD on the creation of an agriculture TWG
- Coordination with PAD on the FGDs and KIIs with the Mango growers and Mango Research Institute on Climate Impacts on the Mango Production, in the Month of May and June 2022.
- Coordination with Focal Person PAD regarding Validation Workshop on UNA and Technical Inputs on the DSS for Punjab Agriculture Department in the month of May and June, 2022.

Desk Review

Completed

Technical Review

Completed

User Needs Assessment

The draft reports on assessment outcomes and recommendations for the development of SESAME for Punjab is being reviewed by PAD. In summary, per the reports, the DSS is recommended to include:

- Local climate and agriculture data for customizing SESAME products for the province
- Advanced analytics for crop management
- Pest management system for providing pests and diseases warning
- Disaster management component for understanding agricultural risks vis-à-vis floods and droughts; market analytics for monitoring agricultural market situations
- Varying requirements of different stakeholders

A consultation/validation workshop for presentation of the reports to broader stakeholders, for obtaining their feedback, recommendations and acceptance of the reports, shall be held, together with the public launching of the prototype system for SESAME, during the next quarter.

DSS Development

RIMES is continuing development of the SESAME for Punjab, building on the prototype system completed in 2021, to ensure its timely deployment despite delays in on-boarding the DSS development team. Key activities for this period include:

- Further development of user interface
- Setup of environment and integration of libraries
- Identification of data source and frame for integration of data
- Integration of weather information/component in the system
- Integration current seasonal crop, seasonal outlook, monthly outlook
- Development of detail page for tehsils in Punjab, on which all information should be listed from historical data to weather prediction data

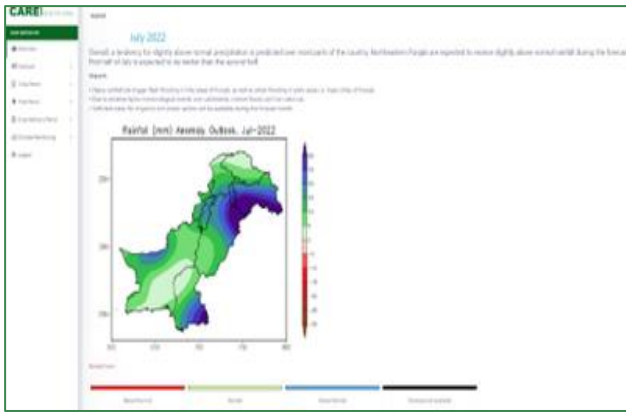

Figure 5. Dashboard showing monthly outlook for decision-making

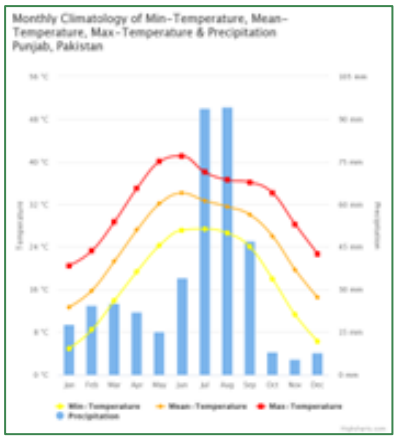

Figure 6. Climate normals for Punjab

Activity 1.2.4b Development of SESAME for Balochistan

Consultations

Consultations for developing the DSS for BAD have been organized. These include:

- National SFP meeting, on 22 March 2022, informed that assessments are yet to be undertaken for SESAME for Balochistan, since it was not originally part of the PAD and was recently only been assimilated by RIMES based on stakeholders' demand, and approval by the Bank, during the ISR Mission in Pakistan in September 2021. RIMES assured development of a prototype for SESAME for Balochistan at the earliest, for the timely delivery and deployment of the system.
- Consultative meeting and coordination with Mr. Juma Khan Tareen on regular basis to develop mechanisms for evolving the SESAME for Balochistan. A demonstration of existing SESAME is also in consideration for firming up concepts at customizing/localizing SESAME for Balochistan.

Desk Review

The desk review shall be carried out upon on-boarding of the Agriculture Expert for Balochistan.

Technical Review

The technical assessment shall be undertaken by RIMES, in collaboration with the Agriculture Expert for Balochistan, once relevant system/s in BAD have been identified.

User Needs Assessment

The user needs assessment shall be undertaken by the Agriculture Expert for Balochistan following approval by RIMES of user needs assessment materials report.

DSS Development

A prototype system for SESAME for Balochistan has been initiated by RIMES to ensure system completion as per agreed timeline. Key activities for this period include:

- Integration of observed meteorological data
- Integration of Numerical Weather Prediction model output from PMD
- Integration of ECMWF model output integration
- Integration of seasonal prediction for the next 3 months for Balochistan
- Integration of monthly outlook for Balochistan

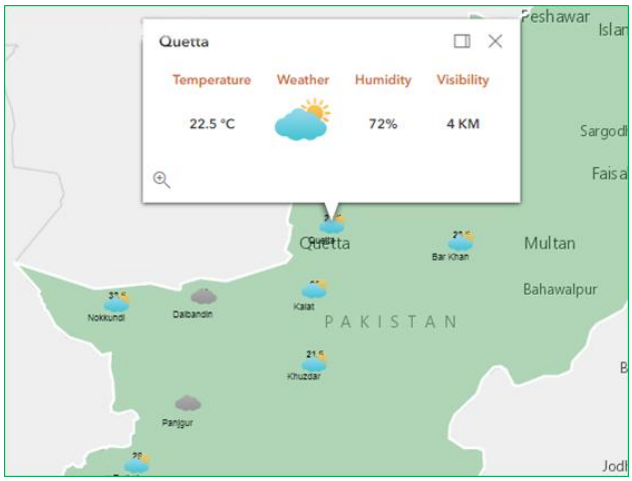

Figure 7. Weather and crop information dashboard for decision-making

The technical report on the prototype for SESAME for Balochistan is provided in Appendix 5.

The SESAME for Balochistan prototype can be accessed via http://sesame-pad.rimes.int/.

Activity 1.2.5
Improving DSS for SID

Consultations

Consultations with SID and allied institutions/stakeholders have been undertaken during the semester, viz.:

- National SFP meeting, on 22 March 2022, presented project updates and recommendations for guiding DSS development. RIMES elaborated that the current DSS developed under Sindh Resilience Project (SRP) will be updated with drought risk management and vulnerability datasets, as well as will create linkages between datasets of relevant departments like the Indus River System Authority (IRSA), Pakistan Meteorological Department (PMD) and Water and Power Development Authority (WAPDA). Further recommendations to the DSS include: i) integration of a water system modeling framework for datasets, ii) utilization of opensource data and software to ensure sustainability, iii) integration of alert mechanisms imbedded with early warning systems or disaster management authorities, and iv) awareness campaign to highlight the importance and usage of the DSS.

Desk Review

Completed

Technical Assessment

Completed

User Needs Assessment

The assessment outcomes and recommendations and inputs to DSS reports are undergoing revision by the Water Expert with guidance from RIMES. Latest key information/findings/recommendations are:

- SID requires a system that can focus on the allocation and availability of water to optimally manage available resources and plan for future reservoirs accordingly

- SID requires dynamic integration of weather forecast, drought risk management and potential flood impact assessment into the DSS
- As a next step, the DSS can be extended for measures like flood forecasting and early warning, reservoir operations, flood risk zoning, disaster management and others relevant to mitigate flood damages
- Elevated efforts should be given to fill up institutional gaps related to data acquisition, archiving and sharing; enhanced coordination and data sharing among provincial and federal departments through the DSS web portal instead of manual and isolated archiving should be given focus.

DSS Development

The DSS development team, once on-board, shall commence enhancement of the DSS for SID.

BANGLADESH

[BANGLADESH]

Procurement

All national sectoral expert positions in Bangladesh have been filled. Pending advise from the Bank on RIMES proposal to internally develop the DSSs, the process of EoI evaluation for the DSS consulting firm for Bangladesh has been completed.

Sectoral focal points

Currently, a total of 9 SFPs for CARE Component 1 are in place for Bangladesh. During this period, a new focal point has been identified for MoWR, while ERD has informed the project team through consultations that it does not have any monitoring role on climate-related activities. Table 2 provides the status of SFPs in Bangladesh.

Table 2 List of sectoral focal points in Bangladesh as of 30 June 2022

Sector	Ministry/ Agency	Focal Point Details
Bangladesh		
Planning	**General Economic Division (GED), Bangladesh Planning Commission**	**Dr. Nurun Nahar** Joint Chief, GED **Mr. Md Nazrul Islam** Additional Chief, GED
Agriculture	**Department of Agricultural Extension (DAE)**	**Dr. Md. Shah Kamal Khan** Project Director, AMIS DP
Livestock	**Department of Livestock Services (DLS)**	**Dr. ABM Mustanur Rahman** Deputy Project Director, LDDP, DLS
Water	**Ministry of Water Resources (MoWR)**	**Mr. Arif Abdullah** Deputy Secretary
	Flood Forecasting and Warning Center (FFWC), Bangladesh Water Development Board (BWDB)	**Engr. Arifurzzaman Bhuiyan** Executive Engineer
	Water Resources Planning Organization (WARPO)	**Mr. Md. Hasan Shahriar** Senior Scientific Officer (Environment)
Transport	**Local Government Engineering Department (LGED)**	**Mr. Gopal Krishna Debnath** Additional Chief Engineer & Director
	Roads and Highways Department (RHD)	**Ms. Anesha Das Hasi** Executive Engineer, Environment Division
Cross-cutting	**Bangladesh Meteorological Department (BMD)**	**Dr. Md. Abdul Mannan** Meteorologist

Work Plan

Consultations with various stakeholders in Bangladesh indicated potential changes in the work plan for Component 1. These include:

- *Change in deliverable for BAMIS*, several meetings with the ongoing World Bank funded Agrometeorological Information System Development project (AMISDP) have been conducted to discuss areas of interventions from CARE and further development of the BAMIS. The SFP and the Project Director of AMISDP, Dr. Shah Kamal Khan has also participated in few focus group discussions and field

visits undertaken as part of the user need assessment process led by RIMES. Based on the field experience and findings from user need assessment, both AMISDP and RIMES have come to an agreement on areas where the CARE project can intervene, avoiding any potential duplication with the ongoing project. As the AMISD project has been extended until December 2023 and the extension period has incorporated activities to enhance BAMIS (e.g. automation of advisory bulletin generation, incorporation of seasonal to sub-seasonal forecast, historical crop database, irrigation advisory, installation of automatic weather stations), the workplan has incorporated activities that are complementary to the ongoing efforts.

- *Change of DSS from finance and planning to planning sector only*, as no formal SFP was nominated from the Ministry of Finance/Finance Division, the user needs assessment has primarily focused on the planning sector and recommended potential enhancement in the existing 'Disaster and Climate Risk Information Platform (DRIP)' developed by the Planning Commission.

Activity 1.2.6
Upgrading BAMIS for Agriculture

Consultations

Meetings have been conducted with DAE and relevant stakeholders in the agriculture sector. These include:

- Consultative meeting with Dr. Md. Shah Kamal Khan, DAE SFP, and AMISD project staff, on 19 January 2022, discussed synergies between AMISDP and CARE and further development of the BAMIS, noting that the extension of AMISDP until December 2023 has incorporated the following activities to enhance the portal, e.g., automation of advisory bulletin generation, incorporation of seasonal to sub-seasonal forecast, historical crop database, irrigation advisory, and installation of automatic weather stations. DAE highlighted potentials areas where RIMES can provide support: i) demonstration of comprehensive agromet advisory service in selected hotspot districts from flood/flash flood prone, drought prone areas, coastal areas; where selected districts can be brought under wider information/advisories/warnings dissemination mechanisms, capacity building activities, feedback collection (datasheet can be incorporated into the mobile application) and impact assessment, ii) enhancement of existing lead farmer database containing 30,000 lead farmer information, and potential development of a web-based database for farmers and local service providers

who will regularly get agromet advisory information, iii) development/enhancement of the BAMIS mobile application with options for push notifications for users, incorporating upazila weather forecasts customized by RIMES and BMD, iv) development of a monitoring system for kiosks installed in upazilas, including a mobile application to track kiosks operation and an option to centrally upload contents to the kiosks, and v) extending voice message dissemination support to directly disseminate messages to extension officials and listed farmers. Formation of a TWG at DAE to coordinate these activities with RIMES was suggested.

- Consultation workshop on "Agro-Meteorological Information Services in Bangladesh", on 24 March 2022, presented findings from the user needs assessment for the agriculture sector to 42 participants including professionals from DAE, BRRI, BARI, BARC, lead farmers of DAE, and RIMES CARE team members. During the open discussion session, participants presented the strengths, weaknesses, and recommendations on current dissemination process of agromet advisories in Bangladesh. Key discussion points were: i) most groups agree that voice message is the most effective medium of advisories dissemination, ii) location and crop stage specific information are needed, for meeting farmer's demands; NARS institute can collaborate with DAE on threshold determination and research on climate sensitivities of relevant crops, and iii) sufficient and intensive training is needed to capacitate both extension officials and farmers in utilizing/applying advisories through climate smart farmers field schools.

Figure 8. Consultation workshop on "Agro-Meteorological Information Services in Bangladesh" with various stakeholders in the agriculture sector

- Several consultative meetings took place with Md. Sayedul Islam, Secretary, Ministry of Agriculture, Md. Ruhul Amin Talukder, Additional Secretary, Ministry of Agriculture (May 18, June 20 etc.), Md. Abul Monsur, Secretary Ministry of Cultural Affairs, and Zakia Sultana, Secretary, Ministry of Industries to track the progress of MoU between DAE and RIMES. Constant communication has been maintained with the SFP at DAE regarding this matter. As of 30 June 2022, milestones on the MoU signing include:

- Clearance on the MoU has been received from the Economic Relations Division, Bangladesh Agricultural Research Council, Ministry of Cultural Affairs, Ministry of Industries, and Ministry of Finance.
- Suggested changes by different ministries have been incorporated in the draft MoU
- Ministry of Agriculture is considering vetting of the MoU by the Ministry of Law, Justice and Parliamentary Affairs

Desk Review

Completed

Technical Review

Completed

User Needs Assessment

An updated assessment outcomes report has been submitted by the Agriculture Expert, which details key findings of KIIs and FGDs:

- Major hazards affecting agricultural crops (e.g., rice, jute, potato, maize, vegetables, fruits, betel lead) include flood, flash flood, cyclone, untimely rainfall, heavy rainfall, drought, heat wave and cold wave
- Mass media (TV, newspaper), voice messaging, miking, LSP, SAAO, religious leaders (especially Imam of mosques) are the most effective ways to reach farmers
- Current BAMIS portal does not yet have an effective early warning and advisory system for reaching a large number of farmers. Further improvements in location-specific advisories up to upazila level, rapid dissemination and feedback collection mechanism are needed
- Automation of advisories, which would be effective for quick dissemination of agrometeorological advisories, is not available in the current system
- Early warning for thunderstorm, with at least 2-3 hours lead time, is crucial and needed
- Integration and collaboration with other partners, especially with BMD and BWDB for weather forecasts and early warning, is very important
- Integration of impact information in the advisory is imperative

Updated user needs assessment report is provided in Appendix 6.

DSS Development

CARE Component 1, to streamline work for BAMIS vis-à-vis other development interventions, will focus on development of relevant databases, tools and mobile applications to strengthen the agrometeorological information service delivery in Bangladesh. A concept note is currently under development which will outline the detailed activities in this regard.

Activity 1.2.7 Improving DSS for Livestock Subsector (Priority system)

Consultations

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

- Consultation workshop on "DSS for Livestock Sector in Bangladesh", on 14 March 2022, demonstrated the prototype of the priority DSS for livestock sector under the CARE project to 42 participants including professionals from DLS, researchers from BLRI, BAU, private sector representatives, e.g., Milk Vita, Prani Sheba and RIMES CARE team members and highlighted the progress and co-production process adopted during system development. Dr. Monjur Mohammad Shahjada, DG, DLS assured the necessary coordination for assimilation of pertinent livestock data into the DSS and emphasized the need for regular dialogues with stakeholders for ensuring the reflection of stakeholder demand in the DSS. Participants expressed their opinions and comments on the DSS during the open discussion. Key discussion points were: i) inclusion of methane emission data/statistics into the DSS; ii) integration of diseases data for bordering countries as diseases such as LSD can spread across countries; iii) identification and prioritization of livestock-dense zones (e.g., buffalo population is higher in coastal belts); iv) provision of forecast of water level rise-fall to farms near beels (lake-like water bodies); v) identification of hotspots for antibiotic usage for assisting with decision-making; vi) inclusion

of fodder production outlook for livestock sector (e.g., regular forecast/advisory can be provided for maize production for use as silage); vii) integration of general outlook (e.g., water availability, seasonal/vector-borne diseases, etc.) for decision making; viii) supply chain for milk; viii) inclusion of direct and secondary impacts of climate on livestock management; ix) integration of livestock shed design based on local climatology and climate change projections; x) provision of recommendations for appropriate breeds considering current and future climate (for this purpose, different climate indices linked with cattle/ruminant breeds can be developed and incorporated into the DSS to assist breed selection); xi) inclusion of special advisory for cyclone-prone areas in the southern area (e.g., cyclone warning for poultry farmers; cyclone alert for the next 5-6 days can enable farmer to sell their mature chickens to avoid a huge loss); xii) capacity building in research/on-farm research; xiii) exit plan for the livestock DSS to ensure smooth and effective technology transfer; and xiv) Bangla version of the DSS for the convenience and utmost benefit of local extension workers.

Figure 9. Consultation workshop and public demonstration of "DSS for Livestock Sector in Bangladesh"

- Several consultative meetings took place with Dr Monjur Mohammad Shahjada and the SFP (2 February, 16 June, etc.) to discuss and finalize the MoU. The MoU has been signed from RIMES end; DLS and RIMES are planning for a formal signing event and discussion on way forward.

Desk Review

Completed

Technical Review

No relevant systems currently in DLS or in allied institutions

User Needs Assessment

The user needs assessment has been completed while the i) assessment outcomes and ii) recommendations and inputs to DSS reports are being prepared by the Livestock Expert. Primary information/findings/recommendations from the user needs assessment activities include:

- Early warning and advisories on weather/climate hazards for livestock are necessary for both farmers and professionals
- Upazila-specific forecasts and advisories will be most effective as localized early warning
- The lead time of dissemination of advisories should be 3-5 days for most cases
- Capacity building program is required for both farmers and DLS officials on livestock-weather relationship, interpretation of forecast and climate-smart management practices
- Mobile application can be considered for progressive farmers
- A dedicated unit should be installed at DLS for the DSS operations and early warning, for embedding and sustaining, in DLS, the DSS operations and maintenance
- Scope of research on livestock-weather relationship, adaptation and mitigation strategies must be expanded as there is huge a shortage of required data
- Feedback mechanism should be introduced for continuous improvement of the DSS

DSS Development

Following completion of the prototype system in December 2021, further development on the DLS DSS was undertaken by the IT Expert and RIMES technical team. The following features have been added:

- Automated data collection process of station-observed and historical forecast data
- Station-wise, three-hourly temperature forecast verification process
- Maximum and minimum temperature bias correction using machine learning technique to improve accuracy of the forecast and visualize area-wise temperature forecast verification results at the sub-district level
- Bias grid of three hourly temperatures and location-specific and area-wise bias corrected temperatures
- Space-time clustering of Foot and Mouth Disease (FMD) cases, visualization of the year-, season-, and month-wise disease cluster, and diseases cluster hotspot on the country map
- Cluster methods and metadata information integrated into the system to understand computation process and verify data source; feedback mechanism for guiding further enhancement of clustering methods

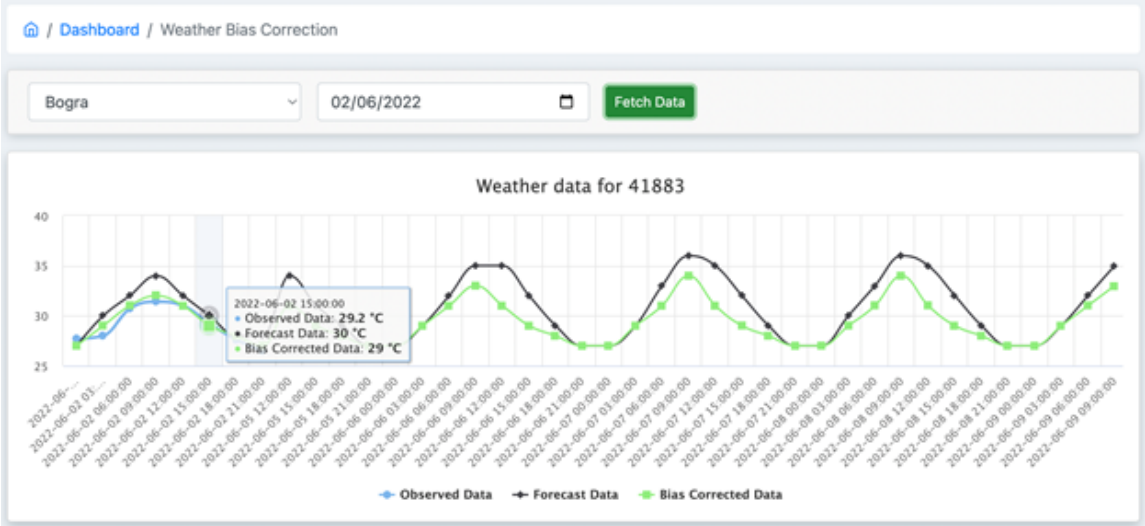

Figure 10. Three-hourly temperature bias corrected graph

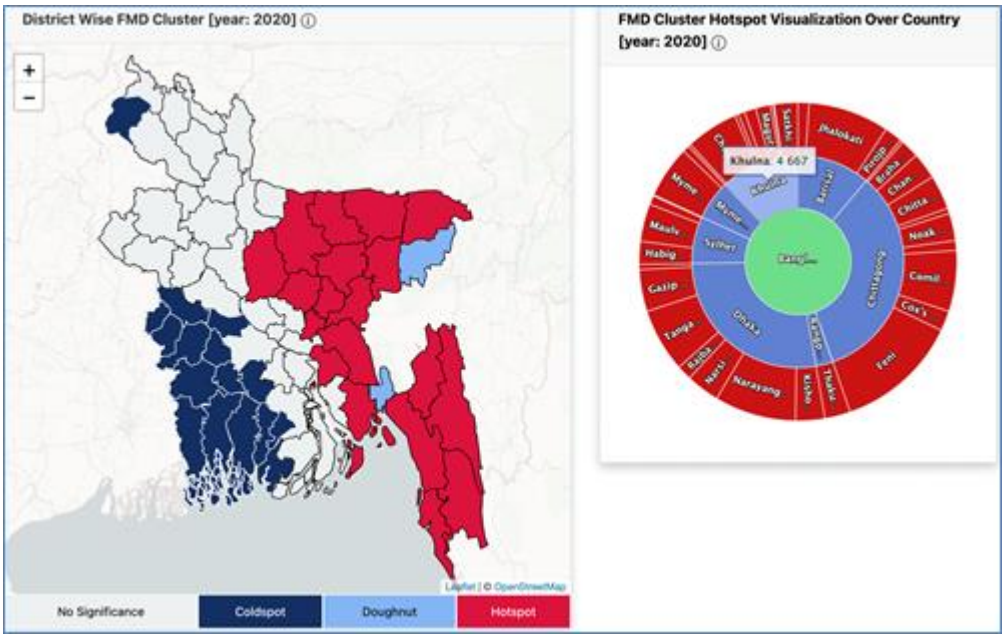

Figure 11. Visualization of FMD clustering

Potential activities for full-scale development of the DSS in the next phase are:

- Processing and integration of CMIP6 datasets (through RDAS)
- Further improvements to the analytics and visualization module
- Development of dissemination module
- Identification of FMS risk factors using a geographically-weighted regression model
- Derivation of station-wise and grid-level climate risk indices
- Correlation between climate risk indices with FMD clusters and other livestock sectoral data

Activity 1.2.8
Upgrading the Online Road Network Portal

Consultations

Several meetings with RHD and LGED were undertaken during this reporting period. These include:

- 1st TWG meeting with LGED, presided by Mr. A.K.M. Luthfur Rahman, Director, CReLIC, on 17 February 2022, presented plans for development of a DSS for Climate Resilient Transport and discussed synergies between LGED and CARE. LGED emphasized the importance of i) cooperation between CReLIC and RIMES, ii) integration of outputs from other LGED projects, e.g., Integrated DSS (IDSS), Rural Connectivity Improvement Project (RCIP), and Provati Project, and iii) compatibility of the DSS with existing and future developed systems of LGED.

Figure 12. First TWG meeting with LGED officials

- 1st TWG meeting with RHD, chaired by Mr. Md. Rezaul Alam, Superintending Engineer, Social and Environment Circle, on 21 March 2022, sensitized its members of the CARE project activities relevant to the transport sector, including ongoing assessment activities and key processes towards DSS development and highlighted support for co-production of the DSS. The TWG members put forward data and analytics requirements in the DSS for guiding operational, strategic and development-oriented plans and decisions, including analysis of land use change pattern around road areas, high water level data for all major rivers in the country, and risks associated with transport-relevant climate-related hazards, among others. Key recommendations were: i) multi-modal approach considering cross-cutting climate-related issues in the entire transportation system, ii) identification and prioritization of decisions that the

DSS will support, for populating data requirements; and iii) preparation of concept note on the DSS development to be undertaken with the CARE Project.

Figure 13. First TWG meeting with RHD officials

Desk Review

Completed

Technical Review

Assessment of RHD's Online Road Network portal was conducted to identify capacities and gaps of the current system and to provide recommendations for development of the DSS for the transport sector.

The following features are available in RHD's Online Road Network system:

- Information on Annual Average Daily Traffic (AADT), e.g., raw traffic counts on different road links for 12 to 24 hours, from 3 to 7 days, based on survey, for use in pavement design or for life cycle economic analysis
- Distance matrix at district and upazila levels
- Structure search by location (e.g., bridge, bridge culvert)
- Summary of major bridges, number of bridges and culverts with lengths according to different zones of the country

The following gaps were identified in the system:

- As the system is developed for RHD (e.g., national, regional and district level transport databases), upazila, union and village level transport databases are not integrated within the system
- Meteorological information from BMD, FFWC and other related organizations is not available for climate-informed decision making in the transport sector
- There is a need for interactive data-driven DSS for the transport sector to identify urban/rural roads prone to climate hazards (e.g., extreme temperature, floods, river erosion, cyclones, earthquakes, storm surge, and landslide), and identification and visualization of blockage in the transport network or changes in trip patterns during a hazard/disaster

- There is a need for climate change and hazard/disaster analytics for identifying risk mitigation and climate change adaptation measures for future road and infrastructure development
- Data is mostly presented in tabular, static and graphical images, and needs to be improved

Recommendations for developing the DSS for the transport sector, noting separate streams for RHD and LGED within the same system, include:

- Use of open-source technology for developing various layers of the DSS including web framework (e.g., Django REST, Flask), web development toolkits (Bootstrap, Foundation), front-end framework (Angular, React, Vue.js), programming language (Python, PHP), relational database (MySQL), and web server (Apache)
- Development of data collection and management system:
    - Integration of climate and other relevant information (e.g., high temperature, coastal inundation, salinity intrusion, river and flash flood, cyclone and storm surges, erosion, and accretion) for computing intensity of potential impacts on transport sector
    - Integration of projection data/information (e.g., climate risk indices from climate projection in different time slices and identification of correlation with sectoral data)
    - Integration of forecast data (e.g., heat stress, fog, precipitation, etc.) to derive relationships between weather and accidents/congestions
    - Integration of hazard data (e.g., flood, cyclone, riverbank erosion, sea level rise, earthquake, landslide) to identify critical/vulnerable areas (zones) and creation of hazard profile for Bangladesh
    - Integration of sectoral data that can be visualized interactively and dynamically updated when fresh data is available
- Development of DSS engine
    - Integration of automated decision-making guidance/advisories for services such as heavy rainfall warning, heat stress monitoring, fog warning, nowcasting, and multi-hazard early warning
    - Integration of recommendations for climate resilient road infrastructure measures
    - Climate data can be taken as an input for automating hydro-morphological analysis for determination of appropriateness of project sites
- Development of analytics and dashboard
    - Integration of weather/climate data with climatic analysis, interactive graph and maps, data analytics, and climate projections information
    - Integration of dashboard for decision-making

Detailed outcomes and recommendations of the technical assessment are provided in Appendix 7.

User Needs Assessment

Assessment activities undertaken by the Transport Expert included KIIs with 6 officials from RHD and 6 officials from LGED. The questionnaire for the KIIs sought to identify the current status of disaster management system, database sharing, and existing gaps in the decision-making within the institutions. Key information/findings/ recommendations are:

- Respondents have identified monsoon floods and heavy rainfall to have a high degree of adverse impact on the transportation system causing physical damage to roads and embankments and temporary blockage during such events, while other climate events such as fog, cloud coverage and wind have relatively lower impact on the transport system
- Although RHD and LGED use climate and disaster-related information (e.g., weather/climate/river forecast of various lead times, historical climate change data on water level, rainfall, humidity, hazard and climate change scenarios, etc.) for making tactical and strategic decisions, including site selection, long-term infrastructure design, operation and maintenance, disaster management, etc., there is no standard system being used by its divisions/units.
- RHD and LGED need to update their existing alerting mechanisms with climate-related databases such as historical climate trends data, climate change scenarios, climate hazard assessment and mapping, river stages and discharge data, etc.
- RHD and LGED do not have any dedicated DSS for climate-informed planning and decision-making
- Potential use of the DSS in RHD and LGED range from short-term contingency planning as well as long term decisions regarding adjustments in design parameters, construction materials, exposure and risk of climate change at project locations, etc.
- Although the key focus is on road transport, cross cutting data (e.g., rail and water transportation) might also be needed to be integrated into the DSS
- There is a need to identify climate-sensitive design parameters and link those with climate projections and extreme weather events for decision-making using the DSS
- Considering limitations of road databases in RHD and LGED, analysis based on satellite data can be added to fill gaps
- Outputs from other relevant ongoing/future projects should be explored for optimizing the DSS development, operations, and sustainability
- Division/department responsible for DSS management needs to be identified, especially at LGED (e.g., bridge and road unit, supported by ICT unit)
- Integration of data/information from multiple government organizations, and ongoing projects usable in the preparation of infrastructure design
- Integration of inundation risk in harbor areas, landslide risk in hilly areas, and salinity risk in coastal areas

- Integration of climate risk assessment and long-term feasibility economic analysis

Based on discussions with RHD and LGED, the DSS is recommended to be segregated into 7 sections:

- Section A: different types of climate projection data, e.g., temperature projection, sea-level rise, and flood projection
- Section B: observed station data of climate/weather variables collected from various sources, mainly from BMD, e.g., temperature, rainfall, wind speed, fog, visibility
- Section C: near-real time climate-related hazard information, e.g., floods, heavy rainfall, and landslides
- Section D: road assets data and their condition pre-, during, and post-hazard/disaster period, e.g., inundation due to flood/rainfall, landside damage information to aid in identification of appropriate/precautionary measures to reduce disaster costs, maintenance of vehicular operations during hazards/disaster, and mechanisms for quick recovery
- Section E: sensitivity and adaptive capacity analysis of road infrastructure, including information on risk assessment of roads under historical/future climates, design/fiscal/organizational capabilities
- Section F: fiscal impact assessment of climate-induced disasters and long-term climate change, e.g., impact on freight movement, road operability, etc.
- Section G: weekly/monthly/seasonal advisories for local-level offices

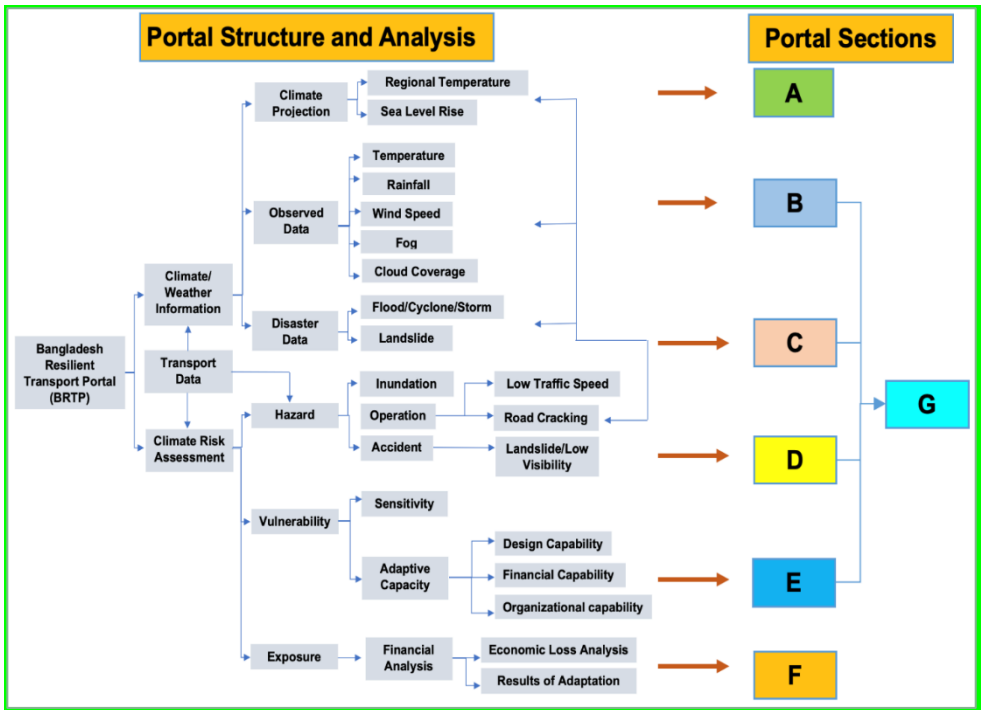

Figure 14. Proposed key components of Transport DSS

Figure 15. Linkages/interconnectivity among all sections in the proposed Transport DSS

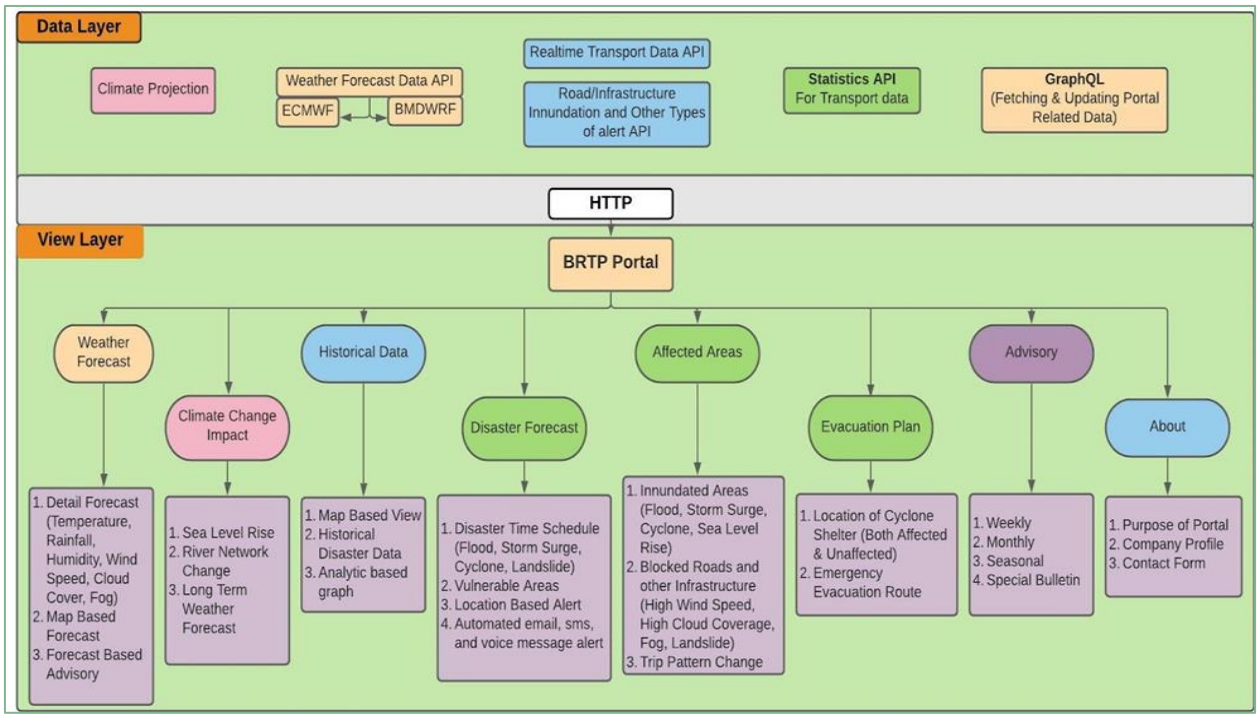

Figure 16. Proposed system architecture of the transport DSS

Key features of the DSS include:

- Interactive forecast visualization
- Integration of a forecast verification system
- Integration of rainfall alert to identify fastest/most appropriate route for drivers to reach destination
- Integration of low visibility alert to reduce traffic accidents in both urban and rural areas
- Integration of landslide risk alert, which provides real-time advice on which road/s to avoid during heavy rainfall, to reduce traffic accidents and avoid road blockage
- Integration of temperature risk assessment to identify design-related measures to protect bituminous roads located in high-temperature areas
- Integration of long-term economic loss analysis, e.g., preparation of different types of susceptibility maps to show future exposure of nation road, and rail networks to climate change and changes in various types of climate parameters including impact of ongoing and upcoming projects; and options for adaptation measures, e.g., enhancing design capability, financial capability, and organizational capability, including impact of adaptation measures taken to show loss recovery.

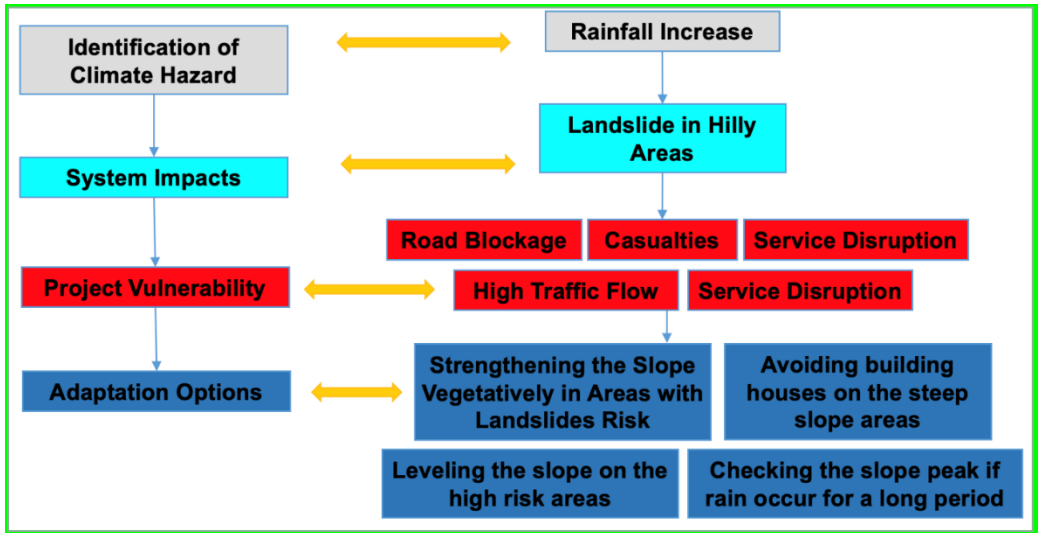

Figure 17. Decision tree for selecting adaptation measures related to heavy rainfall (Source: Black and Pyatt, 2021)

- Generation of weekly, monthly and seasonal advisories for location- and transport-specific infrastructure
- Development of a mechanism to disseminate alerts and advisories via email, SMS, voice message, broadcasting method, mobile app, etc.
- Development of a mobile application with connection to Google Maps for convenient information access across the country

Detailed outcomes and recommendations of the user needs assessment are provided in Appendices 8 and 9.

DSS Development

The transport DSS's primary goal is to provide immediate alert mechanism and long-term risk and opportunities assessment for dealing with adverse climate conditions and appropriate information for RHD and LGED officials related to infrastructure design preparation. RIMES technical team initiated work on the prototype system within this reporting period which involved design of DSS framework based on outcomes of desk review, technical/user needs assessments and consultations with the transport sector TWG, development of a system/database architecture with an exploratory layout of the transport DSS portal, identification of information flow and system components, and design of data analytics and visualization modules, with a robust dissemination mechanism of advisories and alerts for the transport sector.

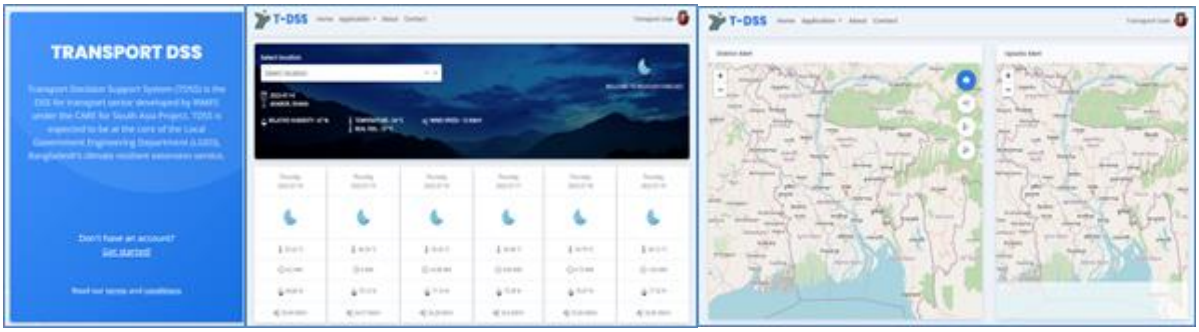

Figure 18. Transport DSS interfaces for location-specific weather information and alerts page linking weather to traffic

Figure 19. Proposed design for dissemination mechanism

Technical report on the DSS prototype development for transport sector in Bangladesh is provided in Appendix 10. The completed DSS prototype can be accessed via http://tdss-wb.rimes.int/app/home.

Activity 1.2.9
Enhancement of FloCAST

Consultations

Various consultation meetings were undertaken with FFWC and allied institutions for firming up the DSS development direction.

Desk Review

Highlights from the desk review are listed below.

- The DSS shall support the decision-making process of FFWC as well as its stakeholder institutes in water and flood management
- The DSS should integrate various forecast products of FFWC, analysis of satellite and remote sensing data, and hydro-morphological and water quality data, among others
- The DSS needs to assist both forecasters in day-to-day operations and public dissemination and stakeholders in key decision-making with impacts information
- The DSS should have an integrated dissemination platform with multi-level dissemination channels (e.g., SMS, emails, voice message, social media, etc.)
- Future hydrological flux can be generated using climate projections data as forcing, to understand future flow scenarios in GBM basin
- Integration with other DSSs (e.g., transport and agriculture DSSs) – the DSS should be able to pull data from water DSS for advisory generation and planning purposes

Detailed outcomes and recommendations of the desk review are provided in Appendix 11.

Technical Review

Technical assessment of FFWC's FloCAST system has been conducted. Key information/findings/ recommendations are:

Features available within the system:

- Monitoring of i) water level at 109 stations, presented as color-coded tabular information, and ii) rainfall at 72 stations, presented as tabular information on the website

- Forecast products are available for: i) 5-day water level deterministic forecasts at 61 stations, and ii) 10-day probabilistic water level forecasts, visualized on a static map, where station data on a tabular format and time series graph are presented in a report, iii) 15-day probabilistic discharge forecast, visualized on a dynamic map, where station data in tabular format and time series graph are presented per station, and iv) 3-day deterministic water level forecast for flash flood, visualized on a static map.
- The following bulletins, outlooks and reports are generated by the system: i) daily monsoon forecast bulletin and river situation report, ii) special flood situation report, iii) flash flood forecast bulletin, iv) dry period bulletin, and v) monthly and annual flood report
- Data available within the portal include: i) observation data (e.g., near-real-time water level and rainfall data), ii) forecast data, e.g., short range forecast (5-day deterministic water level forecast), medium range forecast (10-day medium range probabilistic water level forecast, extended range forecast (15-day extended probabilistic flood flow forecast), iii) derived products (e.g., inundation and rainfall distribution maps produced daily during monsoon period from June to October)
- The current system is built on the following technology stack: framework/CMS (Joomla), programming language (PHP, JavaScrip), database (MySQL), and web server (Apache)

The following gaps were identified in the system:

- Despite availability of large amount of observation and forecast datasets/products, organization of information is not suitable for informed decision-making of forecasters and stakeholders
- Lacks explicit information on forecast trend, statistical analysis of hydrological data, readily available performance matrices, intuitive visualization, exposure and associated impacts
- Use of long-range/long-term forecast products like seasonal outlooks and climate projection for strategic decision-making in water resources management are currently not used in the flood warning system
- Information is scattered across various platforms
- Manual uploading of model outputs and generation of daily bulletins

Recommendations for enhancing the FloCAST system include:

- Use of open-source technology to i) ensure seamless and dynamic integration of GIS data in the web platform, ii) allow complex data analysis and integration which is currently not possible with the existing system, and iii) promote sustainability. These are: front-end framework for single page application (Angular), back-end framework (Django), programming languages (Python, JavaScript), database (PostgresSQL), GIS stack (Leaflet, PostGIS, Geoserver), web server (Nginx), and version control (Git, Github).

- Improvement of observed hydrological data collection through integration of API-based SMS receiving services
- Integration of additional process such as i) visualization of upstream river situations from openly available websites, ii) generation and visualization of basin/sub-basin average outlook in tabular/graphical format with forecast data, iii) auto-generation of rainfall forecast data for in-country basins, and iv) derivation of data-driven model to generate boundary condition water level using available upstream water level data from other websites
- Improvement of visualization through dynamic visualization of key parameters for forecasting like rainfall, temperature, soil moisture, etc., observed rainfall data from global sources, flood forecast and monitoring stations
- Incorporation of the following analytics: i) pre-processing of satellite-based rainfall data, ii) automated flood frequency analysis toolkit, iii) analysis and visualization of lag time for upstream basins, iv) automated performance evaluation of forecasting systems, and v) automated exposure generation tool
- Improvement in bulletin generation and dissemination through automated integration of model simulation forecasts into the DSS
- Integration of Data Exchange Platform (DataEx), currently being developed under SAHF, where NHMSs will submit observation and obtain raw forecast products from global producing centers (ECMWF, IMD, NCMRWF, etc.), verification matrices, analytics based on forecast and archived observation data, etc. Forecast information and analytics can be pulled from DataEx to reduce development and computational efforts and maintain synergy between systems

Detailed outcomes and recommendations of the technical assessment are provided in Appendix 12.

User Needs Assessment

Materials and methodologies for undertaking KIIs and FGDs have been submitted by the Water Expert for RIMES approval, which includes the following proposed activities:

- KIIs at national level with key stakeholders in Dhaka
- Workshops at sub-national level with priority stakeholders in Gowainghat Upazila in Sylhet and Sadar Upazila in Sirajganj, where the FFWC web portal shall be presented for assessing DSS data requirements
- FGDs at sub-national and community levels with priority stakeholders in Gowainghat Upazila in Sylhet and Sadar Upazila in Sirajganj, where a semi-structured questionnaire shall be filled by stakeholders following group discussions

User needs assessment materials for the water sector are provided in Appendix 13.

DSS Development

Development of the DSS, shall be undertaken upon the on-boarding of the DSS development team, and shall focus on:

- Transforming current FFWC portal into a DSS taking advantage of latest web development stack for public dissemination and stakeholders use
- Testing and integration of automated hydrological data processing in the DSS
- Dynamic integration of different forecast products, satellite data, historical hydrometeorological data analysis (e.g extreme value analysis), impact analysis etc.
- Integrating dynamic analytics required by forecasters, automated multi-modal dissemination mechanism like email, SMS, social media etc.
- Incorporating climate change projection, indices, hydrological flux, drought indices, low flow estimation, and salinity information etc.
- Linking with other sectoral DSS e.g., agriculture, livestock, transport through APIs

Activity 1.2.10
Enhancement of the Delta Portal

Consultations

The following consultation have been undertaken during the reporting period:

- Consultative meeting with Mr. Mirza Md. Mohiuddin, Deputy Director, SIBDP and Senior Assistant Chief, GED, and CEGIS officials, on 26 January 2022, discussed the work plan for developing a macro-level and climate-informed M&E framework for the Bangladesh Delta Plan 2100 (BDP2100), which will include the financial tracking system for BDP projects, and synergies with SIBDP project teams. CEGIS mentioned submitting a proposal to GED on this matter and are looking for a financing source for implementation. CEGIS further added that current project planning or implementation modality along with resources engagement do not support external assistance, except financing and will further discuss with their management to find a workable solution. GED appreciated and assured necessary support to the CARE project team and suggested further discussion with respective management for identifying a suitable collaboration modality.

Desk Review

Highlights from the desk review are listed below:

- The main water resources management issues are floods, water logging and drainage congestion, cyclone and storm surges, drought, reduction of dry seasonal flows, riverbank erosion, coastal erosion, sedimentation, salinity, industrial and urban uses, groundwater contamination, groundwater depletion, sea level rise, rural and urban water scarcity for sanitation, drinking, domestic, industrial uses, and transboundary water sharing

- Key stakeholders in the water sector include i) MoWR (BWDB, WARPO, JRC, RRI, DBHWD, IWM, CEGIS), ii) MoA (BADC), iii) MoLGRDC (LGED, DPHE, DWASA, CWSSA, KWSSA), iv) MoEFCC (DoE, BFD), v) MoPSIWT (NRPC, BIWTA, Port Authorities, DoS, BSC), vi) MoFL (DoF, DLS), vii) MoD (BMD), viii) MoRTB (RHD, BBA), ix) MoDMR (DDM), x) NGOs and private sector, and xi) development partners
- The Delta Portal, a comprehensive knowledge portal established in GED, MoP, consists of information related to BDP2100 to support the planning and decision-making on adaptive water management of the Bangladesh Delta. This information is stored in 3 segments: i) mapping of related institutions/organizations, ii) relevant BDP2100 documents, and iii) spatial data layers, which has the following functionalities, a) graphical data (e.g., water resources, disaster management, spatial planning and land use, environmental management, food security, basic data, economic finance) visualized through a viewer, b) interactive climate atlas (floods, droughts, water quality, disaster risk maps, climatic parameters for existing baseline condition, Year 2025 and Year 2085, etc.), c) meta model (not yet completed), d) climate resilient cities, and e) Blue Gold Wiki, which documents lessons learnt, policy, legislation, etc.
- The Delta Portal is still under construction and has insufficient, outdated and unorganized data and information
- The Delta Portal should provide all coastal area data, proper updated land use information, and socio-economic information, *inter alia*
- The Delta Portal has scope to improve by providing statistical analysis of hydrological data, future trends of water events like flood, drought, river erosion, cyclone, storm surges, sea level rise, etc.
- As the Delta Portal lacks project/program M&E; integration of SDG action plan, 5-year plan, national long-term perspective, IMED result indices of various BDP projects can be done to monitor and evaluate BPD2100 goals, targets and projects

- For long-term planning, future climate projection data/information can be utilized to generate crucial information in water resources planning and development

Detailed outcomes and recommendations of the desk review are provided in Appendix 11.

Technical Review

Completed

User Needs Assessment

The Water Expert, following stakeholder consultations and completion of desk review, completed survey questionnaires for KIIs with national level stakeholders in Dhaka. The user needs assessment materials for the water sector are provided in Appendix 13.

DSS Development

The Delta Knowledge Portal was developed by CEGIS. RIMES in coordination with ADPC discussed with SIBDP project to explore possible intervention from the CARE project. As any further enhancements on the system require access to the system, work on the Delta Knowledge Portal will depend on access to the system by RIMES, to be granted by partner government institutions and CEGIs.

Activity 1.2.11 Development of Portal for Finance, ERD, and Planning

Consultations

The following have been pursued during the semester:

- Consultative meeting with Dr. Nurun Nahar, Project Director, National Resilience Programme (NRP) Programming Division at Bangladesh Planning Commission (BPC) and GED SFP, and Mr. Jahedul Huq, Planning Specialist, UNDP, on 24 February 2022, discussed development of the DSS for the planning and finance sector and how the CARE project can utilize and modify the Disaster and Climate Risk Information Platform (DRIP) Portal (http://drip.plancomm.gov.bd/) for the DSS. GED mentioned the DSS should i) incorporate information on ongoing projects around the country and risk information of particular areas for the Development Project Proposal (DPP) of the government in determining disaster risk reduction activities, ii) provide historical information as well as future impacts information vis-à-vis climate projects, iii) link to the ADP Management System (AMS) and Strengthening Digital Processing of Projects (SDPP) to aid project proposal development, and iv) link to other sectoral DSSs, showing risk information of different sectors such as water, agriculture and transport.

Figure 20. Consultation meeting with Planning Commission

Desk Review

Completed

Technical Review

Technical review of relevant system/s, upon discussion with SFP, shall be undertaken by RIMES.

User Needs Assessment

The Planning and Finance Expert carried out various assessment activities: i) KIIs with Planning Commission, ERD, LGED, BMD, DLS, DAE, BWDB, UNDP, ii) basic surveys with MoA, DAE, DLS, RHD, DoE, and Planning Commission, and iii) 4 consultations with key stakeholders in the Planning Commission to assess capacities/gaps of existing systems, and needs/requirements of the planning and finance sector. During the consultations, ERD informed the project team that it does not have any monitoring role on climate-related activities; hence, it has been excluded from the sector. Key information/findings/ recommendations from the assessments are:

- Various types of data needed for project design and subsequent validation of budget allocation on climate-related activities should include i) historical climate trends, ii) climate change scenarios, iii) climate variables, iv) hazard maps, v) climate risk assessment and maps, vi) data of loss and damage caused by climate-induced hazards/disasters, and vii) climate change framework
- Lack of climate screening, climate risk and vulnerability tools
- Lack of internal audit mechanism and monitoring of climate change projects
- Existing climate budget coding options available in ministries/divisions are not effective in tracking climate budget allocation and expenditure
- Planning Commission's DRIP Portal can be improved as the DSS of planning and finance sector
- DRIP's district-wise disaster risk index and climate projection data can be downscaled to upazila (sub-district) level. The risk index needs to be reviewed to include more parameters for vulnerability, adaptive capacity and exposure
- DRIP should be designed to aid in project proposal development and linked to ADP Management System (AMS)
- Climate risk assessment currently incorporated at limited scale in DRIP can be enhanced
- The government is mainstreaming DRIP for developing project proposals. This can be considered as an opportunity
- A technical unit with expertise in climate change, planning and finance at the Planning Commission is essential to mainstream the system

Detailed outcomes and recommendations of the user needs assessment are provided in Appendix 14.

DSS Development

Development of the DSS shall be undertaken upon on-boarding of the DSS development team, based on results for the desk review, technical review, and user needs assessment.

NEPAL

[NEPAL]

Procurement

All county positions in Nepal are filled except for the Agriculture Expert and IT Expert which have been vacated in the past year. Recruitment of Agriculture Expert is underway, while the ToR for IT Expert has been revised for submission to, and approval by, the Bank. The process of evaluating EoIs for DSS consulting firm for Nepal has been completed, pending decision of the Bank on RIMES proposal to internally develop the DSSs.

Sectoral focal points

Nepal has a total of 8 SFPs in place under Component 1; a new focal point for NPC has been identified. Table 3 provides the status of SFPs in Nepal.

Table 3 List of sectoral focal points in Nepal as of 30 June 2022

Sector	Ministry/ Agency	Focal Point Details
Nepal		
Finance *(Convener of SFP in Nepal)*	**Ministry of Finance (MoF)**	Ongoing process: **Mr. Yug Raj Pandey** Under Secretary, IECC
Planning	**National Planning Commission (NPC)**	Ongoing process: **Mr. Biju Kumar Shrestha** Joint Secretary, Infrastructure and Production Division
Agriculture	**Ministry of Agriculture and Livestock Department (MoALD)**	Ongoing process: **Mr. Shankar Sapkota** Senior Agri-Economist, Planning and Development Cooperation Coordination Division
Water	**Ministry of Energy, Water Resources and Irrigation (MoEWRI)**	**Mr. Ram Gopal Kharbuja** Joint Secretary, Hydrometeorology and Environment Division
	Department of Hydrology and Meteorology (DHM)	**Dr. Indira Kadel** Senior Divisional Meteorologist
Transport	**Department of Roads (DoR)**	**Mrs. Pushpanjali Khanal** Unit Chief, GESU
	Department of Local Infrastructure (DoLI)	**Mr. Krishna Bahadur Katwal** Senior Divisional Engineer
Cross-cutting	**National Disaster Risk Reduction and Management Authority (NDRRMA)**	**Mr. Rajendra Sharma** Undersecretary (Technical)

Work Plan

The National SFP Coordination meeting in Nepal, organized by RIMES and ADPC, in collaboration with the Bank, on 30 March 2022, presented the project's progress since October 2021 and discussed implementation strategies for 2022 including prospective synergies across the sectors and components. Participants from institutions including MoF, NPC, MoEWRI, DWRI, MoALD, DoED, WECS, DoR, MoPIT, DoLI, NDRRMA, CCMD, MoFE, MoFAGA and DHM provided feedback on the current status of implementation and key priorities for 2022-25, and recommendations for guiding DSS development.

Figure 21. National SFP meeting in Nepal

Activity 1.2.12 Supporting DHM (Priority system)

Consultations

Several meetings were organized, during the semester, for guiding the enhancement of the DSS for DHM. These include:

- Consultative meeting with Mr. Kamal Ram Joshi, new DG of DHM, Dr. Archana Shrestha, DDG and Dr. Rajan Bhattarai, DDG on 23 February 2022, strengthened collaboration between RIMES and DHM and discussed updates and synergies vis-à-vis the CARE project.

- National SFP meeting, on 30 March 2022, presented project updates and recommendations for guiding DSS development. Dr. Indira Kandel, DHM SFP, appreciated efforts by the CARE project team and confirmed the following key priorities: i) development of flood IBF tool for Babai basin, ii) development of weather forecast verification and bias correction tool, iii) development of nowcasting system, iv) integration of climate product generation for different sectors under the DSS, v) establishment of sub-seasonal to seasonal forecast system, including early warning component, vi) development of dissemination module, building on existing DHM weather application, and vii) development of an interactive climate projection data portal.
- Consultative meeting with various DHM officials, on 19 May 2022, discussed status of updating of HEC-HMS (daily and hourly) models for Babai River and obtained recommendations for further improvement of the models. DHM agreed to share hourly rainfall and water level data until 2021 from all stations to improve the hydrological (hourly) model, while RIMES shall provide scripts to extract hourly rainfall forecasts from DHM's WRF model for use in the HEC-HMS model.
- Consultative meeting with Mr. Kamal Ram Joshi, DG, Dr. Indira Kandel, Senior Divisional Meteorologist and DHM SFP, and Mr. Bikram Shrestha Zoowa, Senior Hydrologist on 16 June 2022, elaborated onward work for the CARE project. DHM advised to hold a meeting following project approval to discuss and agree on the updated workplan; once finalized, an official communication supported by a project implementation plan shall be submitted for DHM approval. Further, he also suggested a joint meeting between World Bank, RIMES, ADPC and DHM to address any outstanding issues during project implementation.

Figure 22. Consultation meeting with DHM officials

Desk Review

Completed

Technical Review

Technical assessment of the FloCAST system shall be undertaken by RIMES technical team, upon onboarding of the IT Expert for Nepal.

User Needs Assessment

Several meetings and discussions were held with DHM officials to identify DHM needs and requirements. The following activities have been prioritized by DHM:

- Development of web portal for weather forecast verification and bias correction
- Development of flood impact DSS
- Improvement of flood forecasting system
- Development of long lead weather forecasting system
- Development of nowcasting system
- Development of climate information products for National Framework for Climate Services
- Training and capacity building
    - Weather forecast verification and bias correction
    - Nowcasting and short-range forecasting using modern weather observation system (both ground and space-based)
    - Advanced hydrological modeling and impact-based flood forecasting
    - Climate data processing and management

FGDs with other user departments including NDRRMA, DoR, DoLI, MoALD, shall be undertaken using the approved tools and methodologies.

DSS Development

Further work has been undertaken on the DHM DSS prototype following its completion in December 2021. These include:

- Recalibration of the daily time-step hydrological model to generate day-to-day forecasts using daily data from DHM for the period 2008 to 2021, where 2009 to 2017 has been considered for calibration and validation purposes. Efficiency of the updated model is better, and the volume difference is lower compared to the previous model. This model has 3 calibration points in Daredhunga, Chepang, and Bhada Bridge. Autoregressive Integrated Moving Average (ARIMA) has been used for bias correction of the input data and model output.
- Development of an hourly time-step hydrological model to generate hourly forecasts as this model can capture peak in the Babai River Basin during the monsoon period. Hourly data for the period 2011-2021 is available from DHM, where years from 2016 to 2017 were used for calibrating purposes. Results show observed discharge has matched significant trends for both years. However, some peaks are generated by the model, which is majorly contributed by the catchment rainfall. This model has only 1 calibration point in Chepang. ARIMA bias correction methods and forecast alternatives will be used.

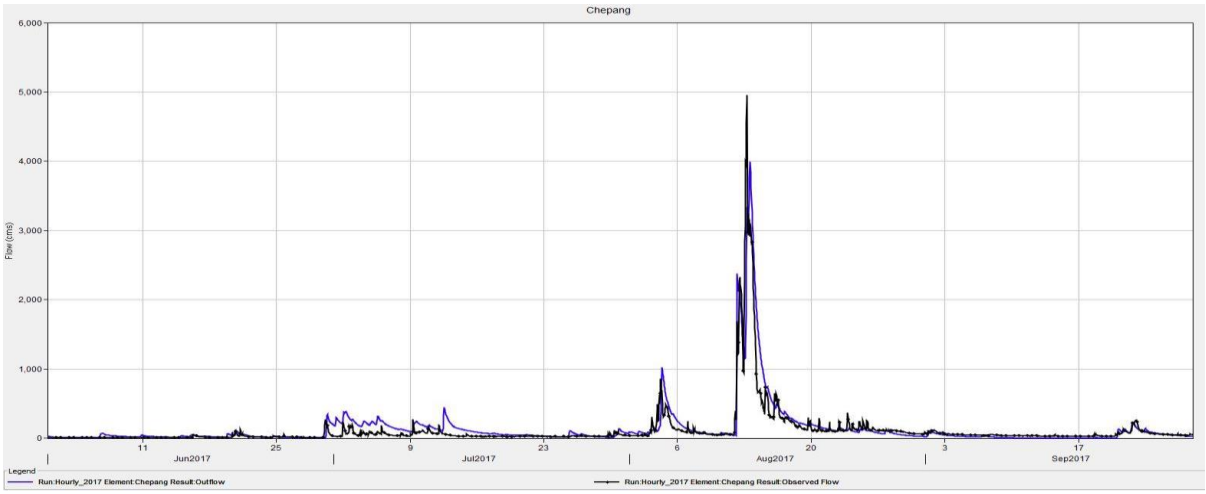

Figure 23. Hourly calibration during 2017 monsoon at Chepang

Activity 1.2.13 Upgrading NAMIS

Consultations

National SFP meeting, on 30 March 2022, presented project updates and recommendations for guiding DSS development. RIMES shared its response on MoALD's recommendation for enhancing information/advisories dissemination through the web/mobile application.

Desk Review

Completed

Technical Review

The technical review of NAMIS/relevant systems shall be undertaken by RIMES with support from the Agriculture Expert, following discussion and agreement by MoALD.

User Needs Assessment

The user needs assessment shall be carried out upon on-boarding of the Agriculture Expert, using the approved tools and methodologies.

DSS Development

The DSS development team shall undertake enhancement of the NAMIS portal once on-board.

Activity 1.2.14 Development of DSS for the Transport Sector

Consultations

Various meetings with the transport sector were undertaken during this semester. These include:

- Consultative meeting with DoR officials, Mr. Shivahari Sapkota, new DG, Mr. Shiva Nepal, DDG, and Mr. Govinda Ghimire on 16 January 2022, introduced the CARE project and discussed the establishment of a TWG composed of GESU, bridge branch, HMIS, Road and Traffic Division) for effective and productive consultations. Mr. Sapkota welcomed the team, assured support to the CARE project once formal processes are completed, and recommended for a ToR for the TWG to be initiated by the CARE project team for review and subsequent guidance of its members.
- National SFP meeting, on 30 March 2022, presented project updates and recommendations for guiding DSS development. Key recommendations from transport stakeholders included i) development of a DSS integrating the different phases of road sector activities: planning, design, construction, operation and maintenance, and hazard/risk maps identified by Component 2, ii) integration of the DSS with other MIS/DSSs in DoR/DoLI, and iii) capacity development (including ToT) to ensure sustainability of the systems.

Desk Review

Completed

Technical Review

Technical review of relevant systems shall be carried out by RIMES with assistance from the Transport Expert, upon discussion and agreement with transport sector stakeholders.

User Needs Assessment

The user needs assessment is being carried out by the Transport Expert, using the approved tools and methodologies.

DSS Development

Development/enhancement of the existing DSS for the transport sector, shall be undertaken by the DSS development team once on-board, taking forward outcomes of the desk review, technical review, and user needs assessments.

Activity 1.2.15 Enhancing the Public Finance Management System for MOF

Consultations

National SFP meeting, on 30 March 2022, presented project updates and recommendations for guiding DSS development. MoF highlighted the following: i) development of activity-level "Chart of Accounts", ii) development institutional-level application for Public Budget and Expenditure, and iii) development of an API for sharing climate public budget and expenditure data.

Desk Review

Completed

Technical Review

The technical review of relevant system(s) shall be carried out by RIMES with support from the Finance Expert, upon discussion and agreement by MoF.

User Needs Assessment

The user needs assessment shall be undertaken by the Finance Expert using the approved tools and methodologies.

DSS Development

The DSS development team, once on-board, shall build on the outcomes of the desk review, technical review, and user needs assessments for developing the DSS for the planning and finance sectors in Nepal.

Activity 1.2.16 Enhancing the DSS for NDRRMA

Consultations

Consultations and other meetings/discussions have been undertaken with NDRRMA for firming up the basic framework of the DSS for NDRRMA.

Desk Review

Review of relevant publications, reports, policies, other literature, and websites for identification of multi-hazard EWS capacities and gaps, and recommendations for enhancements, is underway.

Technical Review

The technical review of relevant system/s including BIPAD Portal shall be carried out by RIMES once access has been granted by NDRRMA.

User Needs Assessment

The user needs assessment shall be undertaken by RIMES using approved tools and methodologies.

DSS Development

RIMES technical team initiated the development of the prototype system for NDRRMA DSS. Based on NDRRMA recommendation, the lightning module was prioritized, integrating data from sensor network of Earth Networks. Completed activities for this period are:

- Development of forecast page which provides forecast with 10-day lead time for rainfall, maximum/minimum temperature, wind speed and humidity using data from ECMWF (0.2 horizontal resolution) processed at district level
- Development of nowcasting and lightning page which shows lightning information for the last 5 minutes to the last hour and prediction for the next 30-45 minutes, using lightning cloud-to-cloud and cloud-to-ground data

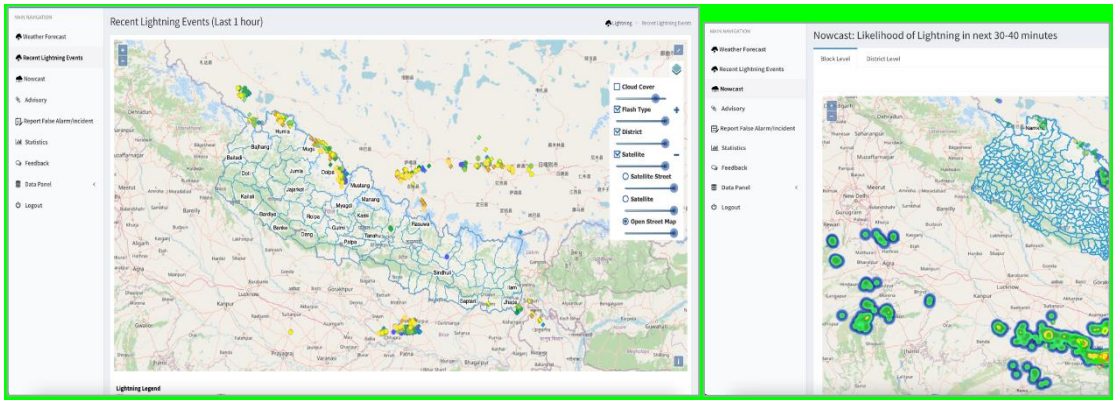

Figure 24. Recent lightning events (left) and nowcasting (right) pages

- Development of statistics, reporting and feedback page which assesses 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 any specific climate-related event or incident

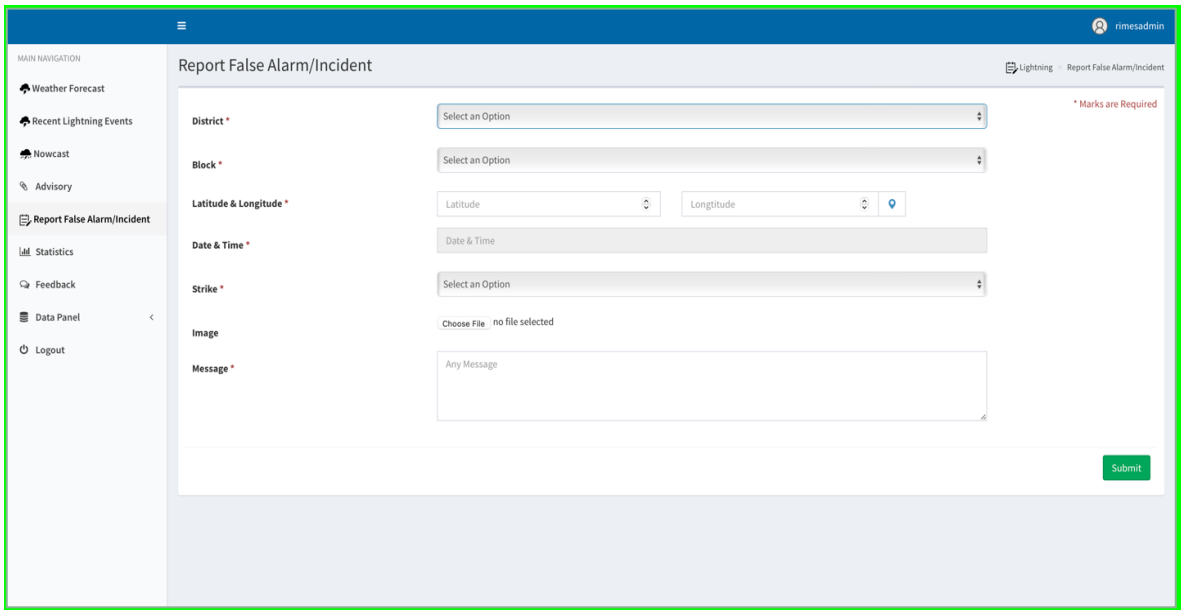

Figure 25. Statistics, reporting and feedback page

- 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

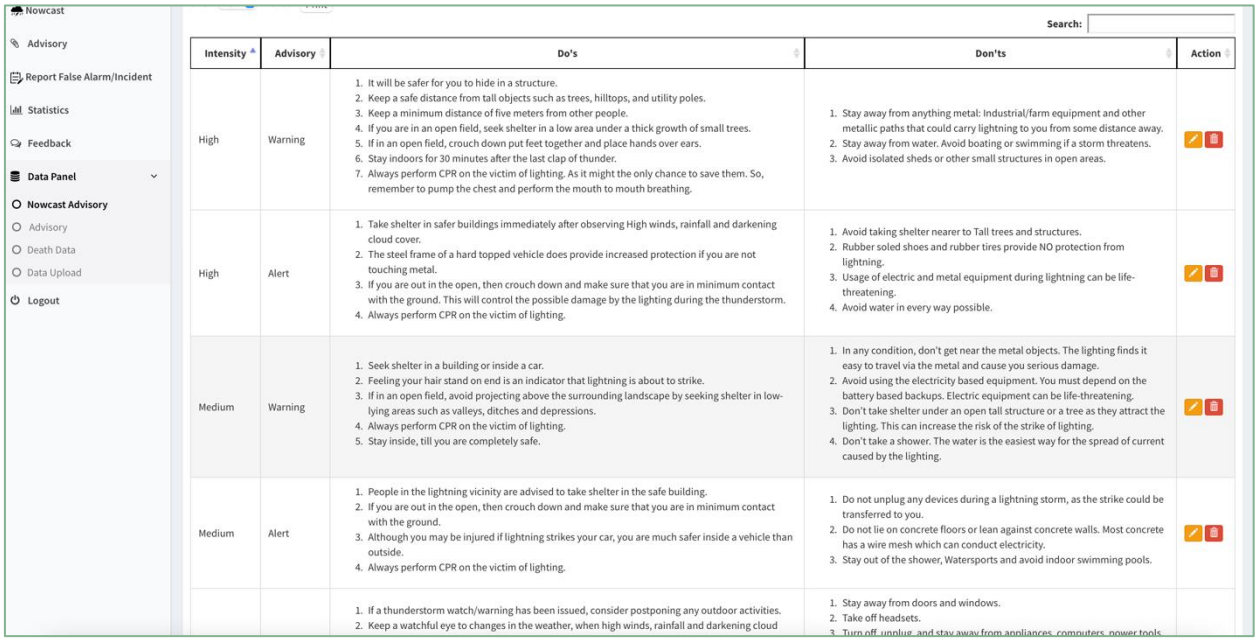

Figure 26. Data Panel Page

Technical report on the DSS prototype development for NDRRMA is provided in Appendix 15. The NDRRMA DSS prototype can be accessed via http://nepal-dss.rimes.int/Login/login_form.

Output Indicator 1.2.2: Percentage of gender-disaggregated data analytics developed that contributes to narrow the gender gap in climate change vulnerability

Activities contributing to overall progress and achievement of output 1.2.2 have started in 2021. The completion of the DSSs is expected by 2024.

Activity/ Sub-Activity	Status*	Remarks
1.1.3 RDAS full system		
1.1.3.3 Development of data analytics module	Jan22 – Sep23	
1.2.2 Development of DSS for Ministry of Planning, Development and Reforms -Pakistan		
1.2.2.4 Development of DSS engine and data visualization and report generation modules	Jul21 – Mar24	
1.2.3 Development of DSS for Ministry of Finance -Pakistan		
1.2.3.4 Development of DSS engine and data visualization and report generation modules	Jul21 – Dec22	
1.2.4 Development of SESAME -Punjab, Pakistan (Priority system)		
1.2.4.4 Development of DSS engine	Jul21 – Dec22	
1.2.5 Improving DSS for Sindh Irrigation Department -Pakistan		
1.2.5.5 Development of DSS engine	Jul21 – Jun23	
1.2.6 Upgrading BAMIS for Agriculture -Bangladesh		
1.2.6.5 Enhancement of DSS engine	Jul21 – Dec22	
1.2.7 Improving DSS for Livestock Subsector -Bangladesh (Priority system)		

1.2.7.5 Enhancement of DSS engine	Jul21 – Dec22
1.2.8 Upgrading the Online Road Network Portal -Bangladesh	
1.2.18.5 Enhancement of DSS engine	Jul21 – Dec22
1.2.9 Enhancement of FloCAST -Bangladesh	
1.2.9.5 Development of DSS engine	Jul21 – Jun23
1.2.10 Enhancement of the Delta Portal -Bangladesh	
1.2.10.5 Development of DSS engine	Jul21 – Dec22
1.2.11 Development of Portal for Finance, ERD and Planning -Bangladesh	
1.2.11.4 Development of portal interface	Jul21 – Dec22
1.2.12 Supporting DHM -Nepal (Priority system)	
1.2.12.5 Enhancement of DSS engine and dissemination module	Oct21 – Jun23
1.2.13 Upgrading NAMIS -Nepal	
1.2.13.5 Enhancement of DSS engine	Jul21 – Dec22
1.2.14 Development of DSS for Transport Sector -Nepal	
1.2.14.4 Development of DSS engine	Jul21 – Dec22
1.2.15 Enhancing the Public Finance Management System for MOF - Nepal	
1.2.15.5 Development of DSS engine	Jul21 – Dec22
1.2.16 Enhancing the DSS for NDRRMA -Nepal	
1.2.16.5 Development of DSS engine and dissemination module	Jul21 – Jun24

Intermediate Outcome Indicator 1.3: Institutional capacities within select sectors strengthened to undertake climate-informed policies and planning

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

Activity/ Sub-Activity	Status*	Remarks
1.3.1 User engagement		
1.3.1.1 Video production	Jan21 – Jun25	
1.3.1.2 Webinar	Jan21 – Jun25	
1.3.1.3 Hackathon	Apr21 – Dec22	
1.3.2 Regional and national training		
1.3.2.1 Regional training workshop for policymakers and planners on RDAS	Apr24 – Dec24	
1.3.2.2 Training of IT on operation and maintenance of sector-specific DSS	Oct23 – Dec24	
1.3.2.3 Sector-specific ToT on DSS product application	Oct23 – Dec24	

Activity 1.3.1
User engagement

Video production

Development of an explainer video highlighting RDAS/DSSs, project objectives, outcomes, activities, and achievements is underway.

Webinar

No webinar events were held during this reporting period.

Hackathon

Virtual hackathon events will be considered upon on-boarding of DSS development teams in focus countries.

Activity 1.3.2
Regional and national trainings

Activities are expected to commence in Year 2023.

Output Indicator 1.3.1: *Percentage of officials trained in targeted unit/ departments to apply climate resilient standards and data analytics in policies, planning and investments (Percentage)*

Output Indicator 1.3.1.a: *At least fifty percent of the female staffs is trained among the staffs trained within targeted unit/ departments (Yes/No)*

Output Indicator 1.3.2: *Number of national policies and plans supported to become climate risk informed*[3]

[3] Progress on this indicator will be shared by ADPC to measure impact of national sectoral DSSs developed and enhanced under Component 1.

Component 3: Project Management and Implementation Support

Key activities during the 4th semester include completion of staff recruitment; onboarding of FMS, financial audit firm, and consulting firm for strengthening RIMES HR, procurement and finance systems; completion of evaluation of EoIS for RDAS/DSSs consulting firms; approval of annual work plan, budget and procurement plans for 2021-22; completion of the PMIS; coordination mechanisms with ADPC; documentation, monitoring and reporting of key project accomplishments.

Activity 3.1.1 Enhancement of HR, procurement, and finance systems

Procurement

Contract for strengthening RIMES Procurement and Finance Systems, with KPMG, has been signed in June 2022, with work to commence immediately.

Activity 3.1.2 Documentation and dissemination/ knowledge-sharing

ICKM

For this reporting period, ICKM activities focused on the development of RDAS, DSSs, and project briefs to further stakeholder appreciation and awareness of Component 1 initiatives, documentation of relevant stakeholder consultation meetings (e.g., public launching of the RDAS and DSS for agriculture and livestock sectors, validation workshop for the livestock sector in Bangladesh, and national SFP meetings in Nepal and Pakistan, among others.

Meetings

Various joint meetings/activities at the regional, national, sectoral and IA levels were organized between World Bank, RIMES and ADPC, viz.:

- RDAS demonstration on 9 March 2022 (organized by RIMES)
- DSS for livestock demonstration and validation workshop in Bangladesh on 14 March 2022 (organized by RIMES)
- National SFP Meeting - Pakistan on 22 March 2022 (organized by RIMES and ADPC)
- National SFP Meeting - Nepal on 30 March 2022 (organized by RIMES and ADPC)
- CARE Project Fiduciary Review from February 2022 (organized by World Bank)
- CARE Project MTR Meeting - Bangladesh on 6 June 2022 (organized by the World Bank)
- CARE Project MTR Meeting - Nepal on 10 June 2022 (organized by the World Bank)
- CARE Project MTR Meeting - Pakistan on 14 June 2022 (organized by the World Bank)

Documentation

The following project documents have been submitted during this period:

- Annual procurement plan – latest version of this plan has been submitted to, and approved by, the World Bank on 6 June 2022
- Minutes of regular meetings established to monitor the status of project implementation and streamline national, regional and IA levels coordination were documented:
  - CWG Meeting – monthly inter-agency coordination meetings facilitated by RIMES and ADPC
  - RIMES PIU Meeting – monthly coordination meetings between regional and country PIUs
  - RIMES Technical Meeting – bi-monthly technical meetings between regional and country sectoral and IT teams
- The following monitoring reports details the status of coordination and progress of project activities:
  - Regional and country-specific monthly progress reports, including activity reports
  - Bi-annual reports
  - Technical reports – reports accomplished within this reporting period and appended to this progress report, are as follows:
    - 1 desk review report for agriculture in Bangladesh

- 1 customized user needs assessment materials and tools for water sector in Bangladesh
- 2 technical assessment reports for FloCAST and Online Road Network Portal in Bangladesh
- 4 assessment outcomes reports for agriculture, transport, and planning and finance, sectors in Bangladesh and Pakistan
- 2 recommendation and inputs to DSS reports for finance and transport sectors in Pakistan and Bangladesh
- 5 technical reports on system development

Activity 3.1.3 Project implementation support, monitoring, evaluation and reporting

Coordination

Project direction and guidance were provided by national stakeholders and the World Bank through various coordination meetings organized during this reporting period. Key activities include i) National SFP meetings in Pakistan and Nepal in March 2022, which aimed to present project updates, obtain feedback and recommendations on sectoral implementation strategies and prospective synergies among SFPs, and ii) CARE Project Mid-Term Review meetings in June 2022, which assessed the project's performance and implementation strategies on various aspects, e.g., coordination, achievements, procurement, finance, risks, etc. and to identify areas/opportunities for optimizing initiatives/efforts over the remainder of the project. Measures for ensuring sustainability of project initiatives, e.g., RDAS/DSSs, were also highlighted in these meetings.

At the IA level, smooth coordination and implementation of in-country activities was made possible through joint consultation meetings with stakeholders, joint organization of national/regional events, monthly CWG meetings, etc.

Procurement

- **Staffing.** As of 30 June 2022, hiring of sectoral consultants and Regional Data Analysts (Transport, Water, Planning and Finance, and Agriculture), have been completed. Also, the Finance Management Specialist is on-board in June 2022. On the Procurement Specialist position, the shortlisting and interview of candidates has been completed; the evaluation of EoIs report is for submission to the Bank. The contract on Review and Enhancement of RIMES' Governance and Business Processes has been signed in June 2022.

  The contracts for GIS Specialists in Nepal and Pakistan have been extended until June 2023. The position of Agriculture Expert for Balochistan, Pakistan is being procured and the Expert is expected to be on-board by July/August 2022.

  ToRs for 3 positions (Transport Expert - Clean and Green Energy, Pakistan; IT Expert, Nepal; and Agriculture Expert, Nepal) are under review by World Bank.

  The Evaluation of EoIs report vis-à-vis consulting firm in support of RDAS development, and DSSs development in Bangladesh, Nepal and Pakistan have been completed meanwhile that RIMES awaits Bank's advice on its proposal to internally develop the RDAS and DSSs.

  As of June 2022, the project team consists of 55 out of a 66-member team, viz.:

  - **PIU Staff (13/14):** Onboard - Project Director, M&E Specialist, Project Analyst, Financial Management Specialist, Project Accountant, ICKM Specialist, ESD Specialist, 3 Country Coordinators, Project Associate, Consultant for financial audit, and Consultant on Review and Enhancement of RIMES' Governance and Business Processes. To be onboarded is the Procurement Specialist.

  - **Sectoral Team (24/29):** Onboard - Climate Application Specialist, Climate Scientist, Disaster Management Specialist, Regional Agriculture Expert, Regional Water Expert, Regional Transport Expert, 3 National GIS Specialists, 2 National Agriculture Experts, 1 National Livestock Expert, 2 National Water Experts, 2 National Transport Experts, 4 National Planning and Finance Experts and 4 Regional Data Analysts. To be on-boarded are National Agriculture Expert in Nepal, Agriculture Expert for Balochistan in Pakistan, Transport Expert – Clean and Green Energy, Pakistan, Regional Planning and Finance Expert, and eLearning Specialist.

  - **System Development Team (18/23):** RDAS-DSS Lead, RDAS Developer, RDAS Quality Assurance Specialist, RDAS Data Scientist, RDAS System

Administrator, 3 consultants for RDAS prototype system; DSS Developer for Agriculture, Water, Disaster, and Hydromet; DSS Developer for Planning, Finance and Transport; DSS Quality Assurance Specialist; DSS Data Scientist for Agriculture, Water, Disaster, and Hydromet; DSS Data Scientist for Planning, Finance and Transport; DSS System Administrator for Agriculture and Water; DSS System Administrator for Planning and Finance; DSS Administrator for Transport, Disaster and Hydromet; 2 IT Experts. To be on-boarded - IT Expert in Nepal, consulting firms for RDAS Development and DSSs Development for 3 focus countries (subject to the Bank's reconsideration, following RIMES proposal to develop the systems internally).

- **Office.** Office arrangements for in-country staff is ongoing.
- **Procurement of Goods:** Video equipment and computing equipment for RDAS -regional has been procured. To be completed - Video Production, Computing Equipment for RDASS activities – Cloud Service, and Computing equipment for DHM Nepal activities.

Budget and Finance

- **Budget, Disbursement and Expenditure.** The annual budget plan for 2021-22, submitted on 22 October 2021, has been approved by the Bank on 3 February 2022. There were no disbursements made following the third disbursement on 21 June 2021. Expenditure from 1 January to 30 June 2022 covered RIMES technical inputs, staff salaries based on the number of days allotted by each staff to the project and/or deliverables; goods, e.g., computing equipment for RDAS activities in the 3 focus countries; and operating expenses, e.g., travel costs for user needs assessment activities (2 FGDs with the livestock sector and 1 FGD with the agriculture sector in Bangladesh) and consultation meetings (SFP meeting in Pakistan, TWG meetings with transport sectors in Bangladesh), office rental and utilities, stationery and other consumables. The project budget against expenditure from 1 January to 30 June 2022 is provided in Table 4. Variances in excess of 10% from RIMES Technical Inputs (84%), RIMES PIU (74%), Goods (84%), Individual Consultants (69%), Consulting Firms (100%), and Operating Costs (90%) are attributed to the following: i) payments of RIMES Technical Inputs and PIU staff from February and April 2022, respectively, are temporarily covered by RIMES until the fiduciary review has been finalized, ii) goods budgeted for this period, e.g., computing equipment for RDAS activities

at the regional level, DHM activities, office equipment in the countries, are still undergoing procurement process, iii) delayed onboarding of consultants (e.g., Data Analysts, Transport/Agriculture/IT Experts in Pakistan and Nepal) and submission of deliverables by sectoral experts, iv) delayed onboarding of RDAS/DSSs consulting/development teams, and v) minimal regional/in-country activities due to Covid-19 and protracted government approval processes.

- **Reporting.** RIMES is awaiting advice/acceptance from the Bank of the IUFR for the semester July to December 2021, submitted on 15 February 2022; audited financial statements for the Year 2020 and Year 2021 are being finalized for the Bank's further review and acceptance. There were no SOEs prepared during this period. RIMES shall submit the second SOE for clearing expenditures from June 2021 to May 2022, early next quarter.

Table 4. Project budget against expenditure from 1 January to 30 June 2022

Description	Planned	Actual	Variance		Forecast For the next 6 mos.
			Amount	%	
RIMES Technical Inputs	181,949	29,054	152,895	84%	173,940
RIMES PIU Staff	139,672	36,849	102,823	74%	139,672
Goods	174,100	27,663	146,437	84%	10,000
Individual Consultants	344,421	108,125	236,295	69%	249,575
Consulting Firms	557,400	-	557,400	100%	923,925
Non-consulting services	-	-	-	-	-
Operating Costs	249,803	24,461	225,342	90%	131,320
Total	**1,647,344**	**226,153**	**1,421,192**	**86%**	**1,628,431**

Project Fiduciary Review

In February 2022, the Bank started its review of fiduciary practices, particularly in procurement and financial management, undertaken by RIMES relevant to the CARE Project.

- **Procurement.** A procurement post review of 3 out of 18 contracts awarded under CARE Component 1 has been conducted by the World Bank Procurement Analyst, Ms. Neena Shrestha, including 1 goods contract (RFQ) and 2 individual consulting services; where requirements for documentation have been uploaded to STEP and/or made available via email. A report detailing key

observations, findings and recommendations has been shared by the Bank on 21 June 2022.

- **Financial management.** Various online consultations and visits to RIMES office have been undertaken by the World Bank finance team led by Sr. FMS, Mr. Syed Waseem Abbas Kazmi, Mr. Muhammad Ishaq Zahwal and Ms. Chalisa Narktabtee. Initial findings underscored recommendations to streamline disbursement via project designated account, full/part-time charging of RIMES technical input, eligible/ ineligible expenditures related to RIMES technical inputs and PIU staff, immediate requirement for on-boarding of the consultant for strengthening RIMES HR, procurement and finance systems, among others.

Environment and Social Management

Joint meetings with the World Bank and ADPC were organized to discuss latest updates, issues and challenges related to E&S and stakeholder engagement. Neither complaints nor grievances have been received as of this reporting period; while recommendations by the Bank, particularly in the management and redress of anonymous complaints, were integrated into the CARE GRM/MIS.

Monitoring, Reporting and Evaluation

- **M&E system.** Key activities and implementation strategies are constantly monitored and evaluated throughout the project period to ensure project outputs and outcomes are on track, and project weaknesses and appropriate measures/approaches are identified to correct deviations in the implementation process. Various mechanisms and tools for reporting project progress during this period include monthly PIU, CWG and bi-monthly TWG meetings among regional and national staffs; monthly progress reports and deliverables (e.g., desk review reports, technical assessment reports, user needs assessment reports, system development reports, etc.); national SFP and bilateral stakeholder consultation meetings; World Bank meetings; surveys; etc.

- **Project Mid-Term Review.** Halfway through project implementation, the World Bank organized a series of mid-term review meetings from 6-16 June 2022 to assess the project's relevance, performance, and identify opportunities for enhancing project implementation. Specifically, the review assessed the relevance of PDO, implementation progress, effectiveness of implementation arrangements and institutional roles and responsibilities in achieving project objectives, managing project risks and mitigation measures, project's alignment with country priorities, and areas for streamlining and prioritization of the most transformational activities for the remainder of the project.

During the mid-term review, RIMES reported its achievements from project inception in July 2020 to June 2022. Although status of indicators remain the same, as these mostly related to full system development, activities towards achieving these results are being undertaken, which include preparatory activities, e.g., desk review, technical assessment of existing systems, user needs assessment activities for guiding development of the RDAS/DSSs, development/demonstration of 4 priority systems (e.g., RDAS, SESAME for Punjab, Pakistan, DSS for Livestock in Bangladesh, and DSS for DHM in Nepal) within the period committed to the Bank, development of 3 additional prototype systems in the countries (i.e. SESAME for Balochistan, Pakistan; DSS for transport sector, Bangladesh; and DSS for NDRMMA, Nepal), which are not part of RIMES commitments during the semester but were accomplished to ensure delivery of these systems by Year 2023-34, despite delayed on-boarding of the RDAS/DSSs development teams.

Moreover, RIMES also highlighted issues towards achieving its targets such as i) delayed user needs assessment activities due to Covid-19, delays in administrative processes and difficulties in finding suitable consultants; ii) developers appreciation/understanding of evolving user requirements such as downscaling of the DSSs to sub-national levels including communities to guide both management and operational plans and decisions, e.g., more localized advisories (DAE, DLS, NDRRMA), location-specific climate/sectoral information (RHD/LGED, DoR/DoLI, PAD), etc.; iii) synergy with ongoing initiatives at stakeholder institutions, e.g., BAMIS further development through AMISDP; iv) status of key PDO/results indicators remain the same, e.g., number of systems developed/enhanced within a particular timeline, etc.

To ensure the smooth implementation and timely delivery of project outputs and outcomes by Year 2025, RIMES proposed the following key aspects for restructuring: i) internal development of RDAS/DSSs by RIMES and subsequent realignment of budget to RIMES technical inputs, to ensure meaningful completion of the systems within the project timeframe and their sustainability post-project implementation, ii) downscaling of DSSs to include sub-national and community beneficiaries/users following demands from stakeholders, iii) change in deliverable in Bangladesh, noting user requirements and onward development planned for BAMIS by other donors, and iv) adjustment to definitions and/or timelines of PDO and results indicators, for providing further clarity. It should be noted that development/enhancement of systems are implemented in a phased manner, and in parallel to each other, hence completion/full functionality of these systems can be expected from Year 4 onwards.

- **Project MIS.** Regular meetings were held with MIS developers to ensure completion of the PMIS by the end of July 2022. Work for this period focused on i) streamlining/refinement of workplan, M&E and timesheet modules, ii) completion of dashboard, procurement (e.g. purchase processes), contract management, financial management (e.g., budget plan, cash flow, financial analysis, planned expenditure, budget forecast) modules, and iii) integration of additional modules for priority activities and activities requiring immediate action. System manuals are being updated based on latest module upgrades to be followed by a demonstration training of CARE MIS users.

Activity 3.1.4
External audit and evaluation

Audit of the fiscal year 2020 (1 June to 31 December 2020) and fiscal year 2021 (1 January to 31 December 2021) was undertaken by KPMG upon on-boarding in February 2022. Initial draft audited financial reports and management letters were submitted to the Bank in June 2022, for review and acceptance.

1.2 Summary of Results

PDO Indicators by Objectives / Outcomes

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

Intermediate Outcome Indicator 1.1: *Improved access to regional climate information and analytics for climate-informed decision making in select sectors (score-based) (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	2.00	5.00
Date	12 May 2020	31 Dec 2021	30 Jun 2022	12 May 2025
Remarks				

Intermediate Outcome Indicator 1.2: *National-level decision-making and planning tools are better climate risk informed in select sectors (Yes/No)*

	Baseline	Actual Previous	Actual Current	End Target
Value	No	No	No	Yes
Date	12 May 2020	31 Dec 2021	30 Jun 2022	12 May 2025
Remarks				

Intermediate Outcome Indicator 1.3: *Institutional capacities within select sectors strengthened to undertake climate informed policies and planning (score-based) (Number)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	12.00
Date	12 May 2020	31 Dec 2021	30 Jun 2022	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 (Yes/No)*

	Baseline	Actual Previous	Actual Current	End Target
Value	No	No	No	Yes
Date	12 May 2020	31 Dec 2021	30 Jun 2022	12 May 2025
Remarks				

Output Indicator 1.2.1: *Number of 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	0.00	10.00
Date	12 May 2020	31 Dec 2021	30 Jun 2022	12 May 2025
Remarks				

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

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	6.00
Date	12 May 2020	31 Dec 2021	30 Jun 2022	12 May 2025
Remarks				

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

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	4.00
Date	12 May 2020	31 Dec 2021	30 Jun 2022	12 May 2025
Remarks				

Output Indicator 1.2.2: *Percentage of gender-disaggregated data analytics developed that contributes to narrow the gender gap in climate change vulnerability*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	40.00
Date	12 May 2020	31 Dec 2021	30 Jun 2022	12 May 2025
Remarks				

Output Indicator 1.3.1: *Percentage of officials trained in targeted unit/ departments to apply climate resilient standards and data analytics in policies, planning and investments (Percentage)*

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	30.00
Date	12 May 2020	31 Dec 2021	30 Jun 2022	12 May 2025
Remarks				

Output Indicator 1.3.1.a: *At least fifty percent of the female staffs is trained among the staffs trained within targeted unit/ departments (Yes/No)*

	Baseline	Actual Previous	Actual Current	End Target
Value	No	No	No	Yes
Date	12 May 2020	31 Dec 2021	30 Jun 2022	12 May 2025
Remarks				

Output Indicator 1.3.2: *Number of national policies and plans supported to become climate risk informed*[4]

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	9.00
Date	12 May 2020	31 Dec 2021	30 Jun 2022	12 May 2025
Remarks				

[4] Progress on this indicator will be shared by ADPC to measure impact of national sectoral DSSs developed and enhanced under Component 1.

FINANCIAL PROGRESS

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	499,374	370,022	72%
2021		3,062,788	1,383,570	1,169,955	38%
2022		3,275,776	-	226,153	7%
2023					
2024					
2025					

Component-wise allocation and utilization of grant

#	Component Description	Contribution from (US$ Million)			Authorized Budget for Semester 1 of Year 2021 (A)	Actual expenditure for Semester 1 of Year 2021 (B)	Cumulative Expenditure (C)	Balance (D= (A-B))
		WB	DFID	Total				
1	Component 1: Promoting Evidence-based Climate Smart Decision Making	10		10	2,802,057	173,811	1,238,453	1,563,604
2	Sub-component 1.1: SAR Regional Resilience Data and Analytics Services (RDAS)	3.5		3.5	1,326,095	85,645	402,684	1,240,450
3	Sub-component 1.2: Strengthening national level sectoral decision-support systems for resilient development	6		6	1,444,467	87,057	810,195	1,357,410
4	Sub-component 1.3: Technical capacity building of users	0.5		0.5	31,495	1,110	25,575	30,385
5	Component 3: Project Management and Specialized Support	2		2	473,719	52,341	527,677	421,377
	Total Budget	12		12	3,275,776	226,153	1,766,130	1,984,982

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	
Macroeconomic	Low	Low	Low	
Sector Strategies and Policies	Moderate	Moderate	Moderate	MoUs/TWGs established to facilitate access to data/systems and for providing guidance/direction to system development Process of orienting/introducing the project to new SFPs Regular consultations and validation workshops to ensure integration of stakeholder requirements
Technical Design of Project	Moderate	Moderate	Moderate	Regular review & feedback on project design via stakeholder consultations Flexibility to address evolving stakeholder requirements
Institutional Capacity for Implementation and Sustainability	Moderate	Moderate	Moderate	Priority systems developed by RIMES technical team to mitigate impacts due to delays in on-boarding of consulting firms
Fiduciary	Substantial	Substantial	Substantial	RIMES on-boarded an FMS, Procurement Specialist, and a consulting firm for strengthening RIMES HR, procurement & finance systems
Environment and Social	Moderate	Moderate	Moderate	Aside from risks related to Covid-19, risk for Component 1 is considered low as it is limited to technical assistance, i.e., development of technical systems
Stakeholders	Substantial	Substantial	Substantial	
Overall	Moderate	Moderate	Moderate	

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: Covid-19 slowed down project implementation		

5. Issues and Actions

Stakeholders yet to fully appreciate their needs/requirements in a DSS that could comprehensively guide their climate-informed decision-making	Regular stakeholder consultations are held to identify priority activities/narrow down scope for DSS. Establishment of TWGs for guiding the direction of the DSSs development.
Unavailability of stakeholders/lengthy process of getting appointments with stakeholders for KIIs/FGDs, validation workshops (i.e government officials have been preoccupied with various activities/work following lifting of Covid-19 protocols)	RIMES frequently follows up with stakeholders to ascertain favorable schedules for the activities
Delay in obtaining stakeholders' feedback on shared sectoral reports	RIMES pursues regular follows-up on stakeholders' feedback and recommendations to guide DSSs development; where necessary meetings/system demonstrations are undertaken to clarify concepts/issues/concerns
Postponement of national/local consultation workshops, FGDs, etc. due to in-country events/activities such as closing of fiscal year, ongoing floods, Eid holidays, etc.	Adjustment to schedule of activities
Overlapping work on BAMIS portal with other donors/projects; delay in the processing of MoU with DAE to facilitate access to the portal	Refocus work on BAMIS from "Enhancing BAMIS" to "Demonstration of end-to-end agro-met advisory service in Bangladesh", with focus on enhancing the dissemination and communication service module for BAMIS, among others.
Frequent turnover of SFPs	Orientation of new SFPs on the project
Changes in coordination protocols with a change in management	Re-orientation of coordination mechanisms
Delay in administrative approvals vis-a-vis the project	RIMES carried out informal stakeholder consultations and prepared implementation plans integrating measures for ensuring sustainability of project outputs/outcomes
Deferred full system development of RDAS/DSSs due to delay in on-boarding of RDAS/DSSs development teams	RIMES technical team initiated further development of RDAS and development of an additional prototype system in each of the focus countries to ensure timely completion of systems by Year 4

6. Integration of Cross-cutting Issues

Institutionalization and sustainability mechanisms, which have to be put in place by stakeholder institutions for ensuring impactful project impacts, are being pursued by RIMES with beneficiary institutions through co-production process and RIMES' commitment of handholding/backstopping support until the DSSs are fully sustained by beneficiary institutions.

7. Stakeholders Participation and Involvement

National level TWGs are established to facilitate effective guidance/overall direction to DSSs development. The TWGs are among the platforms pursued by RIMES vis-à-vis the co-production process for the DSSs.

Regular stakeholder meetings/consultations (e.g., SFP bi-annual meetings, technical/bilateral meetings, user needs assessments, validation workshops, etc.) are held for ensuring integration of user requirements in the RDAS/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	Projects have to be funded immediately after assessments. The long project preparation period, against a backdrop of, among others, changing government officials and priorities, have implications on the project design, implementation processes, and interventions sustainability. For ensuring project relevance, a robust mechanism for accommodating evolving users' requirements is a must.
Project strategy and design	During the project requirement assessments/project development stage itself, sustainability plans have to be developed and proposed to, and acceded by stakeholder government institutions, for ensuring government commitment and ownership early on.
Advocacy, communications, and capacity building	
Gender inclusion	
Implementation and institutional arrangements	
Any other areas	

10. Planned Activities for Next Semester

Sub-component 1.1: SAR RDAS

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

Sub-component 1.2: Strengthening national level sectoral DSSs for resilient development

- Desk review and user needs assessment (completion of pending activities/reports)
- Technical assessment of DSSs (completion of pending activities/reports)
- DSS development: development of framework, data management module, engine and dissemination module
- SFP Meeting for launching of prototype systems
- SFP Meeting for presentation of assessment outcomes

Sub-component 1.3: Technical capacity building of users

- Video production
- Webinars
- Hackathon

Component 3:

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

11.Appendices

1. Technical report on climate-water linkages and decision context in the water sector
2. Technical report on data catalog development
3. Assessment outcomes report for finance sector, Pakistan -updated
4. Recommendations and inputs on DSS report for finance sector, Pakistan -updated
5. Technical report on SESAME prototype development for Balochistan, Pakistan
6. Assessment outcomes report for agriculture sector, Bangladesh -updated
7. Technical report on assessment of transport systems, Bangladesh
8. Assessment outcomes report for transport sector, Bangladesh
9. Recommendation & Inputs to DSS report for transport sector, Bangladesh
10. Technical report on DSS prototype development for transport sector, Bangladesh
11. Desk review report for water sector, Bangladesh
12. Technical report on assessment of FloCAST, Bangladesh
13. User needs assessment materials for water sector, Bangladesh
14. Assessment outcomes report for planning and finance sector, Bangladesh
15. Technical report on DSS prototype development for NDRRMA, Nepal
16. Procurement Plan as of 30 June 2022

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