CARE SOUTH ASIA

2nd Bi-annual Progress Report

1 January to 30 June 2021

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RIMES

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Contents

Contents	i
List of Tables and Figures	ii
Acronyms	iii
Introduction and basic data	1
Executive Summary	2
1. Narrative Report	9
1.1 Programmatic Progress	9
1.2 Summary of Results	56
2. Financial Progress	58
3. Risks and Assumptions	59
4. Performance Issues	59
5. Issues and Actions	59
6. Integration of Crosscutting Issues	60
7. Stakeholders Participation and Involvement	60
8. Compliance with Safeguard, Procurement, Financial Management	60
9. Lessons Learned	60
10. Planned Activities for Next Semester	61
11. Appendices	61

List of Tables and Figures

Table 1	List of sectoral focal points as of 30 June 2021	18
Table 2	Project budget with expenditure from 1 January to 30 June 2021	53

Figure 1	RDAS Prototype Portal Frontend	11
Figure 2	RDAS data and metadata management	12
Figure 3	Association of climate and agriculture indicators and dynamic relationship of wheat yield and annual precipitation	12
Figure 4	Integration of PMD forecast products of different timescales for Punjab districts	25
Figure 5	Color-coded weather alert	33
Figure 6	Derived weather product for THI	33
Figure 7	Livestock population monitoring and statistics interface	34
Figure 8	First webinar episode published on CARE MIS website	48
Figure 9	Webinar presenters on RIMES' Facebook and Twitter accounts	49
Figure 10	CARE Volume 2 Newsletter published on CARE MIS website	50
Figure 11	GRM module: Submission of complaint and status check at front-end; complaints management at back-end	55

Acronyms

AAB	Agromet Advisory Bulletin
AARI	Ayub Agricultural Research Institute
ADPC	Asian Disaster Preparedness Center
AEZ	Agro Ecological Zone
AITC	Agriculture Information and Training Centre
AMIS	Agriculture Management Information System
AMISDP	Agro-Meteorological Information System Development Project
API	Application Programming Interface
ARRCC	Asia Regional Resilience to a Changing Climate
BAHIS	Bangladesh Animal Health Intelligence System
BAMIS	Bangladesh Agro-Meteorological Information System
BARC	Bangladesh Agricultural Research Council
BAU	Bangladesh Agricultural University
BCC	Budget Call Circular
BIPAD	Building Information Platform Against Disaster
BLRI	Bangladesh Livestock Research Institute
BMD	Bangladesh Meteorological Department
BPDB	Bangladesh Power Development Board
BWCSRP	Bangladesh Weather and Climate Services Regional Project
BWDB	Bangladesh Water Development Board
CARE	Climate Adaptation Resilience
CCFF	Climate Change Financing Framework
CDWP	Central Development Working Party
CEA	Chief Engineering Adviser
CHIRPS	Climate Hazards group InfraRed Precipitation with Stations
CIMMYT	International Maize and Wheat Improvement Center
CMIP	Coupled Model Intercomparison Project
CPEIR	Climate Public Expenditure Institutional Review
CRS	Crop Reporting Service
CSRD	Climate Services for Resilient Development
CWG	Coordination Working Group
DAE	Department of Agricultural Extension
DDM	Department of Disaster Management
DEM	Digital Elevation Model
DHM	Department Hydrology and Meteorology
DLS	Department of Livestock Services
DoA	Department of Agriculture
DoAD	Directorate of Agriculture Development
DoLI	Department of Local Infrastructure
DoR	Department of Road
DSA	Daily Subsistence Allowance
DSS	Decision Support System
ECMWF	European Centre for Medium-Range Weather Forecasts

EOC	Emergency Operations Center
ERD	Economic Relations Division
ESD	Environmental and Social Development
ESF	Environmental and Social Framework
FAO	Food and Agriculture Organization
FFC	Federal Flood Commission
FFWC	Flood Forecasting and Warning Center
FGD	Focus Group Discussion
FMS	Finance Management Specialist
FMR	Financial Monitoring Report
FS&CC	Food Security and Climate Change
GED	General Economics Division
GIS	Geographic Information System
GRM	Grievance Redress Mechanism
HEC-HMS	Hydrologic Engineering Center's Hydrologic Modeling System
HEC-RAS	Hydrologic Engineering Center's River Analysis System
ICKM	Information, Communication and Knowledge Management
IA	Implementing Agency
ICIMOD	International Centre for Integrated Mountain Development
ICKM	Information, Communication and Knowledge Management
ICT	Information Communication Technology
IMD	India Meteorological Department
iPAS	Intelligent Project Automation System
IRSA	Indus River System Authority
IT	Information Technology
IUFR	Interim Unaudited Financial Report
IWRM	Integrated Water Resource Management
KII	Key Informant Interview
LDDP	Livestock and Dairy Development Project
LGED	Local Government Engineering Department
LMBIS	Line Ministry Budget Information System
LST	Land Surface Temperature
M&E	Monitoring and Evaluation
MDTF	Multi Donor Trust Fund
MIS	Management Information System
MoA	Ministry of Agriculture
MoALD	Ministry of Agriculture and Livestock Development
MoCC	Ministry of Climate Change
MoDMR	Ministry of Disaster Management and Relief
MoEFCC	Ministry of Forests and Environment
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
MoLMAC	Ministry of Land Management, Agriculture and Cooperative
MoPDSI	Ministry of Planning, Development and Special Initiatives

MoU	Memorandum of Understanding
MoWR	Ministry of Water Resources
MSL	Mean Sea Level
NAMC	National Agromet Centre
NAMIS	Nepal Agriculture Management Information System
NARC	Nepal Agricultural Research Council
NDMA	National Disaster Management Authority
NDRMA	National Disaster Risk Management Authority
NDRRMA	National Disaster Risk Reduction and Management Authority
NDVI	Normalized Difference Vegetation Index
NEC	National Economic Council
NGO	Non-governmental Organization
NMHS	National Meteorological and Hydrological Services
NPC	National Planning Commission
OLAP	Online Analytical Processing
PAD	Punjab Agriculture Department
PC	Planning Commission
PICSA	Participatory Integrated Climate Services for Agriculture
PDMA	Provincial Disaster Management Authority
PEFA	Public Expenditure Financial Accountability
PFM	Public Finance Management
PIU	Project Implementing Unit
PMD	Pakistan Meteorological Department
PPCR	Pilot Program for Climate Resilience
RAMC	Regional Agromet Centre
RCP	Representative Concentration Pathway
RDAS	Regional Data Analytics Services
RDBMS	Relational Database Management System
RFQ	Request for Quotations
RHD	Roads and Highways Department
RIMES	Regional Integrated Early Warning System
SAC	SAARC Agriculture Centre
SAHF	South Asia Hydromet Forum
SAR	South Asian Region
SCARP	Salinity Control and Reclamation Programme
SDU	System Development Unit
SESAME	Specialized Expert System for Agro-Meteorological Early Warning
SEU	Sectoral Expert Unit
SID	Sindh Irrigation Department
SIDA	Sindh Irrigation Authority
SFP	Sectoral Focal Point
SMS	Short Messaging Service
SOE	Statement of Expenditure
SPN	Special Procurement Notice
SQL	Structure Query Language
SRP	Sindh Resilience Project
STEP	Systematic Tracking of Exchanges in Procurement

SUPARCO	Space and Upper Atmosphere Research Commission
SuTRA	Subnational Treasury Regulatory Application
THI	Temperature Humidity Index
ToR	Terms of Reference
TVDI	Temperature Vegetation Dryness Index
TWG	Technical Working Group
UKMO	United Kingdom Meteorological Office
UN	United Nations
WAPDA	Water and Power Development Authority
WARPO	Water Resources Planning Organization
WB	World Bank
WMO	World Meteorological Organization

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

Utilization of Funds					
Total Grant Amount (in US$ Million)	**Disbursement Target for the Current Calendar Year 2020 (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	3,039,288	1,335,703.00	571,966.62	1,873,473.00	1,015,606.51

[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 second bi-annual report for the project and covers the reporting period from 1 January to 30 June 2021. 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.

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

This semester of the project implementation focused on initiating the RDAS system for completing a prototype (completion targeted by end of 2021). Three (3) consultants (Data Scientist, Data Visualization Expert, and Web Interface Developer), with guidance from RIMES Technical Lead, undertook complementary activities: a) data identification and collection and b) prototype development.

Data identified, accessed and collected for building the RDAS prototype include climate observation from the European Centre for Medium-Range Weather Forecasts (ECMWF) and Climate Hazards Group InfraRed Precipitation and Station data (CHIRPS); climate projections from the Coupled Model Intercomparison Project Phase 5 (CMIP5) and Coupled Model Intercomparison Project Phase 6 (CMIP6); and regional sectoral (agriculture, water, and transport) data from the World Bank, Food and Agriculture Organization and other development institutions. Observation data from ECMWF and CHIRPS have been reanalyzed

to serve as baseline data for the region. For matching the spatial and temporal scales of the climate data, granularity of sectoral datasets have been considered in the data collection.

Prototype development, on the other hand, has completed i) system architecture and framework for handling data ingestion, processing, and analysis, and data/information presentation on the portal; ii) data catalogue framework and database, and Master Data Management system, for creating and maintaining a catalogue of resources for support data integration; iii) data analytics, for Online Analytical Processing (OLAP) queries, computation, machine learning, generating reports and visualization; iv) Data and Analytical Services Catalog using a combination of open-source tools; v) Data and Analytics Visualization, for integrating data into the system including climate change scenarios for rainfall and temperature, and climate indicators; and vi) Data Access subsystems, for making data available to consumers.

The RDAS prototype, in its initial stage, has been set up in a private cloud using RIMES server.

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

Bangladesh

In Bangladesh, most of the national sectoral experts have on board the project, except for the Transport and Water Experts. Sectoral focal points have been identified for Ministry of Finance (MoF), Bangladesh Planning Commission (BPC), Department of Agricultural Extension (DEA), Department of Livestock Services (DLS), Ministry of Water Resources (MoWR), Bangladesh Water Development Board (BWDB), Water Resources Planning Organization (WARPO), Local Government Engineering Department (LGED), Roads and Highways Department (RHD), and Bangladesh Meteorological Department (BMD).

Different stages of consultations, desk reviews, user needs assessments, and technical assessments in the finance and planning, agriculture, livestock, roads, and water sectors in Bangladesh identified the following customization requirements for DSSs, for assisting climate-informed plans and decisions. These customization requirements for these DSSs, including their components and functionalities, will be refined as project activities progress further and as more inputs from stakeholders are taken into account based on completion of consultations, desk reviews, user needs assessments, and technical assessments in these sectors.

- MoF and BPC: *DSS for climate planning and screening*, which includes a Climate Change Web Portal customized for the requirements of the Finance and Economic Relation Division, under MoF, and BPC.
- DEA: *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-a-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; and ix) shifting of the entire system to open source web framework for scalability and sustainability.

- DLS: *DSS for livestock diseases early warning,* 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.
- LGED/RHD: *Improvement of the Online Road Network and Transport DSS,* through integration of dynamic climate and asset databases, risk information, and early warning.
- FFWC/BWDB: *Enhancement of FloCAST,* extending the lead time for flash flood forecast, dynamically integrating forecast products from various sources, and integrating voice message broadcasting for forecast/warning dissemination
- MoWR and WARPO: *Enhancement of the Delta Portal*, the details of which will be firmed-up as preparatory activities are completed.

Nepal

A key impediment to project implementation in Nepal has been the delay in project formalization, pending the endorsement of MoF. Despite the impediments, RIMES endeavors to undertake project activities through its existing partnerships with key national institutions like the Department of Hydrology and Meteorology (DHM). National sectoral expert positions have been filled in Nepal, albeit the transport expert has been onboarded only in June. Sectoral focal points have been identified in Ministry of Finance (MoF), National Planning Commission (NPC), Ministry of Agriculture and Livestock Development (MoALD), Ministry of Energy, Water Resources, and Irrigation (MoEWRI), DHM, Department of Roads (DoR), Department of Local Infrastructure (DoLI), and National Disaster Risk Reduction and Management Authority (NDRRMA).

Consultations, desk reviews, user needs assessments, and technical assessments in finance and planning, road/transport, hydromet forecasting/early warning, agriculture, and disaster management sectors, for guiding the customization of sector specific DSSs, are in various stages in Nepal. While many are still on-going, outputs thus far from these activities lend initial direction to the customization of DSSs. It is anticipated that the components and functionalities of these DSSs will further take shape upon completion of consultations, desk reviews, user needs assessments, and technical assessments in these sectors.

- MoF: *Improvement of Public Financial Management*, for climate budget allocation, expenditure tracking, sustainability monitoring, and assessment of investment results in climate-sensitive sectors.
- DoR/DoLI: *DSS for resilient rural/local roads network* that integrates existing climate risk assessments.
- DHM: *Enhancement of DHM Portal*, through development and integration of Flood Impact DSS for Babai river basin, and weather forecast verification and bias correction. Initial work done for the DSS for DMH 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 of 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.

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

Pakistan

National sectoral expert positions have been filled in Pakistan. The Ministry of Planning, Development and Special Initiatives (MoPDSI) has been identified as the lead institutional partner in the country for CARE Project. Sectoral focal points have been identified in the MoPDSI, Ministry of Finance (MoF), Punjab Agriculture Department (PAD), Sindh Irrigation Department (SID), and Pakistan Meteorological Department (PMD).

National sectoral experts are in different stages of consultations, desk reviews, user needs assessments, and technical assessments in finance, planning, irrigation/water resources, and agriculture sectors. While some of these activities are yet to be completed, what have been done thus far provides initial guidance for customization of DSSs for these sectors in Pakistan. The final components and functionalities of these DSSs would be driven by the outcomes of the consultations, desk reviews, user needs assessments, and technical assessments once all have been completed across the sectors.

- MoF: *DSS for integrating climate change scenarios into public expenditures*, for enhancing MoF efforts at climate financing.
- MoPDR/MoPDSI: *DSS integrating climate information into planning*, 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.
- SID: *Improvement of existing SID DSS through* the inclusion of drought risk management; dynamic integration of weather forecasts for predicting forecast-based potential flood situations; integration of vulnerability datasets for potential impact assessment; inclusion of dissemination and alert mechanism and linkage to MoPDSI DSS.
- 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-a-vis floods and droughts; market analytics for monitoring agricultural market situations; and v) mechanism for linking the tool to MoPDSI DSS.

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

Training activities for climate-informed decisions are to be implemented in Year 2024, and hence not included in this report.

Challenges encountered

Covid-19 restrictions, across the beneficiary countries, hampered physical meetings and local travel for stakeholder engagement and data collection. While efforts have been proactively made by RIMES at addressing project requirements via remote/online mechanisms, Covid-19 restrictions delayed project implementation in the countries, particularly as some key stakeholders prefer face-to-face meetings for consultations and data collection. Contracts of sectoral experts in the countries have to undergo a no-cost extension (until December 2021), for completing deliverables, due to delay in project activities.

Acquisition of huge datasets from portals require lengthy time; completion of data collection from portals with restrictions has been a challenge. Delays in data collection and other project activities are also due to official or formalization requirements: in Bangladesh, access to BAMIS is subject to a signed MoU with DAE; in Nepal, official endorsement by the MoF is required by stakeholder ministries and departments prior to commencement of project activities. RIMES prior work in the countries enabled strong partnership with key stakeholder institutions, facilitating some activities to proceed. However, timely and full implementation of project activities could be effectively pursued with official/formalization requirements completed early on in the project implementation.

In Bangladesh, delay in on boarding experts in transport and water sector, due to lack of suitable candidates, pushed back activities in the sectors. While the Country Coordinator covers some of the work for the sectors, key activities have to be undertaken by these experts. Across the beneficiary countries, delay in on boarding the consulting firms for DSS development, have delayed associated activities. Moreover, turnover of sectoral focal points, due to transfer/promotion or retirement, necessitated project re-introduction and other formalities.

Lessons learned

The evolving nature of climate-related risks, capacities and gaps in stakeholder institutions and communities, and technology, among others, necessitates a dynamic project that adjusts to these changes. The flexibility, provided by CARE project, in accommodating stakeholder requirements, has been key in ensuring stakeholder participation and commitment to the project.

Further, amid the backdrop of Covid-19, project implementation has to be dynamic, assimilating tools and mechanisms that depart from the conventional, in order to continue to be relevant and effective.

1. 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 that will contribute to overall progress and achievement in 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	Pending onboarding of Data Analyst
1.1.1.3 Data collection and digitization	Jan21 – Jun25	GIS Experts onboarded only in June 2021
1.1.2 RDAS Prototype System		
1.1.2.1 RDAS prototype system development	Nov20 – Sep21	RDAS interface development underway; climate & agriculture indicators processed
1.1.2.2 Technical support	Sep21 – Nov22	
1.1.3 RDAS Full System		
1.1.3.1 Solution architectural design	Apr21 – Sep21	Further expansion upon onboarding of RDAS CF
1.1.3.2 Development of data management module	Jul21 – Mar22	
1.1.3.3 Development of data analytics module	Jan22 – Sep23	
1.1.3.4 Development of data visualization and interface module	Oct21 – Mar23	
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	Apr24 - Jun24	
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: Assessment of existing data portals
Progress:

- **Procurement.** GIS Specialists, Dr. Bhoj Raj Ghimire (Nepal) and Mr. Muhammad Luqman (Pakistan), got on board the project in June 2021, while the GIS Specialist for

Bangladesh is expected to join the team in July. TORs for 4 Data Analysts will be submitted, for World Bank's review and approval, in July.

- **Data collection and review.** Initial work on reviewing existing national, regional, and global geospatial datasets has been undertaken and will continue to the next semester. This review of existing geospatial datasets took into consideration data source, structure content, metadata, format, projection, scale, precision and accuracy, resolution, quality, access, usage, purpose, challenges, and gaps; and developing a catalog for all relevant sector-specific data including base maps, social and physical data like demography, administrative boundaries, land cover, elevation, slope, hydrography, etc.

Activity 1.1.2 RDAS Prototype System

Progress:

- **Procurement.** The 3 consultants for the RDAS prototype system (e.g., Data Scientist, Data visualization Expert, Web Interface Developer) got on board in January 2021.
- **Data identification and collection.** Details on this activity are listed below.
  - Relevant data and their sources identified; these include global and regional climate data (CMIP5 and CMIP6); regional agriculture, water and transport data from the World Bank, Food and Agriculture Organization (FAO) and other development agencies. Data collection has been initiated and on-going.
  - ECMWF and CHIRPS datasets reanalyzed and used as baseline data for the region.
  - Sources and granularity of sectoral datasets identified to match climate data (spatial and temporal scale).
  - Challenges encountered in data collection include access to portals with restrictions and lengthy time for completing data collection.
- **RDAS prototype system development.** Activities completed for this sub-component include:
  - Design and development of system architecture and framework to handle the ingestion, processing, and analysis of data from various sources, including structured and unstructured datasets (e.g., static files, application data stores, relational databases, data from public APIs, static or dynamic data extracted from external sources, etc.), and create and present data on the organized RDAS portal.
  - Design and development of data catalogue framework and database with SQL, NoSQL, and RDBMS database architecture; and Master Data Management system, to create and maintain a catalogue of resources to support data integration from various sources.
  - Design and development of data analytics, responsible for Online Analytical Processing (OLAP) queries, computation, machine learning, generating reports and visualization.
  - Design and development of the Data and Analytical Services Catalog using a combination of open-source tools e.g., DKAN, an open-source platform for managing, publishing, and consuming structured information; and Google Earth Engine, for computing, aggregating, and displaying geospatial data over JavaScript-enabled maps.
  - Design and development of Data and Analytics Visualization, which integrated data into the system including CMIP5 datasets for RCP4.5 and 8.5 scenarios for rainfall and temperature, while climate indicators were dynamically generated for a region/basin or location from the datasets using the CLIMPACT (WMO) tool.

- Development of Data Access subsystems, where data and services of the system are made available to data consumers through applications, e.g., reports, DSSs and APIs.
- RDAS prototype system demonstrates the application of data analytics and decision support in the agriculture sector; and key indicators relevant to decision-making for agriculture were identified and integrated, such as crop type, crop variety, crop growth, crop production, and soil, etc. at regional and national level
- Prototypes of the main components demonstrated in the system include i) catalog of data and maps, ii) basic data analytics and visualization for exploration and decision support, and iii) country climate profiles.
- Set up of the RDAS private cloud using RIMES server to host all data in the initial phase. Cloud offers added advantage of free services and backup support.
- Technical report on RDAS prototype system is provided in Appendix 1.

- **Further development.** In the next phase of activities, focus will be on development of the visualization platform for i) climate data (CMIP5), ii) visualization of climate indicators, iii) interactive dashboard for the climate-agriculture indicators; and iv) integration of impact and adaptation measures, iv) integration of Google Earth Engine geo-spatial products relating to sectors, and v) integration of products available in the World Bank developed Spatial Agent tool.

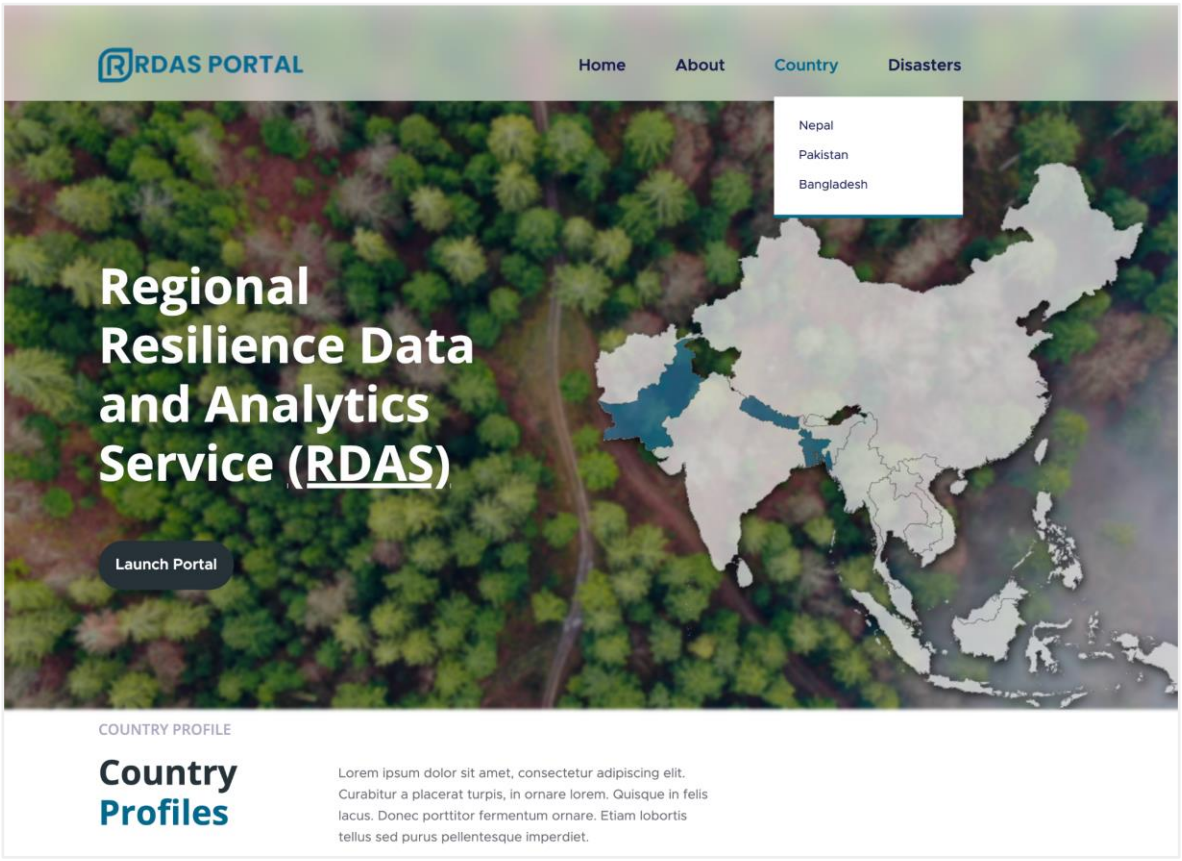

Figure 1 RDAS Prototype Portal Frontend

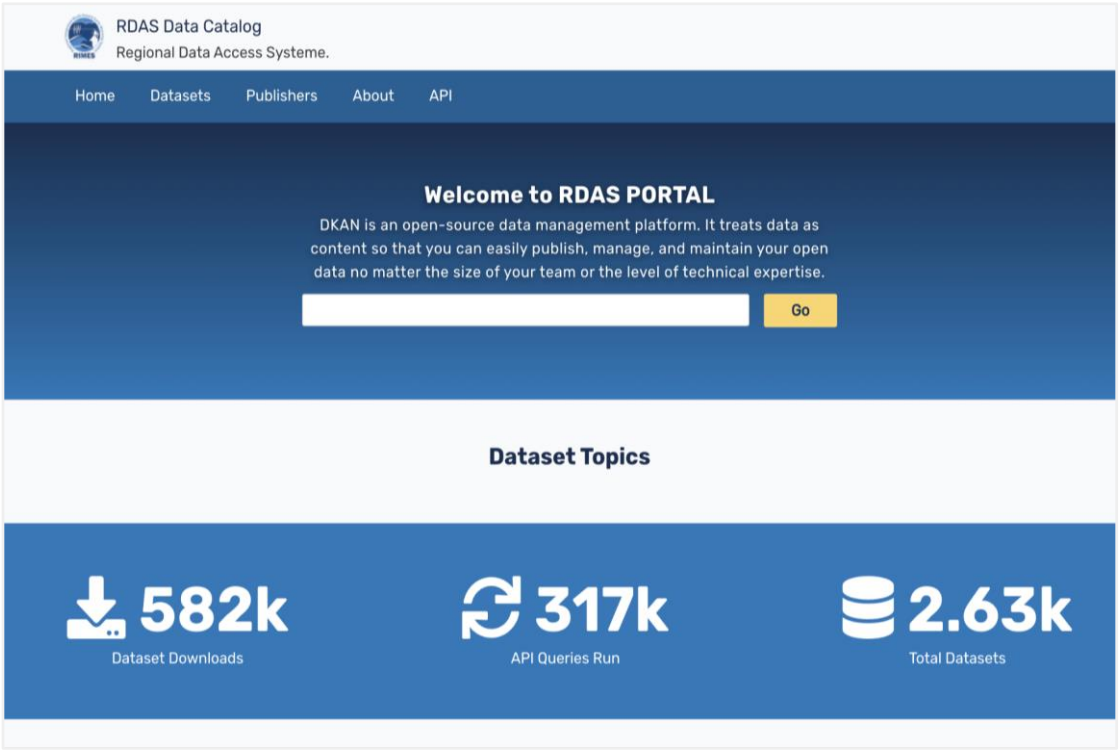

Figure 2 RDAS metadata management

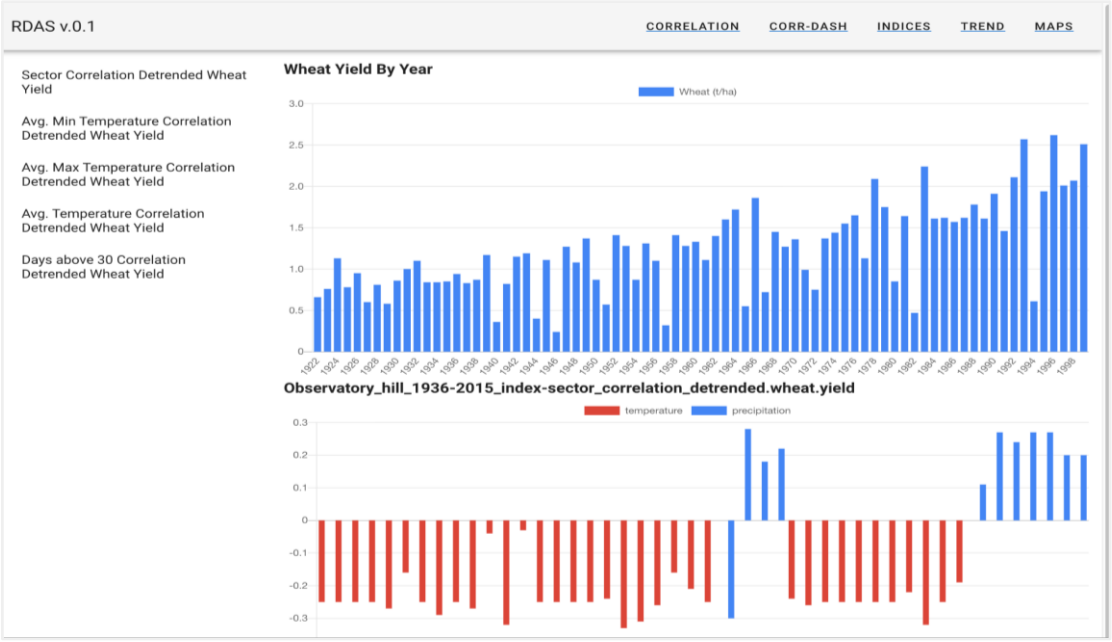

Figure 3 Association of climate and agriculture indicators and dynamic relationship of wheat yield and annual precipitation

Activity 1.1.3 RDAS Full System

Progress:

- **Procurement.** TOR for RDAS consulting firm has been submitted to the Bank for review and approval. The consulting firm will be working in collaboration with, and building on the work of, the consultants for the RDAS prototype system.

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

Activities that will contribute to overall progress and achievement in output 1.1.1 are expected to begin 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 that will contribute to overall progress and achievement in outcome 1.2 are 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 – Sep23	
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	Jul23 – Sep23	

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 that will contribute to overall progress and achievement in 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 – May21	
1.2.1.4 Meeting for presentation of assessment outcomes	Apr21 – Jun21	Pending results of user needs assessments
1.2.1.5 Meeting for soft launch of priority DSS systems	Oct21 – Dec21	
1.2.1.6 Technical meeting on RDAS and DSS systems	Nov20 – Jun25	Completed activity in 2021; no activity planned in 2021
1.2.2 Development of DSS for Ministry of Planning, Development and Reforms -Pakistan		
1.2.2.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – May21	Desk review & UNA completed; assessment of outcomes ongoing
1.2.2.2 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Initial consultation with MoPDSI; full system development pending onboarding of DSS CF
1.2.2.3 Development of data management module	Apr21 – Jun22	Pending onboarding of DSS CF
1.2.2.4 Development of DSS engine and data visualization and report generation modules	Jul21 – Dec22	
1.2.2.5 System audit	Jan23 – Mar23	
1.2.2.6 Preparation user guide and technical manual	Jan23 – Jun23	
1.2.2.7 System transfer and deployment	Jul23 – Sep23	
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 – May21	Desk review & UNA completed; assessment of outcomes ongoing
1.2.3.2 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Pending MoF confirmation for separate DSS & onboarding of DSS CF
1.2.3.3 Development of data management module	Apr21 – Jun22	Pending completion of consultations & onboarding of DSS CF
1.2.3.4 Development of DSS engine and data visualization and report generation modules	Jul21 – Dec22	
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, Pakistan (Priority system)		
1.2.4.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – May21	Desk review & UNA completed; assessment of outcomes ongoing
1.2.4.2 Development of DSS framework and finalization of data parameters	Dec20 – Sep21	DSS framework completed; DSS development started
1.2.4.3 Development of data management module	Apr21 – Jun22	PMD weather forecast data integrated
1.2.4.4 Development of DSS engine	Jul21 – Jun22	

1.2.4.5 Development of dissemination module	Apr22 – Sep22	
1.2.4.6 System audit	Oct22 – Dec22	
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 – May21	Desk review & UNA completed; assessment of outcomes ongoing
1.2.5.2 Technical assessment of existing DSS with the SID	Nov20 – Apr21	Report preparation
1.2.5.3 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Initial consultations ongoing; further actions upon DSS CF onboarding
1.2.5.4 Enhancement of data management module	Apr21 – Jun22	Further enhancement upon DSS CF onboarding
1.2.5.5 Development of DSS engine	Jul21 – Jun23	
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 – May21	Desk review & UNA materials completed; ongoing consultations
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 – Sep21	Pending onboarding of DSS CF
1.2.6.4 Enhancement of data management module	Apr21 – Jun22	Consultations ongoing; further development upon onboarding of DSS CF
1.2.6.5 Development of DSS engine	Jul21 – Dec22	
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 – May21	Detailed assessment by Livestock Expert who onboarded on June 2021
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 – Sep21	DSS framework designed; technical design document preparation
1.2.7.4 Enhancement of data management module	Apr21 – Jun22	Data management module completed; bias corrected are being tested
1.2.7.5 Development of DSS engine	Jul21 – Dec22	
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 – Dec23	
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 – May21	Initial activity started; further activities upon onboarding of Transport Expert
1.2.8.2 Technical assessment of Online Road Network portal	Mar21 – Apr 21	Initial activity started; further activities upon onboarding of Transport Expert
1.2.8.3 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Initial activity started; further activities upon onboarding of DSS CF

1.2.8.4 Enhancement of data management module	Apr21 – Jun22	Initial activity started; further activities upon onboarding of DSS CF
1.2.8.5 Enhancement of DSS engine	Jul21 – Dec22	
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 – May21	Pending onboarding of Water Expert
1.2.9.2 Technical assessment of FloCAST	Dec20 – Apr21	Ongoing assessment
1.2.9.3 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Initial activity started; further activities upon onboarding of DSS CF
1.2.9.4 Enhancement of data management module	Apr21 – Jun22	Initial activity started; further activities upon onboarding of DSS CF
1.2.9.5 Development of DSS engine	Jul21 – Jun23	
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 – May21	Initial activity started; further activities upon onboarding of Water Expert
1.2.10.2 Technical assessment of the Delta Portal	Jan21 – Apr21	Ongoing assessment
1.2.10.3 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Initial activity started; further activities upon onboarding of DSS CF
1.2.10.4 Enhancement of data management module	Apr21 – Jun22	Initial activity started; further activities upon onboarding of DSS CF
1.2.10.5 Development of DSS engine	Jul21 – Dec22	
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 – May21	Desk review & UNA materials completed; ongoing consultations
1.2.11.2 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Initial activities started; further development upon onboarding of DSS CF
1.2.11.3 Development of data management module	Apr21 – Jun22	Initial activities started; further development upon onboarding of DSS CF
1.2.11.4 Development of portal interface	Jul21 – Dec22	
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 - May21	Desk review & UNA materials completed; ongoing consultations
1.2.12.2 Technical assessment of DHM hydrological forecasting portal	Jul20 – Apr21	Completed
1.2.12.3 Enhancement of data collection and management system	Dec20 – Jun22	DHM priority: improvement of flood forecasting system
1.2.12.4 Downscaling of climate outlooks	Oct21 – Mar23	

1.2.12.5 Enhancement of dissemination module	Oct21 – Jun23	
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 – May21	Desk review & UNA materials completed; ongoing consultations
1.2.13.2 Technical assessment of NAMIS	Oct20 – Apr21	Access to NAMIS pending project formalization
1.2.13.3 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Pending onboarding of DSS CF & project formalization
1.2.13.4 Enhancement of data management module	Apr21 – Jun22	Pending onboarding of DSS CF & project formalization
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 – May21	Pending onboarding of Transport Expert
1.2.14.2 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Initial activities started; further development upon onboarding of DSS CF & project formalization
1.2.14.3 Development of data management module	Apr21 – Jun22	Initial activities started; further development upon onboarding of DSS CF & project formalization
1.2.14.4 Development of DSS engine	Jul21 – Dec22	
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 – May21	Desk review & UNA materials completed; ongoing consultations
1.2.15.2 Technical assessment of existing portal	Apr21 – Apr21	Pending project formalization
1.2.15.3 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Pending onboarding of DSS CF & project formalization
1.2.15.4 Development of data management module	Apr21 – Jun22	Pending onboarding of DSS CF & project formalization
1.2.15.5 Development of DSS engine	Jul21 – Dec22	
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 – May21	
1.2.16.2 Technical assessment of NDRRMA portal	Feb21 – Apr21	Pending project formalization
1.2.16.3 Development of DSS framework and finalization of data parameters	Apr21 – Sep21	Pending onboarding of DSS CF & project formalization
1.2.16.4 Enhancement of data management module	May21 – Jun22	Pending onboarding of DSS CF & project formalization
1.2.16.5 Enhancement of DSS engine	Jul21 – Dec22	
1.2.16.6 System audit	Jan23 – Mar23	
1.2.16.7 Preparation of user guide and technical manual	Jan23 – Jun23	
1.2.16.8 System transfer and deployment	Jul23 – Sep23	

Detailed progress of each activity are:

Activity 1.2.1 Preparatory Activities: In-depth assessment of users' investment planning and decision-making processes, and information product and service needs

Progress:

- **Procurement.** National sectoral expert positions have been mostly filled except for the transport and water sectors in Bangladesh. Due to difficulty in securing good candidates, the positions required readvertising. Moreover, ToRs for consulting firms in the three countries have been shared with the national stakeholders for their inputs and approval; and submitted to the World Bank in May 2021 for prior review and approval.
- **Sectoral focal points.** SFPs underwent a series of changes during this period due staff turnover (e.g., retirement, transfer). For Bangladesh: SFP for DLS, Mr. Mohammad Shah Alom Biswas was replaced by Dr. ABM Mustanur Rahman; SFP for MoWR, Mr. Mahmudul Islam was replaced by Mr. Md. Mahmud Hasan; SFPs for RHD and WARPO, Ms. Anesha Das Hasi and Mr. Md. Hasan Shahriar, respectively, have been confirmed. For Nepal, SFP for MoF, Mr. Ishowri Prasad Aryal, was promoted and replaced by Mr. Kamal Bhattarai. For Pakistan, SFP for MoF Pakistan, Mr. Raja Tanveer Azmi, has been confirmed. Table 1 provides the status of SFPs for each beneficiary country.

Table 1 List of sectoral focal points as of 30 June 2021

Sector	Ministry/ Agency	Focal Point Details
Bangladesh		
Finance *(Convener of SFP in Bangladesh)*	**Ministry of Finance (MoF)**	Ongoing process: **Ms. Milia Sharmin** Deputy Secretary, Finance Division **Ms. Afrina Islam** Deputy Secretary, ERD
Planning	**General Economic Division (GED), Bangladesh Planning Commission**	Ongoing process: **Mr. Md Nazrul Islam** Joint Chief
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. Md. Mahmud Hasan** 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. A.K.M. Luthur Rahman** Additional Chief Engineer & Director
	Roads and Highways Department (RHD)	**Ms. Anesha Das Hasi** Executive Engineer, Environmental Division
Cross-cutting	**Bangladesh Meteorological Department (BMD)**	**Dr. Md. Abdul Mannan** Meteorologist
Nepal		
Finance *(Convener of SFP in Nepal)*	**Ministry of Finance (MoF)**	Ongoing process: **Mr. Kamal Bhattarai** MOF Under Secretary
Planning	**National Planning Commission (NPC)**	Ongoing process: **Dr. Chakrapani Acharya** Program Director, EMD
Agriculture	**Ministry of Agriculture and Livestock Department (MoALD)**	Ongoing process: **Mr. Shankar Sapkota** Senior Agri-Economist
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** Senior Divisional Hydrologist **Mr. Anil Pokhrel** Chief Executive
Pakistan		
Planning *(Convener of SFP in Pakistan)*	**Ministry of Planning, Development and Special Initiatives (MoPDSI)**	**Mr. Faisal Baloch** Deputy Chief Planning Commission
Finance	**Ministry of Finance (MoF)**	**Mr. Raja Tanveer Azmi** Deputy Secretary, EFP-II
Agriculture	**Punjab Agriculture Department (PAD)**	**Mr. Rana Mahmood Akhtar** Chief, Planning and Evaluation Cell
Water	**Sindh Irrigation Department (SID)**	**Mr. Ehsan Leghari** General Manager
Cross-cutting	**Pakistan Meteorological Department (PMD)**	**Dr. Muhammad Riaz** Director General

- **Consultations.** Covid-19 lockdowns imposed in the countries since the end of March 2021 delayed consultation activities with most stakeholders. In Pakistan, however, project coordination and implementation, amid the Covid-19 lockdowns, went smoothly since MoPDSI took the lead in the project. On the other hand, project implementation in Nepal has stalled due to ministerial requirements to formalize the process through official project endorsement of MoF to stakeholder ministries and departments.
- **Desk review.** Regional Experts for Agriculture, Water, Planning & Finance and Transport sectors have been working together with the Climate Application Specialist to provide guidance to national sectoral experts on the conduct of desk review and user needs assessment activities. Desk review activities have been completed for Pakistan, while work remains for the livestock, water and transport sectors for Bangladesh and Nepal either due to onboarding of corresponding experts only in June or the hiring process is yet to be completed. Outcomes and details of these activities, including stakeholder mapping, assessment of existing DSSs/portals, and identifying gaps/requirements are outlined in sections specific to each sector.
- **User needs assessment.** Approach and methodology design, including customization of user needs assessment materials, e.g., survey, interviews and focus group discussion (FGD) questionnaires, have been completed by national sectoral experts except for the livestock, water and transport sectors in Bangladesh and Nepal. Following these, user needs assessment activities, e.g., surveys, consultation meetings, interviews, FGDs, decisions-simulation workshops shall be conducted to identify a sector's weather/ climate information needs and requirements, decision-making contexts, data availability and accessibility, and technical capacity.

  Most stakeholder ministries and departments prefer to conduct physical meetings for assessing user needs and requirements. However, Covid-19 restrictions hampered and delayed these activities in the countries. To address the situation, online surveys have been initiated in Bangladesh, to be supplemented by phone calls, virtual Key Informant Interviews (KIIs) and FGDs, etc. Similar remote methods for getting inputs and feedback from the stakeholders will be put in place in Nepal and Pakistan should Covid-19

associated risks and restrictions persist. Physical meetings will be pursued as in-country conditions al ns allow.

Activity 1.2.2 Development of DSS for Ministry of Planning, Development and Reforms -Pakistan

Progress:

- **Procurement.** Mr. Salman Irfan Abbasi, Planning Expert in Pakistan, came on board in January 2021.
- **Sectoral focal points.** Mr. Faisal Baloch is MoPDSI's SFP, while Dr. Muhammad Riaz remains the focal point for PMD.
- **Consultations.** Regular consultations were held with various CARE project stakeholders and the planning sector in Pakistan. These include the following.
    - Kickoff meeting with CARE national sectoral experts, Pakistan country coordinator, MoPDSI SFP Mr. Faisal Baloch, Dr. Hamid Janil, MoPDSI Member, Food Security and Climate Change (FS&CC), and other MoPDSI officials on 9 February 2021 presented the project, discussed the work plan and approach of each sectoral expert, and officially connected the sectoral experts to their respective focal points
    - Meeting led by MoPDSI, convening Water and Power Development Authority (WAPDA), MoWR, Salinity Control and Reclamation Programme (SCARP), on 2 April 2021 introduced the CARE project and the water experts
    - Meeting with Dr. Hamid Janil, on 8 March 2021, discussed plans for developing the DSS for the planning ministry. Importance of the DSS was highlighted and how other ministries like the Ministry of Finance had developed a DSS to track the prices of wheat and other essential items. He was of the view that the DSS for planning should be an integrated platform which has access to other DSSs being developed by RIMES e.g., SESAME, DSS for SID, etc. This tool could take the form of a dashboard presenting all DSS outputs in Pakistan. Assurance of the sustainability of the DSS was underscored, with the planning ministry hosting and owning this tool.
- **Desk review.** Highlights from the desk review are listed below.
    - Policy and project planning related to climate change at the Federal level is undertaken by 1) MoPDSI, 2) MoF, and 3) Ministry of Climate Change (MoCC). At the provincial level, there are 1) Planning and Development Boards, and 2) Environmental Protection Departments.
    - The Planning Commission (PC), under MoPDSI, formulates planning documents after an extensive stakeholder consultation process of the PC which solicits input from the entire government and then gives final shape to these plans. Provisions on climate change are incorporated into the plans in the form of separate sections/chapters. After development and subsequent reviews and feedback, the final planning document is sent to the Central Development Working Party (CDWP) or the National Economic Council (NEC), depending upon project value, for final review and approval.
    - Concerns relevant to climate change are not formally and sufficiently included in the project planning process; focus is mainly on environmental considerations. Tools for climate benefit analysis in project appraisal and a high-level checklist for decision makers for project selection could be beneficial. Based on Climate Public Expenditure Institutional Review (CPEIR) and an enhanced focus on climate change,

the MoPDSI has been in the process of modifying and updating all its pro forma documents for including climate change
    - Project planning and planning documents formulation are a manual process in the PC; there are no climate-related decision support systems (DSSs) supporting the planning process. The Intelligent Project Automation System (iPAS), under development, is a non-climate related tool that targets to automate PC processes at project planning, implementation, and monitoring.
    - MoPDSI does not have a climate-smart tool and relies on data from National Disaster Risk Management Authority (NDRMA) and PMD to make subjective climate-sensitive decisions. Without a central repository, data are stored manually and isolatedly by relevant institutions/sections and obtained individually as needed. The current process is inefficient and lacks avenues for synergizing inter- and intra-institutional undertakings
    - The availability of a DSS for integrating climate information into planning is welcomed by the MoPDSI/PC. PC identifies its lack of capacity to undertake the DSS on its own, particularly as its Climate Change Section require capacity building; challenges in the Section include lack of appropriately trained personnel and outdated IT equipment.
    - Detailed outcomes and recommendations of the desk review are provided in Appendix 2.
- **User needs assessment.** Preparations for, and conduct of stakeholder engagements, have been conducted this semester, viz.:
    - Survey, FGD, and KII tools completed for understanding institutional needs/requirements for climate-informed planning and decision-making
    - Survey questionnaires shared with MoPDSI key stakeholders; collection of completed survey forms is underway
    - FGDs and KIIs have been arranged with the PC for receiving inputs
- **DSS development.** Development of DSS(s) for MoPDSI for climate-informed planning will be undertaken by the consulting firm in Pakistan once on board. Tools initially identified, by MoPDSI stakeholders, as beneficial for their operations and which may be further refined at the completion of the stakeholder consultations during the following semester are:
    - Dashboard integrating the outputs of all DSSs developed for the country, for guiding MoPDSI's sector-specific initiatives
    - DSS for estimating climate-related risks of development projects and integrating climate information into development plans

Activity 1.2.3 Development of DSS for Ministry of Finance -Pakistan

Progress:

- **Procurement.** Mr. Usman Butt, Finance Expert in Pakistan, was hired in January 2021.
- **Sectoral focal points.** Mr. Raja Tanveer Azmi, Deputy Secretary, EFP-II, has been confirmed as focal point for MoF Pakistan.
- **Consultations.** Several meetings have been arranged with MoF stakeholders. These include:
    - Meeting with Dr. Hamid Janil, MoPDSI (Member, FA&CC), on 9 February 2021, discussed the project, its objectives, and its potential benefits to MoF/MoPDSI.

- Meeting with Mr. Faisal Baloch, on 12 February 2021, discussed the nomination of a focal point for MoF, Mr. Raja Tanveer Azmi, Deputy Secretary (EFP-II Section).
- Meeting with Mr. Raja Tanveer Azmi, on 16 March 2021, discussed project details, roles and mandates of the ministry, rules of business, and others relevant.
- Informal meetings with Dr. Irfan Tariq (DG, CC, MoCC), Mr. Asif Sahibzada (Director, EP), and ADPC on 18 March 2021 discussed CPEIR and Climate Change Financing Framework (CCFF) and identified further enhancements and hindrances.

- **Desk review.** Highlights from the desk review are listed below.
  - MoF, and its two divisions, viz.: Finance and Revenue Divisions, sees the importance of partnership with the Ministry of Planning, Development and Reforms and MoCC for incorporating climate change into direct/indirect expenditures in the public sector.
  - MoF, in collaboration with the MoCC, has started integrating climate change into public sector expenditures through the CPEIR. For streamlining climate financing, a CCFF was planned; progress has been stalled by the change of government and the Covid-19 pandemic
  - Efforts have been made to imbed climate change into annual budgeting as a part of the Ministry's medium-term objectives. The MoF has updated its Budget Call Circular (BCC) to require line ministries to identify projects and programs relevant to climate change, but more efforts are required to effectively implement the framework
  - DSS utilized in the MoF are financial management-based; there are no climate-related DSS currently employed in the MoF
  - With climate change expenditure tagging already in place in MoF through the CPEIR, a DSS for integration of climate change scenarios into public expenditures could enhance MoF's efforts
  - Detailed outcomes and recommendations of the desk review are provided in Appendix 3.
- **User needs assessment.** Activities relevant to user needs assessment are indicated below:
  - Survey, FGD, and KII questionnaires have been developed
  - Survey, FGD, and KII activities are underway
  - Customized user needs assessment materials are provided in Appendix 4.
- **DSS development.** DSS for MoF will be developed by the consulting firm in Pakistan once on board. At this stage, based on initial consultations with MoF stakeholders, DSS for integration of climate change scenarios into public expenditures could be prioritized; refinement of options/final selection of the tool for development under CARE is expected to ensue upon the completion of consultations and user needs assessment.

Activity 1.2.4 Development of SESAME -Punjab, Pakistan (Priority system)

Progress:

- **Procurement.** IT Expert for Pakistan, Mr. Qamar Munir, joined the team in January 2021; while Agriculture Expert, Mr. Asif Chughtai, came on board in February 2021.
- **Sectoral focal points.** Mr. Rana Mahmood Akhtar, Chief of Planning and Evaluation Cell, has been confirmed focal person for PAD.
- **Consultations.** The meetings, below, have been organized with PAD and PMD:
  - Meeting with Dr. Anjum, DG Agriculture Extension (Punjab) in Lahore, on 1 March 2021, discussed CARE and its objectives, provided an overview of SESAME, its

requirements for development, and the potential benefits that could be derived from a fully customized system. The meeting identified capacities and gaps in climate information collection, analysis, and dissemination. Current utilization of PMD-generated climate information in PAD includes onward dissemination to agriculture stakeholders via Bakhabar Kissan, an SMS service; generation of climate-related advisories for kharif and rabi crops; and generation of Kharif and Rabi Production Plans. The meeting highlighted that a DSS integrating and analyzing both agriculture and climate parameters for generation of PAD-required climate-informed guidance is not available and its development would be beneficial as PAD moves toward climate-smart agriculture

- Meeting with Additional Secretary, Planning (Punjab), Mr. Rao Atif Raza, on 1 March 2021, in Lahore discussed the CARE Project and its inclusive activities. The Additional Secretary assured the project and of his support
- Meeting with Chief Meteorologist, Punjab Meteorology Department, Mr. Mahr Sahibzad Khan, in Lahore, on 1 March 2021, discussed the project and assessed current mechanisms in PMD at collection, analysis, and dissemination of weather/climate data/information for Punjab. PMD's National Agromet Center (NAMC), in Islamabad, provides agriculture-relevant advisories at district/province level in weekly, 10 days, monthly scales, and seasonal scales.
- Meeting with Director of NAMC, PMD, Mr. Khalid Malik, on 12 March 2021, discussed climate change impacts on agriculture, NAMC's existing system for data collection, archiving, analysis and dissemination which include: five (5) Regional Agromet Centers (RAMCs) which collect and compile relevant weather/climate parameters, and analyze relationships between weather/climate and agriculture parameters in consultation with research institutes or universities; information are disseminated via Tehsil forecast, agromet bulletins/advisories, crop reports, Agro Climate Outlook, Desert Locust Situation, and Met Weather, a YouTube channel.

- **Desk review.** Highlights from the desk research are provided below:
  - Stakeholder mapping conducted for the agricultural sector identified the following key departments: 1) PAD, responsible for development of agriculture sector in Punjab; 2) PMD, mandated institution for collection, archiving, generation and dissemination of weather/climate information; 3) Crop Reporting Service (CRS) of PAD, responsible for preparing annual crop estimates for Kharif and Rabi seasons; 4) Agriculture Delivery Unit (ADU) of PAD, responsible for providing advisory services to PAD; 5) Ayub Agricultural Research Institute (AARI) in Faisalabad, responsible for developing new variety of crops, technologies for food safety and sustainable generation of exportable surplus, value addition and conservation of natural resources; and 6) University of Agriculture, Faisalabad, a major institution of higher agricultural education and research in Punjab.
  - PMD's key information products include: weather forecast (nowcast, daily, weekly, monthly) at provincial level; seasonal outlook at provincial level; flood advisory and forecast (daily, weekly) for major rivers and basins; drought alert and bulletin (weekly, fortnight, monthly, quarterly) at provincial level; agromet bulletin (weekly, monthly, decadal) at provincial level; agro advisory for South Punjab; seasonal agroclimate outlook at provincial level; crop report for 5 RAMCs; desert locust situation update; outlook maps (precipitation, rainfall, drought, water availability, soil moisture); satellite indices (LST, NDVI, TVDI), etc.

- Data available from the departments include, PMD: hourly/ daily observation data of maximum, minimum, normal temperature, soil temperature at different depths, humidity, rainfall, sunshine, wind speed and direction, evaporation, frosty and cloudy days, soil moisture that are manually and automatically collected; and CRS: data on area and production of crops produced in Punjab to correlate increase or decrease in area or production of a crop to some unexpected weather event or climate change.
- Weather/climate information from PMD are analyzed by PMD's agriculture expert partners, translated into different guidelines and crop reports, and disseminated through the website; while PAD receives reports and climate data from PMD's website and disseminates guidelines to end users, e.g., farmers.
- The current system of collecting, analyzing, storing, and disseminating weather/ climate information needs to be improved.
- Data sharing is sensitive to PMD, modalities to access data needs agreement at departmental level.
- A system that dynamically integrates/analyzes relevant weather/climate and agriculture parameters for providing climate-informed agricultural decisions is not in place in the country
- Detailed outcomes and recommendations of the desk review are provided in Appendix 5.

- **User needs assessment.** Preparation for user needs assessment is being undertaken following completion of stakeholder consultations and desk review. Key activities are listed below.
  - Questionnaires for surveys, FGDs and KIIs have been initiated and will be finalized.
  - Interviews with relevant stakeholders are planned to collect information on current agricultural practices; good practices, challenges, and gaps in decision-making; and mechanisms for addressing challenges and gaps.
  - Interviews with select farmers are planned for obtaining information on agricultural practices (pre- to post-harvest); good practices, challenges, and gaps in decision; and requirements for enhancing plans and decisions.
- **DSS development.** as required by PAD, SESAME will be customized for Punjab. The functionalities of SESAME for PAD will be refined/finalized at the completion of user needs assessment. Key activities, for this semester, are:
  - Discussions with PAD stakeholders for understanding specific requirements of the system, including crop-related data for integration into the DSS; and with the Agromet Centre at PMD for discussing availability of agromet forecasts that can be used in the DSS.
  - Guided by initial requirements identified by PAD, the following have been undertaken: a) design and development of the customized DSS framework and database; b) identification of datasets useful to the DSS including different agromet data from various national and international sources, taking stock of data type, format, authenticity, etc.; c) data collection and automation of the process; d) integration of numerical weather prediction data; sea level forecast and assessment; interfacing for graphs, etc.; and d) customization of user interface.
  - Ongoing work includes design and development of DSS engine; dynamic crop calender and other components; and analytics and visualization and dissemination modules.

- Further enhancements of the system would focus on, among others (subject outcomes of the user needs assessment), advanced analytics for crop management; pest management system for providing pest and disease warning; integration of disaster management component to understand agricultural risk relating to floods and droughts; expansion to market analytics to monitor agricultural market situations; and linking the tool to the MoPDSI DSS.
- Technical report on DSS activities is provided in Appendix 6.

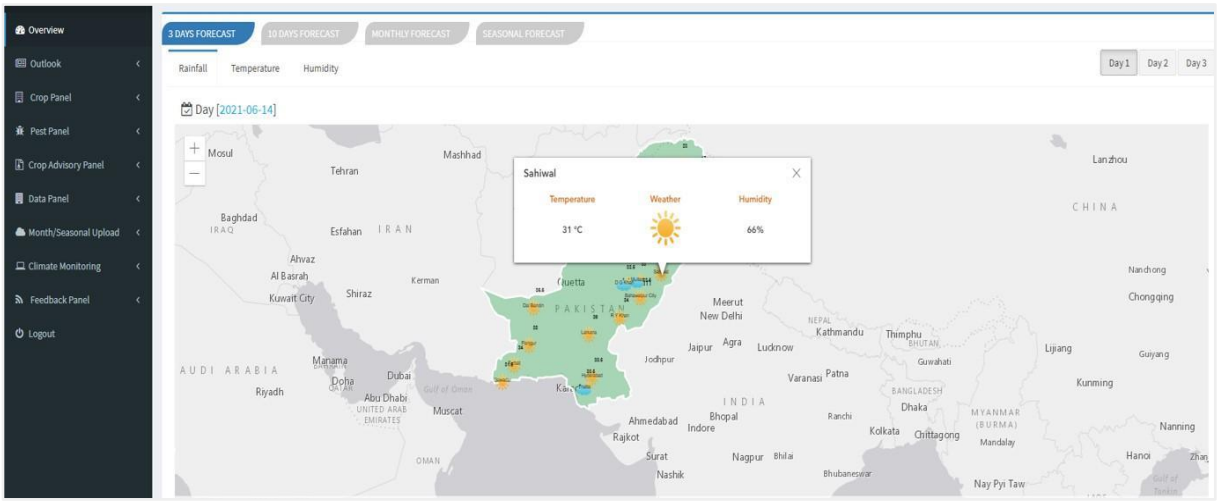

Figure 4 Integration of PMD forecast products of different timescales for Punjab districts

Activity 1.2.5 Improving DSS for Sindh Irrigation Department -Pakistan

Progress:

- **Procurement.** Ms. Sana E Sakina, Water Expert for Pakistan, joined the team in February 2021.
- **Sectoral focal points.** Mr. Ehsan Legari, General Manager, has been confirmed as the focal point for SID.
- **Consultations.** The following outlines the meetings held with various stakeholders in the water sector.
  - Meeting with Mr. Faisal Baloch, MoPDSI SFP, on 11 February 2021, discussed MoPDSI support for the initiative and coordination mechanisms with MOWR
  - Meeting with Ms. Fariha, Section Officer at MoWR, on 1 March 2021, discussed project objectives in detail
  - Meeting convened by MoPDSI with various stakeholders including the WAPDA, MOWR, SCARP, on 2 April 2021, introduced the CARE project and the Water Experts. MoPDSI shared its plan for developing country-wide Water Accounting System and water database, which could be synergized with CARE Component 1 activity in Pakistan's water sector (i.e., enhancement of the Sindh Irrigation's flood forecasting system) through integration of drought monitoring components.
  - Meeting with Mr. Syed Muhammad Mehr Ali Shah, Joint Secretary, on 15 April 2021, discussed project objectives, with emphasis on DSS requirements and benefits. The Joint Secretary committed support to the project.
  - Meeting with Dr. Sana Ullah, Risk Assessment Expert, Sindh Resilience Project, on 30 April 2021, discussed project activities and established a connection with the General Manager, SUPARCO for further discussion of the DSS.

- Meeting with Mr. Asif Jan Siddique, Sindh Resilience Project Director, on 3 May 2021, discussed project implementation status.
- Meeting with Mr. Abdul Basit Somro, Chairman of Sindh Irrigation and Drainage Authority (SIDA), on 29 April 2021, discussed the project and its components.
- Meeting with Mr. Roa Irshad, Chairman of Indus River Systems Authority (IRSA), on 12 April 2021, discussed the placement of the authority for water quota where the chairman appreciated CARE project and committed the required support.
- Meeting with Mr. Jan Muhammad, Meteorological Department Director for Drought, on 8 March 2021, discussed climate change and the effects of weather on water scarcity.
- Separate meetings with Major Norman at National Disaster and Management Authority (NDMA) and Ms. Zahra Hassan, Sr. GIS Specialist, NDMA, on 9 April and 28 April 2021, respectively, discussed the activities of the department and potential synergies with project interventions.
- Meeting with Mr. Ahmad Kamal, Chairman of Federal Flood Commission, on 15 April 2021, discussed data collection mechanisms and past DSS interventions.
- Meeting with Mr. Zahid, Chairman of Sindh Drainage and Irrigation Project, on 18 May 2021, linked the Water Expert with stakeholders from various departments.

- **Desk review.** Highlights from the desk review are listed below.
  - Stakeholder mapping conducted for the water sector identified the following key departments: 1) MoWR, responsible for developing the country's water and hydropower resources to meet current and future challenges of water shortage and provision of affordable environmental friendly renewable energy; the Sindh Resilience Project is a key undertaking in SID, under the MOWR; 2) Office of the Chief Engineering Adviser, responsible for providing advisory services to MoWR on issues related to engineering matters; 3) Federal Flood Commission (FFC), under the CEA, responsible for the preparation of National Flood Protection Plans and their implementation; 4) Water and Power Development Authority (WAPDA), responsible for developing water and hydropower resources in an efficient manner; 5) Indus River System Authority (IRSA), responsible for regulating and monitoring the distribution of water resources of the Indus River system; 6) Pakistan Commissioner for Indus Waters, responsible for implementing and managing goals, objectives and outlines of the Indus Waters Treaty; 7) Sindh Irrigation and Drainage Authority (SIDA), responsible for ensuring equitable distribution of irrigation water in Sindh, 8); NDMA/PDMA, lead agency in disaster management activities; and 8) PMD, mandated for collection, archiving, and generation of weather/climate information.
  - PMD is the sole entity collecting weather/ climate information, while IRSA is the only authority that tracks the regulation and daily water allocation to provinces. Floods being a key hazard in the country, the development of an early warning system for floods is a key undertaking; this will require data sharing between PMD and IRSA, which is not currently in place.
  - SID, in collaboration with SRP, is working on a real-time operational DSS for Sindh Province which will allow decision makers to combine real-time information including climate and hydrological data, spatial distribution of flood from satellite imageries, and expert judgement with computer output. The system aims to reinforce present flood hazard management practices by integrating real-time hydromet data, spatial information, latest terrain representation, infrastructure

capacities and thresholds, possible flood paths after breaching a certain location, pre-assessed damages, experience of previous flood handling, and GIS-based layers of various facilities, utilities, infrastructure, inundation layers and modeling tools. The system is expected to contribute to pre-flood preparedness and post-flood recovery by adopting efficient flood damage reduction strategies.
    - Detailed outcomes and recommendations of the desk review are provided in Appendix 7.
- **User needs assessment.** Stakeholder consultation is ongoing. Some of the activities are listed below.
    - Questionnaires have been prepared for collecting information from different stakeholders. Meetings with stakeholders were held to discuss details of the questionnaire, which was shared via Google Forms by the Water Expert.
    - Primary data will be gathered through KIIs and FGDs. Relevant stakeholders in target areas will be interviewed to collect information on maintenance of data repository, interdepartmental sharing of information, and others relevant.
    - Customized user needs assessment materials are provided in Appendix 8.
- **Technical assessment.**
    - A DSS development under the Sindh Resilience Project is ongoing with the overarching objective is to understand the river morphology, flood hazard and risks and integrate all the information into a single platform for effective early warning and decision-making. The project aims to assist SID with an advanced and fully automated DSS for effectively managing the frequent flooding in the district of Sindh. The components of the project include field survey and development of high-resolution DEM models (Task-1), Flood hazard Mapping (Task-2) and establishment of a DSS (Task-3).
    - Technical assessment on the current version of the tool puts forward the following analysis/recommendations:
        - The tool is developed using open-source packages and is sustainable
        - The tool integrates flood hazard maps of different return periods for different breaching scenarios
        - There is no integration of weather forecast in the current version for predicting forecast-based potential flood situations; it is based only on upstream boundary conditions data from barrage locations.
        - The tool does not utilize vulnerability datasets for potential impact assessment
        - The current version has no dissemination and alert mechanism and does not integrate with NDMA
        - Recommendation was made by the SID for inclusion of drought risk management and water resource management mechanisms
- **DSS development.** Improvement of existing DSS for SID through integration of drought risk management and for responding to gaps identified by the technical assessment, above, will be conducted by the DSS consulting firm in Pakistan once on board.

Activity 1.2.6 Upgrading BAMIS for Agriculture -Bangladesh

Progress:

- **Procurement.** Dr. Md. Abdul Muyeed, Agriculture Expert for Bangladesh, on boarded in February 2021.

- **Sectoral focal points.** Dr. Md. Shah Kamal Khan, AMISDP Project Director, has been confirmed as focal point for DAE.
- **Consultations.** The following outlines the meetings held with various stakeholders in the agriculture sector.
    - Various meetings between RIMES and DAE facilitated the drafting of an MoU between RIMES and DAE; the MOU had been reviewed by Bangladesh Agricultural Research Council (BARC) and ERD and had been sent to the ministry for approval and signing. The MOU, among others, shall facilitate access by RIMES to the BAMIS portal.
    - Meeting with SFP, on 8 June 2021, discussed mechanisms at enhancing the existing dissemination mechanism of BAMIS viz.: incorporation of voice message broadcast in addition to its SMS system.
    - Meeting with SFP, on Jun 30, 2021, discussed the progress of MoU signing. per recommendation from MoA, the MoU reflects five (5) years collaboration, with auto renewal for another Five (5) years. The signing of MoU has been delayed because of stringent lockdown measures imposed by the GoB due to Covid-19.
- **Desk review.** Highlights from the desk review are listed below.
    - Stakeholder mapping conducted for the agricultural sector identified the following key departments: 1) BMD, as the main provider of meteorological services; 2) BWDB, as the main provider of water resources information and flood forecasting services; and both 3) DAE; and 4) National Agriculture Research System (NARS) Institute as the main generators of crop advisories for different crop stages to farmers.
    - Data available from the departments include BMD: daily and 3-hourly manually observed data on temperature, rainfall, humidity, wind speed and direction, sunshine hour, cloudiness, visibility, MSL pressure at district and upazila levels; BWDB: daily and weekly manually observed data on river water level and rainfall at district and upazila levels; and DAE: daily automatically observed rainfall data at union level, where discrepancy with rainfall data from BMD was observed.
    - Neither BMD, DAE, nor research institutions such as BARI or BRRI has a systematic way of combining meteorological information and forecasts with agriculture related information to produce tailored agromet advisories for farmers in the different Agro Ecological Zones (AEZ) to enable them to make appropriate decisions about planning, harvesting, fertilizer application, irrigation, and adjusting cropping patterns at the farm level, among others
    - The BAMIS portal is a web portal developed under the Agro-Meteorological Information Systems Development Project (AMISDP, Component C: Bangladesh Weather and Climate Services Regional Project: BWCSRP) of the DAE with a view to disseminate agromet and other related information to different users, particularly the farmers. Meteorological data from BMD and hydrological data from BWDB are translated and validated by the DAE Agromet Technical Committee; the information is then disseminated to 30,000 lead farmers and linked with other relevant stakeholders. Agromet advisories circulated through the BAMIS portal twice a week for 64 districts and weekly for the national level include information on crop, weather sensitivity on crops, pests and diseases information with weather data and control measures, crop weather calendars, etc.

- Some weather and crop related data are already available in the BAMIS portal. However, the process for generating advisories is manual, which is time consuming, cumbersome and a constraint for scaling up.
- Advisories in the BAMIS portal are mostly generic and not dynamically linked with weather information.
- Dissemination is through the portal and mobile app, which is currently not user friendly. Additionally, there are pilot projects which are using innovative dissemination mechanisms like voice broadcasting.
- Currently, portal operation is centralized and feedback on the advisories are not available.
- The current platform needs to be transformed into a DSS, stocktaking, and digitizing existing data/information from BAMIS portal.
- There is a similar proposal to enhance the BAMIS portal under Component C of the BWCSRP. The extension and proposed enhancements are yet to be approved by the NPC. Gaps could be jointly enhanced through this proposal in coordination with the CARE project. A discussion between the BWCSRP and CARE Project teams on the specific enhancements that each will undertake can avoid potential duplication and ensure optimization of resources. In addition, an agreement between the consulting firms of both projects should be in place to ensure proper turnover/ sharing of codes, etc. while enhancements are being made by both teams.
- Other relevant initiatives that CARE could learn from/synergize with are a) the RIMES Asia Regional Resilience to a Changing Climate (ARRCC) Project which aims to strengthen provision and uptake of weather and climate services across the South Asian Region by the UK Met Office (UKMO) and is piloted in Bangladesh, Nepal, Pakistan, and Afghanistan. It focuses across all meteorological timescales (weather, seasonal, climate), and is being implemented with a main goal of building climate and environmental resilience by improving the application and access to weather and climate services at regional to national levels; and b) Climate Services for Resilient Development (CSRD) project of the International Maize and Wheat Improvement Centre (CIMMYT) which promotes Participatory Integrated Climate Services for Agriculture (PICSA).
- Detailed outcomes and recommendations of the desk review are provided in Appendix 9.

- **User needs assessment.** Key completed and planned activities are listed below.
  - Tools for surveys, FGDs, and KIIs have been completed, reviewed and approved
  - Stakeholder engagements are ongoing through remote/online platforms
  - A consultation workshop at the national level is being planned with stakeholders, subject to improvement in Covid-19 situation
  - 12 FGDs are planned to be conducted with targeted communities and relevant stakeholders in 6 districts to capture diverse user requirements across different areas; this will be pursued as Covid-19 situation improves
  - KIIs are planned to be conducted with key stakeholders for obtaining information on gaps and potentials for improvements of the present weather forecasting, agriculture advisories generation and dissemination system.
  - Customized user needs assessment materials are provided in Appendix 10.

- **Technical assessment**
  - The BAMIS portal (www.bamis.gov.bd) was developed under the Agro-Meteorological Information Systems Development Project (AMISDP) - Component C of the BWCSRP funded by the World Bank for enhancing access to agrometeorological services for farming communities. The portal, hosted by DAE, receives forecast data and warning information from BMD (e.g., 3-day, 7-day, 30-day forecasts, etc.) and FFWC of BWDB (e.g., flood forecasts during the pre-monsoon and monsoon seasons); generates agricultural advisories considering the region and crop variables on best management practices, possible diseases, etc.; disseminates information through the website, mobile app, and SMS; and acts as a data hub (e.g., various crops, crop calendar, possible climatic threshold for disease and pest outbreak). Summary of portal functionality, services, data availability, products, etc. are provided in Appendix 10.
  - The BAMIS portal has been developed with a combination of open-source (for data processing, web crawling, and automation) and closed-source (web framework.
  - In its current state, the BAMIS portal can be considered as a data/ information repository of weather forecasts, crop-related information, and static advisories rather than a systematic and dynamic DSS. There is no linkage between weather forecast-derived climate products and advisory generation; localized information and alerting mechanism for agromet events (e.g., alert for blast outbreaks) is not available; advisory generation and dissemination process remains centralized; and information is not structured according to different audiences, thereby underutilizing data available in the portal.
  - Potential enhancements to the portal could cover i) customization of functionality according to user level (e.g., extension worker, regional agricultural officer, farmers, etc.); ii) integration of localized information (e.g., location-specific advisories based on upazila level-specific weather forecast products from BMD, and flood forecast information); iii) incorporation of climate projection data; iv) automation of processes to depict location and growth stage-specific crop-weather sensitivity, detection of threats, and triggering advisories from contingency tables; v) automated alerting mechanism based on thresholds; vi) decentralization of advisory generation; vii) incorporation of a localized information service delivery mechanism; viii) dynamic visualization of agromet data/information; and ix) shift of the entire system to open source web-framework to facilitate scalability and sustainability
- **DSS development.** Functionality of the BAMIS portal will be enhanced by the DSS consulting firm in Bangladesh once on board. The enhancement work will take stock of the gaps identified in the technical assessment and integrate outcomes of the stakeholder consultations, desk review and user needs assessment.

Activity 1.2.7 Improving DSS for Livestock Subsector -Bangladesh (Priority system)

Progress:

- **Procurement.** Mr. Sajib Hasan, IT Expert in Bangladesh, came on board in January 2021; while Dr. Md. Ali Akbar, Livestock Expert, joined the team in June 2021.
- **Sectoral focal points.** Dr. ABM Mustanur Rahman, Project Director of LDDP, DLS replaced Mr. Mohammad Shah Alom Biswas, Upazila Livestock Officer, as focal point for DLS.

- **Consultations.** The following outlines the meetings held with various stakeholders in the livestock sector.
    - A national consultation workshop on *Operational Livestock Advisory Services*, on 18 March 2021, shared progress of the Forecast-based Livestock Advisory Service, gathered feedback on integration of the DSS into DLS, and identified areas of improvement. The workshop was attended by key officials from DLS: Dr. Abdul Jabbar Sikder, DG and Dr. Syed Ali Ahsan, Assistant Director; BMD: Mr. S.M. Quamrul Hasan, Meteorologist and Mr. Md. Hafizur Rahman, Meteorologist; BLRI: Dr. Md. Zulfekar Ali, Scientific Officer and Dr. Sardar Muhammad Amanullah, Principal Scientific Officer; and SAC: Dr. Ashis Kumar Samanta, Senior Program Specialist. DLS appreciated RIMES for providing technical support for the livestock advisory service through this project, and the TWG for providing their expertise in DSS development. A weather-based advisory service would aid the livestock sector in making timely and appropriate decisions, considering the extensive damage brought on by floods and cyclones; the DSS could help address the shortage of staff at DLS as it is not labor intensive and easily accessed and operated. Meanwhile, BMD expressed their support to DLS through this initiative and mentioned they could provide 10-day alert for cyclones, in addition to fog, cold and heat wave forecasts, which are critical to poultry and big animals, respectively, while FFWC could provide 3-day flash flood forecast. Other BMD data relevant to the livestock sector include temperature, relative humidity, rainfall, wind speed and direction; while the Bangladesh Animal Health Intelligence System (BAHIS) portal can provide region-wise animal statistics, such as disease cases which can be useful in identifying problem areas. On another hand, as the supply is lower than the demand for vaccines, BLRI recommended integrating vaccination alerts into the DSS, for efficient planning of vaccination programs and management of vaccines (stocking), especially during high-risk events. Finally, AARC Agriculture Center (SAC) made the following recommendations: use of existing Temperature-Humidity-Index (THI) experimentally for the THI-based advisory, identification of critical temperature for livestock, and mentioned that housing structure and drainage management is critical for livestock.
    - Meeting with the newly appointed DG of DLS, Dr. Shaikh Azizur Rahman, and Dr. ABM Mustanur Rahman, Project Director of Livestock and Dairy Development Project and DLS SFP, on 10 June 2021, introduced the project; provided updates on the progress of the livestock DSS; and discussed integration of the DSS into DLS, data requirement, and endorsement of the TWG for advisory development of the DSS and the necessity of MoU between DLS and RIMES. Dr. Shaikh Azizur Rahman appreciated the initiative since use of the DSS will expedite relevant decision-making processes. DLS appreciated the proposal of signing an MoU between DLS and RIMES and assured that all required support will be provided for the successful implementation of the project. The MoU, among others, shall ensure sustainability of the system, and the endorsement of the TWG is expected to facilitate DLS to continuously work with RIMES on DSS activities. The TWG, consisting of researchers, academics, and practitioners from DLS, Bangladesh Livestock Research Institute (BLRI), Bangladesh Agricultural University (BAU), and SAC, is responsible for translating forecast information into actions and advisory generation.

    - Meeting with TWG for the livestock sector was organized on 10 January and 2 March 2021 to discuss the different components and framework of the DSS, including advisory generation. DLS informed different actions taken through LDDP projects and it was discussed how these initiatives can be linked to the DSS. For example, if a deworming database is available, outlook can be provided through the DSS when and where such actions are necessary depending on the climate. It was discussed that contingency plans can be developed and linked to the DSS to advise farmers decision options during adverse weather conditions. The TWG has also provided inputs to the development of a climate adaptive vaccination calendar for generating vaccination alert.
    - Meeting with TWG, on 29 April 2021, discussed integration of THI in DSS. TWG emphasized incorporation of THI as heat stress has severe impact on large animals and this need to be addressed in the advisory. TWG suggested that for THI index, the standard equation, thresholds, and stress condition can be used as a starting point. Additional parameters such as wind speed and direction, and solar radiance can be added at an advanced stage. Further study and projects may need to be developed for improvement of these thresholds. TWG suggested that the advisory needs to be tailored for both commercial and backyard farmers. On the other hand, the impact of heat stress is distinguishable for poultry and large animals, so the bulletin template should address these distinctions. It was recommended that disease and production data need to be linked with THI index in the future. Secondary data may be utilized in case the scope is limited. For sharing the advisories, the TWG suggested the beneficiaries from LDDP project, and any other ongoing projects can be considered. It was decided during the meeting that a draft template based on current weather conditions be shared for the inputs of TWG members along with a data table for the advisories on different stress levels of THI corresponding advisories.
- **Desk review.** Livestock expert has started a detailed desk review of the livestock sector.
- **User needs assessment.** User needs assessment will be conducted following the desk review report.
- **Technical assessment.** In summary, the following features are identified as key focus areas in the extended phase of the development of the DSS.
    - Knowledge base for forecast advisory
    - Forecast bias correction using machine learning
    - Trend analysis of population changes based on disaster events
    - Inference engine composed of production rules to query the system
    - Community-based fodder inventory system and dissemination
    - Vaccination center locator and group vaccination request to livestock authorities
    - Overall management system based on the animal life cycle
    - Linking climate change, regional perspective (RDAS) and adaptation measures
- **DSS development.** The IT Expert in Bangladesh is doing preliminary work on DSS customization for the livestock sector. The Livestock DSS shall integrate key inputs from stakeholders during the series of consultations and will further take shape as the desk review and the user needs assessment are completed. Key activities during this semester include:
    - Initial DSS framework drafted through intensive literature review, data availability analysis, and in-depth discussion with the TWG, and relevant ministry and

departments to identify which information or processes should be included in the DSS, e.g., vaccination calendar to help the public health/livestock department prepare, vaccination alert, monthly advisory based on climate data, extreme event advisory, heat stress alert based on THI index, identification of disease patterns and livestock conditions/ population and changes from region to region, location-based advisory, data requirements such as agricultural data for fodder production, etc.

- Initial work done included design and development of DLS framework, and database; data collection and integration of vaccination alert/ table, monthly advisories considering climate parameters, etc. into the system; generation of dynamic bulletins and advisories; design of admin panel and redesign of the front-end interface to visualize advisory system considering weather parameters; and identification of livestock response to short-term and long-term atmospheric conditions as seasonal climate fluctuation forecasts for enhancing livestock management.
- Ongoing work includes engine development (e.g., THI, vaccination module, advisory services), analytics and visualization (e.g., population and livestock health risk based on THI), and dissemination modules (e.g., extreme event bulletin).
- Technical report on DSS activities is provided in Appendix 12.

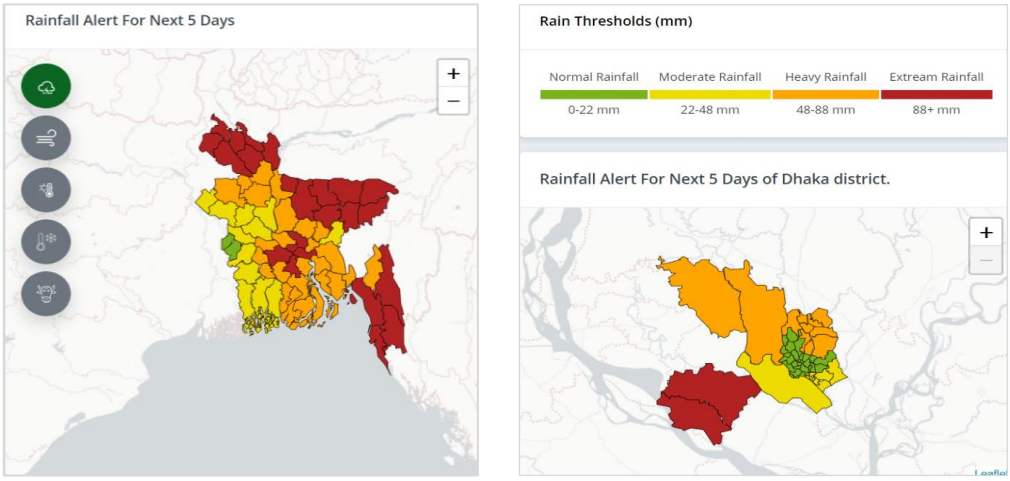

Figure 5 Color-coded weather alert

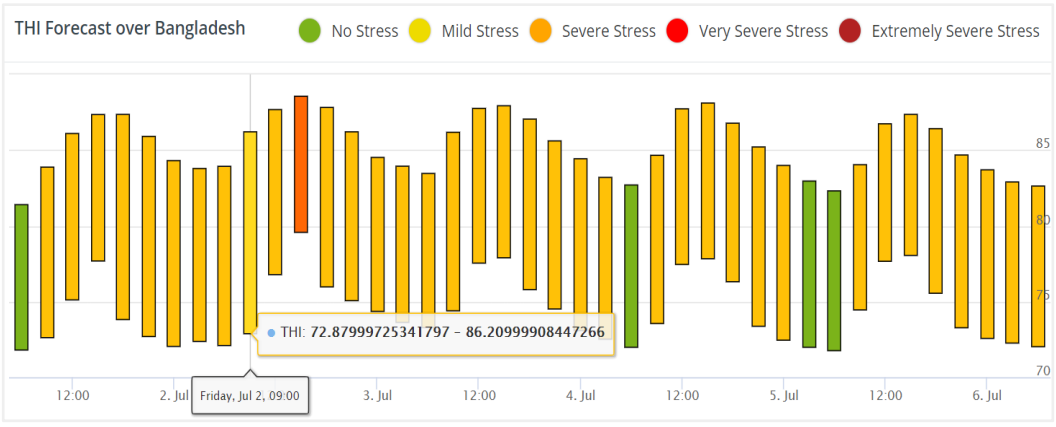

Figure 6 Derived weather product for THI

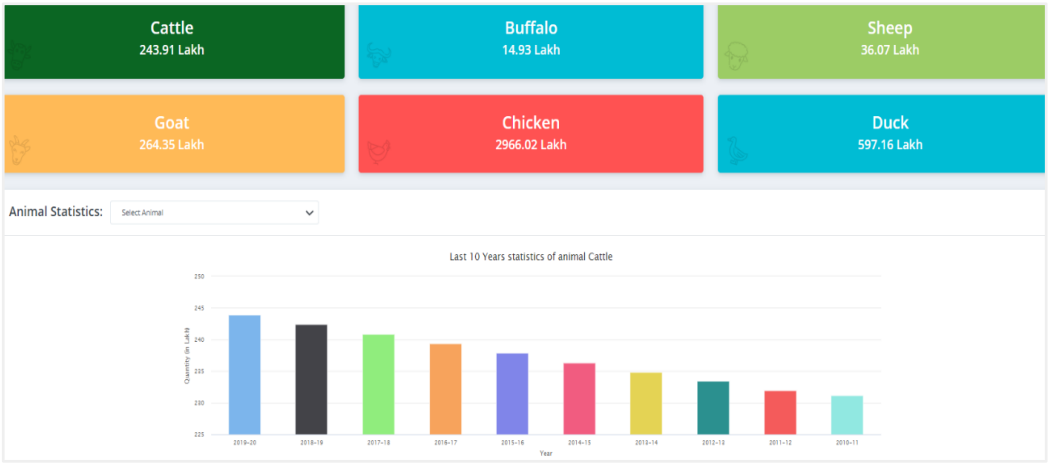

Figure 7 Livestock population monitoring and statistics interface

Activity 1.2.8 Upgrading the Online Road Network Portal -Bangladesh

Progress:

- **Procurement.** Recruitment process for the Transport Expert has been delayed and the position has been readvertised due to difficulty in selecting suitable candidates.
- **Sectoral focal points.** Mr. A.K.M. Luthur Rahman, Additional Chief Engineer & Director, has been confirmed focal point for LGED; while Ms. Anesha Das Hasi, Executive Engineer, Environmental Division, replaced Mr. Abdul Awal Molla, Superintending Engineer, as focal point for RHD.
- **Consultations.** The following outlines the meetings held with various stakeholders in the transport sector.
    - Meeting with Exec. Engr. Anesha Das Hasi, RHD SFP, on 14 January 2021, introduced CARE project, discussed the work plan and role of the SFP for the transport sector, requirements for upgrading including data requirements and process for data collection and access, among others.
    - Meeting with RHD, on 12 April 2021, introduced Component 1 and 2 to the RHD SFP, and elaborated on the DSS concept for the transport sector. SFP informed that application of climate data in the decision process of RHD is currently very limited. SFP informed that there is a pilot project ongoing to explore how climate change projections can be applied in coastal road designs. SFP informed that the HDM division in RHD is mainly responsible for storage of data but very limited is available - they mainly store the Average Annual Daily Traffic data. SFP assured that she will facilitate coordination with different divisions of RHD in the data collection process.
    - Meeting with RHD and LGED, on 30 June 2021, discussed the proposed strategic framework for resilient road development planning. RIMES requested for data sharing assistance and access to existing portals for technical evaluation and DSS development. It was discussed that a national consultant from RIMES will be on board soon and a stakeholder consultation meeting will be organized thereafter. LGED welcomed the initiative and assured cooperation in data sharing from their end.
- **Desk review.** Desk research will be conducted by the Transport Expert once on board.
- **User needs assessment.** Assessment activities will be conducted by the Transport Expert once on board.

- **Technical assessment.** User needs assessment will be conducted following the desk review report.
- **DSS development.** Improvement of the Online Road Network and transport DSS through integration of risk information, early warning, climate database and a dynamic asset database, per result of earlier consultations, and integrating outcomes from the desk review and user needs assessment, will be undertaken by the consulting firm in Bangladesh once on board.

Activity 1.2.9 Enhancement of FloCAST -Bangladesh

Progress:

- **Procurement.** Various water sector agencies are assisting RIMES in looking for suitable candidates for the Water Expert position, which is currently being readvertised.
- **Sectoral focal points.** The following focal points have been confirmed for the water sector: Mr. Mahmudul Islam, Additional Secretary, for MOWR; and Engr. Arifurzzaman Bhuiyan, Executive Engineer for FFWC, Bangladesh Water Development Board.
- **Consultations.** The following outlines the meetings held with various stakeholders in the water sector.
    - A stakeholder consultation workshop on Flash Flood Early Warning System in North-Eastern Region of Bangladesh, on 24 April 2021, presented the current mechanism of flash flood forecasting from BMD and BWDB, identified the limitations and gaps in the current interventions for flash flood early warning system, and determined potential ways of solving the issues and probable next steps for enhancing the early warning system. The workshop was attended by various government officials from BMD, BWDB, FFWC, DAE, DLS, and DDM. Discussions on flash flood warning and early action for the agriculture sector highlighted the benefits of flash flood forecasting during the 2020 Boro season, where DAE was able to take early preparation to address a potential flash flood situation on 13 April 2020 through its collaboration with BMD and FFWC. Workers from different districts were transported from the Haor area and were able to harvest almost 100% of the Boro rice. However, there was a recommendation that available lead time of less than 1 week for flash flood forecast is not sufficient and needs to be extended to at least 10-15 days, to address flash flood concerns during the boro season. For the livestock sector, flash flood issues included livestock shifting with sufficient fodder during the event and severe outbreak of disease following the event. It was also included that along with flash floods, the north-eastern region is also experiencing increased thunderstorm activities leading to casualties. It was informed from BMD that the lead time for thunderstorms is currently very limited but there is room for improving the awareness that can help reduce casualties. It was also discussed that location specific flash flood forecast if available with sufficient lead time, can be used for mobilizing mechanical harvesters/reapers and migratory labors ahead of an impending flood. FFWC informed that multiple forecasting approach e.g., event-based forecasting, probabilistic hydrological forecasting can be undertaken to improve the current skill and lead time for flash flood forecast. It was suggested by stakeholders that beside the national IVR (1090), voice message broadcasting can be introduced for forecast/warning message dissemination.
    - Meeting with FFWC-BWDB, on 27 June, discussed data availability and DSS features for FFWC/BWDB. RIMES informed the SFP regarding the project progress and plan

for the water sector developments. It was discussed that there are several types of flood forecast products at FFWC that are generated from different platforms and the need for integration of these forecast products. On the other hand, for day to day forecast generation, operational forecasters provide additional data/information from third party websites like IMD, or manually analyze data for integration (e.g., basin wise average rainfall). It was discussed that the proposed DSS under WB-CARE project can integrate the forecast products, bring in different analytics used by the forecasters and provide scope for custom analysis. SFP was informed that the need assessment process will start soon. It was suggested by the SFP that an in-house brainstorming session can be organized involving FFWC professionals to determine the features of the DSS. There could be a series of such sessions as the development makes progress.

- **Desk review.** Desk research will be conducted by the Water Expert once on board.
- **User needs assessment.** Assessment activities will be conducted by the Water Expert once on board.
- **Technical assessment.** Ongoing; expected to be completed by August 2021.
- **DSS development.** Enhancement of the FloCAST system will be undertaken by the consulting firm in Bangladesh once on board. The enhancements will include key improvements agreed with stakeholders during consultations; the tool enhancement will also be informed by the outcomes of the desk review and the user needs assessment. While the Water Expert is yet to be on boarded, initial work done include identifying components necessary for DSS in the water sector.

Activity 1.2.10 Enhancement of the Delta Portal -Bangladesh

Progress:

- **Procurement.** The Water Expert position is currently being readvertised.
- **Sectoral focal points.** The following focal points for water and planning sectors have been confirmed: Mr. Mahmudul Islam, Additional Secretary, for MOWR; Mr. Md. Hasan Shahriar for WARPO; and Mr. Nazrul Islam, Joint Chief for GED.
- **Consultations.** The following outlines the meetings held with various stakeholders in the water sector.
    - Meeting held with Senior Secretary MoWR on June 14, 2021. The Senior Secretary appreciated the support of RIMES and ADPC in the project and agreed to host the sectoral implementation workshop at the earliest. Additionally, he recommended identifying and addressing the capacity building needs of MoWR as the activities make progress in the project. The Sector Focal Point from MoWR provided essential directions for the workshop and assured necessary cooperation.
    - Meeting held with SFP at WARPO, on 28 June 2021, briefed the SFP of the project progress and plan for water sector initiatives. SFP assured his support to the project. The meeting highlighted that the current project screening in Bangladesh does not look at climate sensitivity; there is also no DSS for the purpose in the country. The meeting further underscored that the Delta Knowledge portal is outdated and not utilized for operational decision making, and its enhancement could be a focus in the CARE project, with a possibility of looking into a separate IWRM Portal at a later time. Synergy between RIMES and ADPC work in the Delta Knowledge Portal was highlighted: RIMES to focus on DSS development while ADPC focus on Delta Monitoring and Evaluation Framework.

- **Desk review.** Desk research will be conducted by the Water Expert once on board. At the time being, available information are being compiled by the Country Coordinator and will be beefed up once the Water Expert is formalized into the project.
- **User needs assessment.** Assessment activities will be conducted by the Water Expert once on board.
- **Technical assessment.** The following are initial findings vis-a-vis the Delta Knowledge Portal, particularly related to its repository of geospatial and tabular data and knowledge materials:
    - The system has not been maintained post-completion of the Delta Plan; data and materials are outdated, and some components are no longer functional.
    - The system is developed using asp.net framework which is a legacy codebase.
    - Access to metadata is restricted for public, geospatial layers and tables can only be viewed.
- **DSS development.** Enhancement of the Delta Portal will be undertaken by the consulting firm in Bangladesh once on board, taking in inputs from the consultations and outcomes from the desk review and user needs assessment.

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

Progress:

- **Procurement.** Mr. Mohammad Shamsul Alam, Planning and Finance Expert in Bangladesh joined the team in February 2021.
- **Sectoral focal points.** Mr. Md. Hasan Maruf, ERD Joint Secretary, has been confirmed focal point for MoF Bangladesh; while Mr. Nazrul Islam, Joint Secretary, has been replaced by Ms. Afrina Islam, Deputy Secretary.
- **Consultations.** Key meeting held with MoF were:
    - Coordination meeting with ERD, on 9 June 2021, explored formalization of CARE/strengthening of RIMES partnership with MoF/ERD for CARE implementation. RIMES informed ERD that in-depth discussions will take place with relevant MoF/ERD officials to assess their needs for developing the climate screening/finance portal. The assessment of needs will be undertaken through interviews, surveys, and FGDs. ERD requested the team to share the coordination mechanism of the overall project.
    - Various discussions/meetings were held with the officials of the Finance Division and the Economic Relation Division of the Ministry of Finance, and the Planning Commission for obtaining stakeholders inputs vis-a-vis the portal development.
- **Desk review.** Highlights from the desk review are listed below.
    - The Planning Commission currently has two active web portals: the Planning Commission Portal which provides information about the commission, and the Bangladesh Delta Knowledge Portal which shows details about the projects related to the Bangladesh Delta Plan 2100.
    - The Ministry of Finance has three active web portals: the Finance Division Portal which provides information about the division; the Economic Relation Division Portal which highlights the work of the division; and the Support to Sustainable Graduation Project Portal which shows details of activities related to Bangladesh's sustainable graduation from the least developed country status.
    - Despite their availability, it is unclear how the information on the web portals are/can be used in decision-making. The web portals lack some data/ information

for gaining better understanding of the planning, financing, or budgeting process in the government.
    - Review of available portals suggests insufficient data/information and analytics to aid climate-informed decision making in the sector. The proposed climate planning and screeding DSS is anticipated to address this gap. The DSS could include a Climate Change Web Portal customized for the requirements of the Finance Division, the Economic Relation Division, and the Planning Commission.
    - Detailed outcomes and recommendations of the desk review are provided in Appendix 13.
- **User needs assessment.** Stakeholder engagements are ongoing. Key activities are outlined below:
    - Completion of tools for surveys, FGDs and KIIs
    - Conduct of assessment activities, through phone calls or online platforms, are planned; face-to-face engagements with stakeholders will be pursued as in-country Covid-19 situation allows.
    - Customized user needs assessment materials are provided in Appendix 14.
- **DSS development.** DSS for finance and planning ministries will be developed by the consulting firm in Bangladesh once on board. DSS for climate planning and screening, which includes a Climate Change Web Portal, is identified as a potential DSS for Finance, ERD and Planning; the completion of the user needs is expected to firm up the DSS required by the institutions.

Activity 1.2.12 Supporting DHM -Nepal (Priority system)

Progress:

- **Procurement.** Booth the Country Lead and the IT Expert in Nepal have been onboarded in 2020.
- **Sectoral focal points.** Mr. Ram Gopal Kharbuja, Joint Secretary, Hydrometeorology and Environment Division has been confirmed focal point for MoEWRI; while Dr. Indira Kadel, Senior Divisional Meteorologist, has been confirmed focal point for DHM.
- **Consultations.** Amid issues in project endorsement and formalization, activities are progressing well due to RIMES partnership with DHM. The following synthesizes meetings undertaken during the semester:
    - Meeting with DHM SFP, Dr. Indira Kadel, and Mr. Kamal Ram Joshi, DDG, Hydrology, on 8 February 2021, discussed the work plan for 2021. The annual workplan for DHM has been finalized, with focus on weather forecast verification and bias correction for meteorology; and Flood Impact DSS for hydrology, to be initially piloted in Babai River Basin for the first year and for expansion to other river basins, e.g., Narayani and Kamali, in the following year. DHM recommended to submit a 5-year work plan to avoid duplication with other activities/projects and ensure complementarity with budget preparations, as well.
    - Meeting with DHM SFP, Dr. Indira Kadel, Dr. Jagadishwor Karmacharya (DDG) and Dr. Archana Shrestha (DDG), on 4 March 2021, discussed the work plan and activities. DHM recommended building on the existing portal to optimize resources. Regarding the meteorology component, DHM recommended to include verification of parameters other than rainfall and to support 7-day ECMWF forecasting and nowcasting. The new system that RIMES will develop will be integrated within the existing system.

- **Desk review.** Highlights from the desk review are listed below.
    - Although DMH has relatively better capability in operating hydrological and meteorological stations and collecting hydrological and climate data, processing and publication of collected hydro-meteorological data, and short-term forecasting, it has relatively inadequate capacity in establishing and operating real time weather and hydrological stations, collecting snow and glaciological data, management of real-time data, medium and long-range weather forecasting, hydrological and hydraulic modeling, impact based forecasting, forecast verification and bias-correction, understanding and forecasting climate extreme events, developing and communicating early warning products, and responding to multi-sectoral user's needs on climate information.
    - Some of the major gaps are i) inadequate coverage and sustainability of hydro-meteorological stations, ii) lack of real-time data management system, iii) inadequate level of technical capabilities in modeling and forecasting of extreme climate events, iv) lack of modeling software and computing resources for many hazards, v) inadequate communication and dissemination systems to provide timely, accurate and meaningful forecasting and early warning information down to the level of communities, and vi) lack of comprehensive DSS to provide customized weather, climate and hydrological information to users.
    - Some of the priority actions recommended for strengthening the capacity of DHM are i) improvement of the hydro-meteorological data collection, data processing, modeling and forecasting process, ii) production of customized information for different sectors and users, iii) improvement of data transmission and communication system, iv) development of decision support system, v) development of feedback mechanisms between DHM and institutional/end-users to facilitate evaluation and improvement of the system, and vi) training and capacity building of DHM staff in data management and modeling.
- **User needs assessment.** Consultations with DHM, which will feed into the user needs assessment, have been conducted.
- **Technical assessment.** Following priority activities have been identified:
    - Development of web portal for weather forecast verification and bias correction will include development of visualization interface, verification module, forecast bias correction module, and metadata management module.
    - Development of flood impact DSS will include data collection, quality control and processing; enhancement of FLoCAST; development of an integrated data acquisition platform, data analytics, dashboard, visualization, report generation and dissemination, functionality to integrate DHM forecast with Ensemble Forecast products, and flood impact forecasting module.
    - Improvement of flood forecasting system will include collection and processing of observation data; short, medium, long-range rainfall forecast data collection and processing; generation and integration of bias-corrected rainfall/ error correction model into hydrological model and generation of water level/ discharge forecast, etc.
    - Development of long-lead weather forecasting system will include customization of ECMWF forecast of various lead times (7 days, 10 days, monthly); a web portal will be developed to visualize and export forecast data.

- Development of nowcasting system will include the visualization, interpretation, analysis, and presentation of weather data to facilitate the detection, monitoring and forecasting (now-casting) of significant local weather phenomena (thunderstorm, hailstorm, lightning strikes (thunderbolt), windstorm, snowstorm, heatwave, cold wave, monsoon onset/withdrawal, gust fronts, heavy precipitation, flash flooding, heavy convection, dry spell etc.) at a specified time interval (hourly to daily).
- Development of MIS will facilitate management of hydrological and meteorological service information from field offices to DHM through provision of tools for organizing, evaluating, and efficiently running the department
- Development of climate information products (e.g., real-time weather data; short, medium, long-term climate forecast; seasonal climate outlook; forecast for floods, landslide, drought; hazard, vulnerability, and risk, etc.) for National Framework for Climate Services for 8 key sectors.
- Development of climate information products for NAMIS.
- Technical report on assessment of DMH's needs and requirements is provided in Appendix 15.

- **DSS development.** The DHM portal is being customized for hydrology (Flood Impact DSS for Babai river basin) and meteorology (weather forecast verification and bias correction) and. Some activities conducted by the IT Expert in relation to DSS design and development are outlined below.
  - Initial work done, in collaboration with Country Technical Lead, involved system design along with languages and technology stack to be used in development of the impact-based forecasting system; preliminary analysis and identification of the system to be developed for the hydrology component, including data requirements and sources; detailed analysis of the system to be developed for the meteorology component, including weather forecast verification and bias correction.
  - Preliminary analysis of RIMES' FloCAST system, including algorithm and libraries used for impact-based forecasting; review of other existing flood systems; review of different impact modeling methods, for quantifying exposure and vulnerability data to calculate risk; design and development of the DSS framework (enhancement of FloCAST); development of an integrated data acquisition platform (integrating data from the DHM portal); data collection and integration of hazard and exposure datasets as well as algorithm to generate impact, into the system; integration of forecast from DHM and ensemble forecast products; quality control of datasets; classification of various parameters according to appropriate thresholds; and customization of graphic user interface for the DSS.
  - Additional work included updating and integration of a new HEC-RAS model in the existing system, which provides results daily; updating of HEC-HMS model for water level and discharge level forecast of Babai river basin; improvement of data processing pipeline of the FloCAST system; updating raw rainfall forecast data in the DSS, etc.
  - Development of the flood impact forecasting module (e.g., integration of localized data for floodplain mapping and impact assessment; development of simulation scenarios and modeling), data analytics module, dashboard and visualization, report generation and dissemination module.
  - Technical report on DSS activities is provided in Appendix 16.

Activity 1.2.13 Upgrading NAMIS -Nepal

Progress:

- **Procurement.** Mr. Damodar Kanel, Agriculture Expert in Nepal, joined the team in January 2021.
- **Sectoral focal points.** Mr. Shankar Sapkota, Senior Agri-Economist and MoALD Under Secretary, is the current focal point for MoALD.
- **Consultations.** Although MoALD requires formal endorsement from MoF to initiate project activities and allow access to the NAMIS portal, several meetings have been held with stakeholders in the agriculture sector as outlined below.
    - Meeting with Mr. Shiv Nandan Shah, Project Director, PPCR, on 21 January 2021, discussed the NAMIS handover, associated issues, and challenges.
    - Meeting with Dr. Amit Timilisina, NARC, on 18 February 2021, discussed the status of agro-advisory bulletins and issues and challenges associated with its preparation, dissemination, and feedback.
    - Meeting with Mr. Saroj Kanta Adhikari from the Agriculture Information and Training Centre (AITC), on 23 February 2021, discussed project details and status of the NAMIS portal. He mentioned several ministry plans that could be incorporated within the NAMIS portal such as creation of a common portal for all information related to agriculture, providing access with restrictions to local level users to fill basic information, e.g., population, production; development of a mobile application to view this portal; and integration of FAQs from the 'Kishan Call Center' and agriculture-related news.
    - Meeting with MoALD Secretary, Dr. Yogendra Kumar Karki, MoALD Joint Secretary Dr. Shreeram Ghimire and MoALD SFP and Under Secretary, Mr. Shankar Sapkota, on 28 February 2021, introduced the project and discussed plans moving forward. During the meeting, a recommendation was made to set up a steering committee chaired by MoF Secretary and vice-chaired by NPC Secretary, to be effective. In addition, MoALD ensured complete support to the project once the process has been formalized.
- **Desk review.** Highlights from the desk review are listed below.
    - Stakeholder mapping conducted for the agricultural sector identified the following key ministry and departments: 1) MoALD, responsible for growth and development of the agriculture sector in the country; 2) DoA, responsible for bridging role between agricultural research and extension; 3) AITC, responsible for orienting and motivating farmers to adopt/practice knowledge-based agriculture through establishing linkages between farmers, agricultural extension workers, and researchers through mass media communication technologies; 4) Nepal Agriculture Research Council (NARC), responsible for researching and recommending appropriate agro-technologies suitable to various agro-ecological zones for the country's diversified crops, livestock, fisheries, etc.; 5) Provincial Ministry of Land Management, Agriculture & Co-operative (MOLMAC), responsible for agricultural development and integration of climate change in agriculture in the provincial policies and programmes; 6) Directorate of Agriculture Development (DoAD), responsible for overseeing agriculture extension and coordinating agricultural development activities through the Agriculture Knowledge Centers; 7) Krishi Gyan Kendra, frontline agriculture extension units in the current federal structure; 8)

Municipalities, responsible for agricultural extension; and 9) farmer groups and cooperative.
    - The Pilot Program for Climate Resilience (PPCR) project was instrumental in bringing together MoALD, NARC, DHM, and AITC together to develop and disseminate agro-advisory based on weather forecasts developed by DHM. It has pulled together the hydromet, agricultural research and extension, markets, and ICT expertise in providing a range of decision support information through a single gateway, the NAMIS portal.
    - The Nepal Agriculture Management Information System (NAMIS) is an online repository and gateway to a gamut of information, forecasts, and advisory related to agriculture, livestock, and fishery; and linked to MoALD, NOA, NARC, and other webpages. It provides timely delivery of agro-climatic and weather information under early warning systems to farming communities to increase agricultural productivity and reduce losses from climatic hazards. It is a decision support tool to farmers, and other stakeholders.
    - Following services are available in the NAMIS portal: Agromet Advisory Bulletin (AAB), a weekly bulletin based on historical data and 7-day forecast for crops (e.g., cereals, fruits, vegetables, cash crops, etc.), livestock, fishery, and forage crops; agricultural statistics (e.g., area, production, productivity); market price of agricultural commodities in different wholesale and retail markets; 3-day weather forecast; flood early warning system -API linked with DHM's flood early warning system; drought monitoring -API linked to ICIMOD's platform; e-library; fertilizer calculator; agri-insurance, etc.
    - Although, numerous information systems, portals, apps have been developed, most of these provide the same information and share a common problem, that is, these are supply driven, being more information repository than advisory and lacking differentiated and targeted information/ advisory for different stakeholders and actors, on policy, programs, and practice.
    - There are challenges in documentation culture, lack of available desk or online information, required discussions with key people having institutional knowledge.
    - Due to the federal structure, interaction with local and provincial governments is needed to understand their real needs in terms of climate services and data. A bottom-up planning process through talking with local and provincial authorities, to figure out their demands or contents that need to go into the DSS could be employed.
    - Detailed outcomes and recommendations of the desk review are provided in Appendix 17.
- **User needs assessment.** Stakeholder engagements are on-going. Some of the activities during the semester are listed below.
    - Questionnaires for conducting FGDs and KIIs have been completed
    - A virtual consultation with a municipality and Krishi Gyan Kendra officials in Arghankhanchi and Gulmi districts was organized by the Agriculture Expert to understand local weather and climate needs for local level planning, where stakeholders highlighted the need for downscaled and localized climate and weather information to support local level planning.
    - FGDs will be undertaken with farmers to understand their weather/ climate information needs vis-a-vis their management practices and decisions on, varietal

choices, seeds and inputs usage, scheduling of irrigation, use of fertilizer/ pesticides, harvest, and post-harvest practices, etc. At least one FGD will be undertaken with one of the active farmers' groups in Lumbini province, where final list will be made in consultation with the Krishi Gyan Kendra. Questionnaire-guided semi-structured interviews will be undertaken with selected actors/ stakeholders (key informants) representing the federal, provincial, and local authorities involved in making and implementing decisions in the agriculture sector. The final interview list will be made in consultation with MoALD.
    - A half-day stakeholder consultation will be organized in Kathmandu with representative participants to discuss and agree upon sectoral weather and climate service needs in agricultural decision-making, noting preliminary findings of KIIs and FGDs and validating these information.
    - Customized user needs assessment materials are provided in Appendix 18.
- **Technical assessment.** The following are key findings:
    - NAMIS is a web portal of the MoALD to provide agro-advisory to the farmers. It aims to provide critical and timely agro-climate and weather information to farmers in order to increase productivity and reduce losses from meteorological and hydrological hazards. Other objectives of NAMIS are to provide a mechanism to deliver timely relevant agro-climate and weather information under early warning system; to provide open data access for information and web portals; to build ICT assisted communication opportunities to strengthen the voice of the farmers on agricultural issues; to reduce the impacts of extreme climate related events; to protect lives and assets; and to support agriculture livelihoods.
    - The following climate information products need to be integrated in NAMIS:
        - Historical climate datasets (normal, trends, maximum and minimum values)
        - Climate monitoring (real-time, daily, weekly, monthly, seasonal)
        - Climate watches (nowcast, short and medium range forecast of precipitation, temperature, floods, landslides, drought, hailstorm, windstorm)
        - Monthly/Seasonal/Decadal climate predictions
        - Climate change projections
        - Hazards, impacts, vulnerability and risk analysis and mapping for agriculture and food security sector (present and future)
        - Adaptation options for agriculture and food security sector
- **DSS development.** Improvement of data flows and functionalities of the existing NAMIS portal will be undertaken by the consulting firm in Nepal once on board, integrating key stakeholder requirements based on consultations, desk review, user needs assessment and technical assessment.

Activity 1.2.14 Development of DSS for Transport Sector -Nepal

Progress:

- **Procurement.** Transport Expert for Nepal, Mr. Manoj Shrestha, will be on board in July 2021. Meanwhile, the Regional Transport Expert has been covering transport-related activities.
- **Sectoral focal points.** Mrs. Pushpanjali Khanal, GESU Unit Chief, has been confirmed as focal point for DoR; while Mr. Krishna Bahadur Katwal, Senior Divisional Engineer, has been confirmed as focal point for DoLI.

- **Consultations.** Several meetings have been organized with DoLI and DoR stakeholders. These include:
    - Meeting with DoLI SFP Mr. Krishna Katwal, DoR SFP Ms. Pushpanjali Khanal, on 18 January 2021, discussed project details, existing systems within the transport sector and updates on the project's formalization process.
    - Meeting with DoR, Mr. Arjun Jung Thapa, DG; Ms. Pushpanjali Khanal, Chief of Geo-Environment and Social Unit and DoR SFP; and other DoR officials, on 24 June 2021, discussed potential synergy between CARE project and ongoing initiatives by the DoR, viz.: proposed framework for resilient transport planning linking Components 1 and 2 via the DSS, and linking detailed risk assessment to the DSS. DoR appreciated the project and its potential benefits in planning, management, and decision-making in the transport sector, in the light of extensive damages to road infrastructures brought by torrential rains, floods and landslides during the monsoon season; DoR committed providing institutional and administrative, as well as data support RIMES. RIMES assured DOR of the latter's involvement throughout the DSS design and development process, for effectively responding to institutional requirements.
- **Desk review.** The desk review will be undertaken by the Transport Expert once on board.
- **User needs assessment.** Pending on boarding of the Transport Expert, user needs assessment questionnaire for guiding KIIs has been initiated by the Regional Transport Expert. Completion of other user needs assessment materials will be undertaken by the Transport Expert.
- **DSS development.** Development of a DSS for the transport sector that, among others, will integrate existing climate risk assessments for resilient rural/ local roads network will be undertaken by the consulting firm in Nepal once on board. The components and functionalities of the DSS for the transport sector will be further defined as the consultations, desk review and user needs assessment are completed.

Activity 1.2.15 Enhancing the Public Finance Management System for MOF - Nepal

Progress:

- **Procurement.** Finance Expert in Nepal have been onboarded in 2020.
- **Sectoral focal points.** Mr. Kamal Bhattarai, MoF Under Secretary, replaced Mr. Ishowri Prasad Aryal as focal point for MoF.
- **Consultations.** Informal meetings held with MOF in relation to project coordination, implementation, and DSS enhancement are outlined below.
    - Meeting with MoF SFP, Mr. Ishowri Prasad Aryal, and Section Officer, Mr. Shivalal Neupane, on 20 January 2021, discussed details of the project, shared the approved work plan and received updates on the formal communication with other agencies. According to MoF, the ministry will be sending the endorsement letter to ministries and agencies following receipt of approved project documents from the World Bank.
    - Meeting with MoF SFP, Mr. Aryal, on 8 February 2021, obtained updates on the formalization of CARE project in Nepal.
- **Desk review.** Highlights from the desk review are listed below.
    - DFID is working on modifications in the budget system, CARE initiatives need to be harmonized with initiatives of other donor agencies.
    - Several Public Financial Management (PFM) DSS tools (LMBIS, BMIS, FMIS, TSA, CGAS, RMIS, PAMS, PLMBIS, SuTRA) are currently available for systematic recording

of financial activities of the government. These systems are used to process, compile, and analyze the financial activities of the government.
    - The existing PFM DSS are used at the federal, provincial, and local levels. However, the PFM DSS in the provincial and local levels are just evolving and need improvement. Meanwhile, the PFM DSS in the federal level is already improved. Therefore, it will be a practical approach to assess the strengths, weaknesses and gaps of the PFM DSS in the federal level at the first stage and suggest improvements for effective climate change financing. The improvements for the DSS in the provincial and local levels will be carried out at the second stage, after the changes are identified in the PFM DSS in the federal level.
    - Sectoral and climate-related information are not linked with the existing PFM DSS, as it is expected that sectoral agencies have their own DSS to capture specific sectoral information, including climate-related information.
    - Getting the stakeholders to accept the modifications to be made on the PFM DSS is more challenging than developing a new system. The implementation of a CARE DSS is possible only when relevant government agencies own the initiatives. For this to happen, a clear plan of action, collaboration and robust institutional mechanism are the prerequisites.
    - Several development partners are engaged in streamlining climate finance in Nepal. Therefore, there is a need to build consensus on policy reform agendas among the development partners to avoid duplication and contradicting interventions on climate financing. Hence, the DSS improvements would be enforced through the single door system of PEFA and MDTF framework.
    - Detailed outcomes and recommendations of the desk review are provided in Appendix 19.
- **User needs assessment.** Key activities for the semester are provided below.
    - Tools for undertaking the user needs assessments have been completed. Customized user needs assessment materials are provided in Appendix 20.
    - Stakeholder engagements are ongoing.
- **Technical assessment.** Technical assessments will be completed upon formalization of the project.
- **DSS development.** Improvement of PFM information system for climate budget allocation, tracking expenditure, monitoring sustainability and assessing investment results in climate-related sectors and integrating key inputs from the consultations, desk review, user needs assessment, and technical assessment, will be undertaken by the consulting firm in Nepal once on board. Pending onboarding of the consulting firm, an assessment of the LMBIS have been undertaken.

Activity 1.2.16 Enhancing the DSS for NDRRMA -Nepal

Progress:

- **Sectoral focal points.** Mr. Rajendra Sharma, Senior Divisional Hydrologist, is the current focal point for NDRRMA.
- **Consultations.** The following outlines the meetings held with NDRRMA.
    - Meeting with NDRRMA SFP and Chief Executive, Mr. Anil Pokhrel, Undersecretary, Mr. Janardan Gautam, on 2 March 2021, introduced the project and discussed NDRRMA-related activities in the project. NDRRMA took keen interest in the proposed impact-based forecasting system and suggested linking DHM portal and

forecasts to NDRRMA, considering loss and damage data which NDRRMA can collect from the local level. NDRRMA noted that disaster risk reduction and climate change should not be taken separately, and that the current system should incorporate the financial aspect of risk assessment.

  - Meeting with NDRRMA Chief Executive, Mr. Anil Pokhrel; Joint Secretary, Ms. Anita Niraula; Senior Divisional Hydrologist, Mr. Rajendra Sharma; on 10 June 2021, presented and discussed synergy of CARE project with NDRRMA's ongoing initiatives, viz.: implementation framework and linkages between Component 1 and 2 through the DSS that will be developed. Mr. Pokhrel expressed his gratitude to RIMES since the DSS could be a great help for decision-making in the early warning system and other decisions. The meeting underscored that NDRRMA is working towards an approach, with MoF, MoFAGA, and DoLI, to rate municipal governments based on their performance to construct resilient roads and identify which of these municipalities will require more technical support. A meeting with such ministries and departments could be organized to identify areas hardly hit by climate change induced hazards. He also suggested utilizing outcomes from the study made by UK Met Office, DHM and DMG on developing an impact-based early warning system for landslides focusing on gathering available risk information using the disaster portal. Mr. Sharma commented that the risk assessment will be useful for DSS and resilient road planning and that NDRRMA will be happy to support data as well as facilitate coordination with other departments for similar data access. RIMES assured complementarity between the DSS and the Building Information Platform Against Disaster (BIPAD) portal and that NDRRMA can make use of climate-related information from the DSS to issue advisory for safe travel.
  - The DSS component for NDRRMA is not initially included in the project, but due to demand from NDRRMA, the required DSS will be undertaken.

- **Desk review.** The desk review will be undertaken by the Disaster Management Expert.
- **User needs assessment.** Some preliminary user requirements were collected during consultation meetings. Completion of user needs assessment will be undertaken by the Disaster Management Expert.
- **Technical assessment.** The technical assessment will be undertaken by the Disaster Management Expert.
- **DSS development.** DSS for resilient road planning, for rating municipalities and identifying those that require more assistance in integrating resilience in road plans.

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

Activities that will contribute to overall progress and achievement in output 1.2.2 are expected to begin in Year 2021.

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 – Dec22	
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 – Jun22	
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 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 Enhancement of DSS engine	Jul21 – Dec22	

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

Activities that will contribute to overall progress and achievement in outcome 1.3 are provided below.

Activity/ Sub-Activity	Status*	Remarks
1.3.1 User engagement		
1.3.1.1 Video production	Jan21 – Jun25	Ongoing preparations
1.3.1.2 Webinar	Jan21 – Jun25	Completed 2 webinars
1.3.1.3 Hackathon	Apr21 – Dec24	Pending onboarding of DSS CF
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 – Mar24	
1.3.2.3 Sector-specific ToT on DSS product application	Oct23 – Mar24	

Activity 1.3.1 User engagement

Progress:

- **Video production.** A video to introduce the project, and its latest accomplishments, is being planned to further stakeholder awareness and appreciation of the project, its objectives, on-going and planned activities and targeted/potential benefits. Ongoing preparations by the ICKM Specialist for the first video production include design and

development of concept, content, format, animation requirements, and script, among others.

- **Webinar.** Stakeholder engagement in the project, at the regional level, is sustained through a series of webinar events designed to introduce the DSSs, their application and benefits to relevant sectors, and obtain feedback for enhancements. The events have been participated by various project stakeholders in the agriculture, water, transport, planning, and finance sectors, where short presentations were delivered by professionals in the field, followed by breakout sessions to receive stakeholder inputs crucial to DSS development.
    - The webinar series entitled *Decision Support System (DSS) for Understanding and Reducing Climate Risks* is divided into 6 different episodes, 90 minutes each, and delivered online by Zoom. Webinar brief, agenda, landing page, invitations, notification and presentations templates, polling and survey questions, social media posts and post-event web story were developed for supporting the webinar.
    - The first webinar episode, entitled An Overview of DSS, on 3 March 2021, provided a general overview of the DSS, its components and functionalities, and how information generated from the DSS is integrated into development plans or investments. Three presentations on DSS overview, DSS application for agriculture and DSS application for disaster risk management were followed by sector-specific breakout sessions for agriculture, planning and finance, water resource and transport sectors in the 3 countries. Key highlights were presented by each group during the open discussion.
    - The second webinar episode, entitled DSS for Agriculture Sector, on 4 May 2021, explored the role of IT in climate-smart agriculture, operational challenges in decision making for agriculture in South Asia, and DSS component for climate-smart agriculture. The presentation from Bangladesh introduced the BAMIS portal and operational challenges in decision making for agriculture in South Asia; for Bhutan, the operational Agromet DSS; while the presenter from India discussed agro-advisory services provided by IMD.

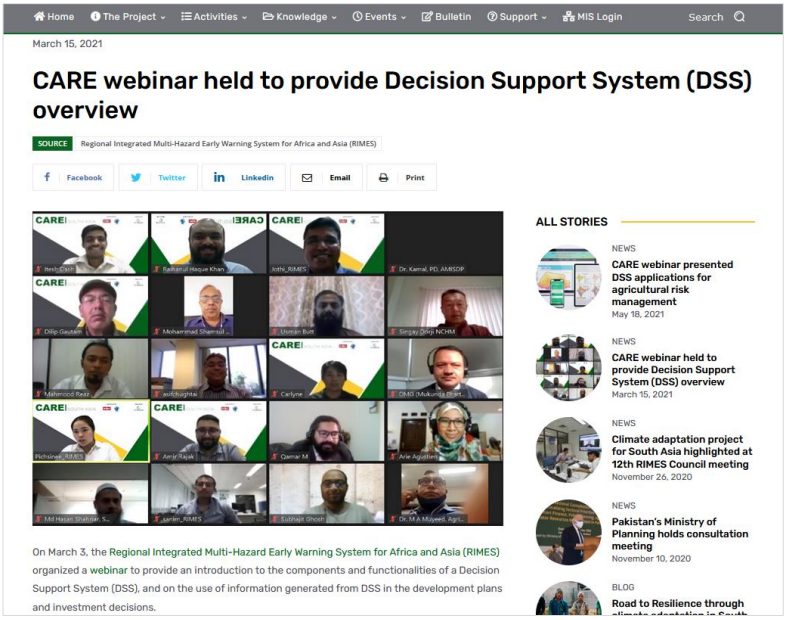

Figure 8 First webinar episode published on CARE MIS website

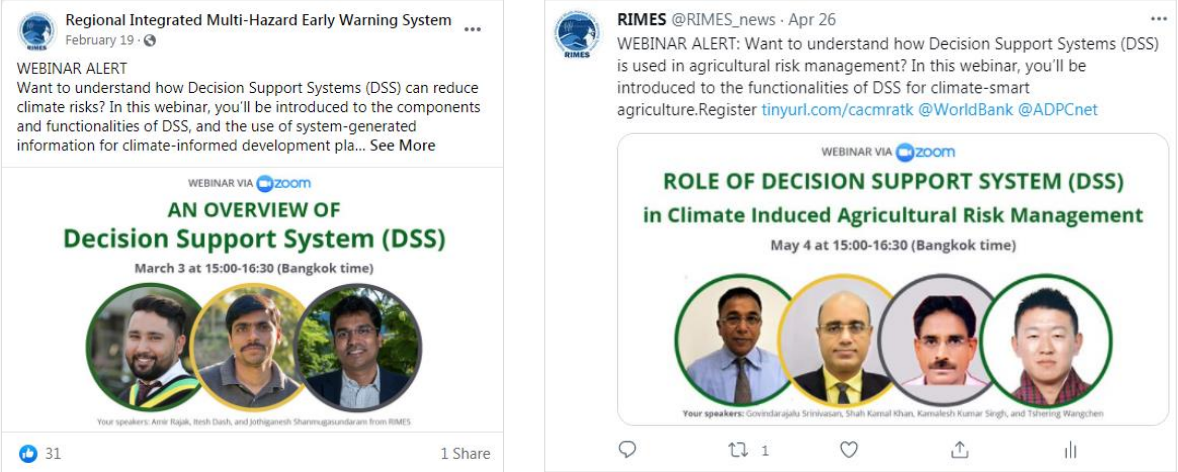

Figure 9 Webinar presenters on RIMES' Facebook and Twitter accounts

- **Hackathon.** Amid the Covid-19 situation, virtual hackathon events will be considered upon onboarding of consulting firms in the 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[2]

Component 3: Project Management and Implementation Support

Under this component, activities in the first semester of 2021 focused on staff recruitment; procurement of various consulting firms; securing World Bank approval of the revised budget and procurement plans based on adjustments made to the work plan following stakeholder consultations in December 2020; ensuring that basic guidelines on RIMES human resource, procurement and finance policies, in accordance with the World Bank, are well circulated and understood by project staff; user engagement activities to increase stakeholder awareness; organization of the project MIS and coordination mechanisms with ADPC; in addition to the regular documentation, monitoring and reporting of the project.

Activity 3.1.1 Enhancement of HR, procurement, and finance systems

Progress:

- Consultations with World Bank on the procurement method for hiring a consulting firm for strengthening RIMES procurement and finance systems have been undertaken following World Bank's advice to shift from CQS to QCBS. Customization and

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

operationalization of the accounting software procured last year is being managed by the Finance Management Specialist and Project Accountant.

Activity 3.1.2 Documentation, dissemination/ knowledge-sharing

Progress:

- **ICKM.** Activities for this reporting period included migration of content to the project's official front-end MIS website (www.careforsouthasia.info), development of content for, and maintenance of, website and social media platforms (e.g., Facebook, Twitter, etc.) to increase project visibility, organization and maintenance of stakeholder mailing lists, co-development with ADPC of the second volume of the project's newsletter shared with stakeholders in May 2021, and participation in relevant project meetings.
-

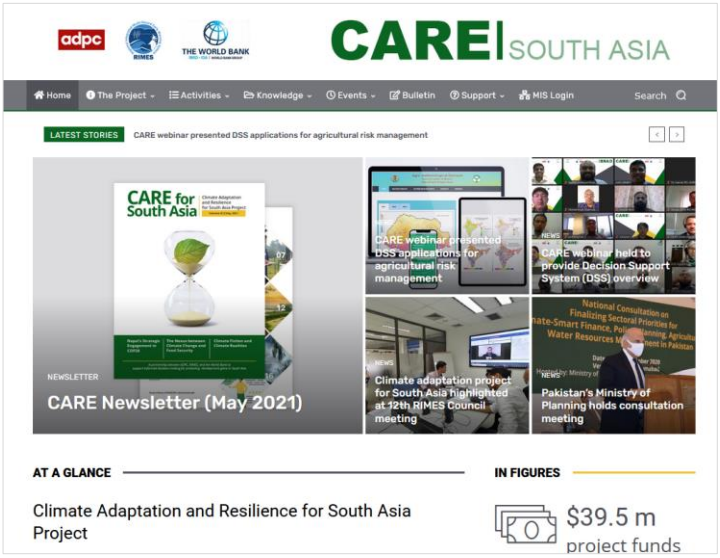

Figure 10 CARE Volume 2 Newsletter published on CARE MIS website

- **Meetings.** Joint meetings between World Bank, RIMES and ADPC were held virtually from January to April 2021; meeting outcomes are outlined below.
  - On 28 January, the team discussed the CARE Project front-end MIS website (careforsouthasia.info), CARE newsletter, and joint CARE communication plan.
  - On 16 February, discussions included the joint event plan for CARE activities and March 2021 events, e.g., RIMES webinar and ADPC CAP South Asia Forum.
  - On 9 March, RIMES reported on the webinar event completed on 3 March.
  - On 8 April, the team discussed plans for the developing an online knowledge hub for CARE, webinar event on May, and World Bank's weekly newsletter, which can be used to promote CARE-related events.
- **Documentation.** The following project documents have been reviewed and approved by World Bank during this reporting period.
  - Annual budget plan - following approval of the annual work plan for 2020-21, the annual budget plan for 2020-21 has been revised and submitted to the World Bank on 5 February 2021 and approved on 23 March 2021.
  - Annual procurement plan - following stakeholder discussions, the annual procurement plan has been revised to integrate stakeholder requirements and approved by World Bank on 16 May 2021.
  - Regular meetings established to monitor the status of project implementation and streamline national, regional and IA-level coordination were documented:

        - CWG Meeting – monthly inter-agency coordination meetings facilitated by RIMES and ADPC
        - TWG Meeting – monthly inter-agency technical 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 detail the status of coordination and progress of project activities:
        - Country-specific monthly progress report, including activity report
        - Quarterly financial monitoring reports
        - Bi-annual reports
        - Technical report - reports accomplished within this reporting period and appended to this progress report, are as follows:
            - 8 desk review reports for the agriculture, water, finance and planning sectors in Bangladesh, Nepal and Pakistan
            - 6 customized user needs assessment materials and tools for the agriculture, water, finance and planning sectors in Bangladesh, Nepal and Pakistan
            - 2 technical assessment reports for BAMIS, Bangladesh and DHM portal, Nepal
            - 4 technical reports on development of priority systems

Activity 3.1.3 Project implementation support, monitoring, evaluation and reporting
Progress:

- **Coordination.** On 19 April 2021, Mr. Hemang Karelia took over the CARE project replacing Mr. Haris Khan as Task Team Leader; while a change in management of CARE Component 1 will take effect on 1 July 2021, with Ms. Ruby Rose Policarpio replacing Ms. Carlyne Yu as Project Director. On another note, a mechanism has been established in January 2021 by RIMES and ADPC PIUs to ensure smooth coordination and implementation of jointly organized events; while regular coordination between RIMES and ADPC country staff ensures synchronization of inter-agency activities, e.g., joint consultation meetings with stakeholders, identification of sectoral focal points, data sharing, etc.
- **Procurement**
    - **Staffing.** As of 30 June 2021, the process for hiring for country staff in Nepal has been completed. For Pakistan, only the Project Associate position remains vacant; while for Bangladesh, the transport and water expert positions have been readvertised due to difficulties in finding suitable candidates in the respective sectors. In addition, national experts requested for a no-cost extension of their contracts due to Covid-19 restrictions which limited physical meetings, data collection and slowed down project implementation in the countries. Meanwhile, ToRs of consulting firms in the countries have been shared with the beneficiary ministries and departments for their feedback and submitted to the World Bank for review and approval in May 2021. Delays in the procurement of these consulting firms set back DSS development activities from April 2021. On a regional level, ToRs

for Data Analysts are being reviewed for submission to the World Bank in July 2021; hiring process for the Procurement Specialist position has been restarted following failure of the first procurement process and is now in the selection stage, while processes for hiring financial auditor and consultant for strengthening RIMES procurement and finance systems are ongoing. Currently, the project team consists of 53 out of a planned 60 team members. This includes the following:

- **PIU Staff (11/15):** Project Director, M&E Specialist, Project Analyst, Finance Management Specialist, Project Accountant, ICKM Specialist, ESD Specialist, Country Technical Lead -Nepal, and 3 Country Coordinators
- **Sectoral Team (23/26):** Climate Application Specialist, Climate Scientist, Regional Agriculture Expert, Regional Water Expert, Regional Transport Expert, Regional Planning and Finance Expert, eLearning Specialist, 4 Data Analysts, 3 GIS Specialists, 3 Agriculture Experts, 1 Livestock Expert, and 1 Water Expert, 4 Planning and Finance Experts
- **DSS Team (19/19):** 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; 3 IT Experts

- **Office.** Office arrangements for in-country staff are being coordinated with the NMHSs in the countries. Considering Covid-19, however, in-country staff are encouraged to work from home. Regional staff, on one hand, are currently working at the RIMES office in Pathumthani, Thailand.
- **Procurement of goods.** No goods or equipment have been procured during this period. However, changes to the procurement plan have been made to address Covid-19 related challenges in procuring country equipment from Thailand. That is, the original procurement item, Computing Equipment for RDAS activities, has been further divided into 4 items, based on which country the procurements will be made: Regional (Thailand), Bangladesh, Nepal, and Pakistan. Furthermore, request for quotations for these items including photography and video production equipment is currently ongoing.
- Appendix 21 provides details on the status of staff hiring and procurement of goods under the latest approved procurement plan.

- **Budget and Finance**
  - **Training.** A new FMS was hired on 1 June 2021 following the failure of the previous FMS to pass the probation period. The new FMS has gone in-office training and is currently working with the Project Accountant to customize the accounting software acquired for the project in October 2020 and prepare financial reports, e.g., SOE, IUFR, disbursement requests. A virtual training was conducted on 24 February 2021 by Mr. Syed Waseem Abbas Kazmi on World Bank's IUFR requirements.
  - **Budget, Disbursement and Expenditure.** The second disbursement, totaling US$ 500,626 based on forecasted expenditure from January to March 2021 was made to RIMES on 3 February 2021; while the third disbursement, totaling US$ 882,944 based

on forecasted expenditure from April to June 2021 was made on 21 June 2021. Expenditure from 1 January to 30 June 2021 covered RIMES technical inputs, staff salaries based on the number of days allotted by each staff to the project; operating expenses, e.g., travel costs for user needs assessment in Pakistan, office rental and utilities; communication, e.g., job posting; stationery and other consumables. The annual budget plan for 2020-21 submitted on 5 February 2021 was cleared by the World Bank on 23 March 2021. The project budget with expenditure from 1 January to 30 June 2021 is provided in Table 2. Variances in excess of 10 percent for RIMES PIU staff (18%), goods (100%), Individual Consultants (55%), Consulting Firms (100%), and Operating Costs (69%) can be respectively attributed to the following: i) RIMES PIU staff, consultants and consulting firms expected to be onboard within the first semester of 2021 have just recently or yet to complete the hiring process; ii) goods are still in the process of procurement; while iii) operating costs remained low due to unutilized travel budgets for national stakeholder meetings and user needs assessment activities, noting Covid-19 travel restrictions in the countries.

- **Reporting.** IUFR for May to December 2020 was submitted to the World Bank on 8th March 2021 using the World Bank template; while SOEs for May to December 2020 and January to March 2021, were submitted and cleared by the World Bank on 10th June 2021.

Table 2 Project budget with expenditure from 1 January to 30 June 2021

Description	Planned	Actual	Variance		Forecast For the next 6 mos.
			Amount	%	
RIMES Technical Inputs	206,020.00	206,020.00	0.00	0%	209,385.00
RIMES PIU Staff	116,695.00	95,520.72	21,174.28	18%	121,699.00
Goods	97,000.00	0.00	97,000.00	100%	0.00
Individual Consultants	505,180.00	226,866.04	278,313.96	55%	265,372.00
Consulting Firms	270,554.00	0.00	270,554.00	100%	948,897.00
Non-consulting services	0.00	0.00	0.00	0%	0.00
Operating Costs	140,254.00	43,559.86	96,694.14	69%	160,233.00
Total	**1,335,703.00**	**571,966.62**	**763,736.38**	**57%**	**1,705,586.00**

- **Environment and Social Management**
  - **GRM.** The Grievance Redress Mechanism (GRM) proposed by the ESD Specialist is being reviewed and will be finalized within the next semester, in coordination with the World Bank and ADPC. A functional basic mechanism is already available within the CARE MIS website and is undergoing improvements, where complaints and grievances are received from the front-end interface and managed through the back-end portal. GRM protocols and guidance, particularly on staff travel and safety; templates for acknowledging complaints/grievance, resolution, and appeals, are

being finalized. As of this reporting period, neither complaints nor grievances were received.

- **Meetings.** Joint meetings with World Bank and ADPC colleagues have been organized to discuss latest updates, issues and challenges related to E&S and stakeholder engagement. Meanwhile, trainings for targeted groups are being planned; dates and mechanisms for trainings are being finalized.
  - Stakeholder engagement for PIU staff
  - Environmental and social screening and ESF for PIU staff and consultants
  - Standard Gender and Diversity Framework training for all incoming staff and consultants
  - Sexual harassment policy and child protection policy training for all relevant staff
- **Training.** Following the ESF training held from 22-26 March 2021, an in-office training is being planned for CARE project staff in the countries.

- **Monitoring, Reporting and Evaluation**
  - **M&E system.** Monitoring of project implementation against agreed timelines, milestones, and budget are undertaken through monthly PIU meetings; monthly reports and deliverables (e.g., desk review reports, technical assessment reports, user needs assessment reports, system development reports, etc.); consultation meeting outcomes; data collection activities, e.g., questionnaire surveys, FGDs, KIIs; etc. Information from these sources feed into the progress report submitted to the World Bank every 6 months. An internal mechanism using Google apps was established and serves as a central repository of all project documents; and as a system for dynamic communication of information and monitoring of progress of activities (e.g., uploading, editing, and viewing of reports/ deliverables from both country and regional staff). Data and processes within this system will be migrated to the CARE Project MIS once completed. A similar mechanism was established to synergize CWG activities, where information shared by both RIMES and ADPC can be seen, monitored, and updated by both teams (e.g., coordination status, directory of all CARE project staffs, list of SFPs, list of data, CWG meeting minutes, etc.). An online data repository has been created by RIMES to store all project datasets accessible to both teams (e.g., freely available, and online regional/national datasets; national data collected in the countries where access has been granted to both RIMES and ADPC; etc.).
- **Project MIS.** A follow-up meeting was organized on 6 January 2021 to discuss latest updates on the CARE Project MIS and to receive inputs from the World Bank; while internal meetings were held regularly to get requirements from the project team. The MIS (www.mis.careforsouthasia.info) which is hosted by RIMES has two interfaces: the front-end which is public and the back-end portal which is password protected.
  - Further customization has been made to the following back-end modules: *Work plan*, *M&E, Timesheet*, *Suppliers*, *Procurements*, *Budgets.* Activities in the work plan can be visualized in Gantt chart or in a tabular form, following the template approved by the World Bank. These activities are linked to project indicators in the *M&E* module, where indicators are automatically updated based on the current progress of activities. Internal output indicators have been identified and are used to objectively rate activity progress. *Timesheet* module logs and documents monthly progress and work done by each staff. Monthly progress and activity reports are uploaded and

stored through this module for easy viewing. Currently, a *Reports* module is being developed to consolidate and automate the generation of all reports. *Budget* module presents the budget in different ways: activity-wise, country-wise, or period-wise (monthly, quarterly, semester). *Supplier* module indicates the details and status or standing of a supplier. Lastly, *Procurement* module provides the details and status of each procurement activity, including contract management, which is yet to be developed. Further enhancements to the dashboard are being planned to provide a quick overview of the progress and highlight key outcomes and activities.

- Latest updates to the front-end interface include the *Webinars* section under the *Events* tab, which provides details on upcoming webinar events; and the *Complaints* section under the *Support* tab, where complaints or grievances are lodged, and status can be viewed. For management of webinar events, details, e.g., schedule, organizer, overview, agenda, documents/presentation materials, participant list, FAQs entered from the back-end will be visualized at the front-end; while registrations made from the front-end will trigger automatic email notifications to the registrant and registrant information will be stored at the back-end. On another hand, once a complaint or grievance has been lodged, automatic email notifications will be sent to the complainant, while monitoring and response will be managed at the back-end.

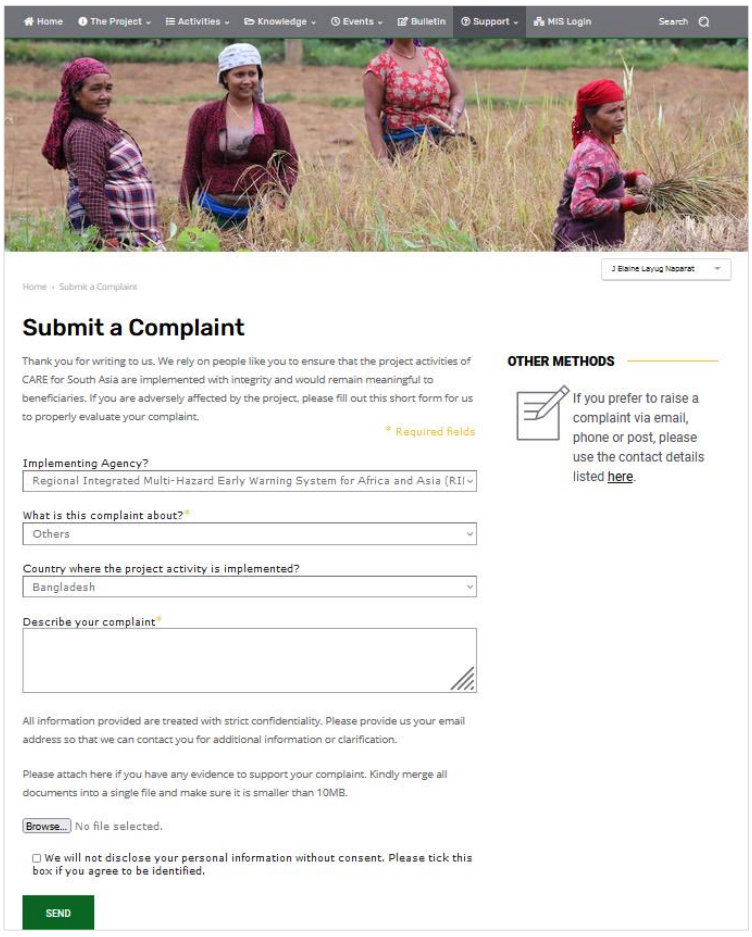

Figure 11 CARE MIS GRM module

Activity 3.1.4 External audit and evaluation

Progress:

- Revisions to the ToR for the financial auditor to lump 2020-2022 audits have been approved by the World Bank. Following recommendation by the World Bank Finance team, the CARE project will require the ISA800/805 framework, as it is a part of RIMES, where the primary objective of the audit is to report that the financial statements have been in accordance with the applicable financial reporting framework.

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	0.00	5.00
Date	12 May 2020	25 Aug 2020	30 Sep 2020	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	25 Aug 2020	30 Sep 2020	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	25 Aug 2020	30 Sep 2020	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	25 Aug 2020	30 Sep 2020	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	25 Aug 2020	30 Sep 2020	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	25 Aug 2020	30 Sep 2020	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	25 Aug 2020	30 Sep 2020	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	25 Aug 2020	30 Sep 2020	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	25 Aug 2020	30 Sep 2020	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	25 Aug 2020	30 Sep 2020	12 May 2025
Remarks				

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

	Baseline	Actual Previous	Actual Current	End Target
Value	0.00	0.00	0.00	9.00
Date	12 May 2020	25 Aug 2020	30 Sep 2020	12 May 2025
Remarks				

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

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	$537,770	$537,770	$499,374	$443,639.89	82%
2021	$3,039,288	$3,039,288	$1,383,570	$571,966.62	19%
2022					
2023					
2024					
2025					

Component-wise allocation and utilization of grant

S. #	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 (E= (A-C))
		WB	DFID	Total				
1	Component 1: Promoting Evidence-based Climate Smart Decision Making	10	-	10	1,130,680.00	434,867.54	434,867.54	695,812.46
2	Sub-component 1.1: SAR Regional Resilience Data and Analytics Services (RDAS)	3.5	-	3.5	347,765.00	109,155.00	109,155.00	238,610.00
3	Sub-component 1.2: Strengthening national level sectoral decision-support systems for resilient development	6	-	6	752,540.00	315,077.54	315,077.54	437,462.46
4	Sub-component 1.3: Technical capacity	0.5	-	0.5	30,375.00	10,635.00	10,635.00	19,740.00

	building of users							
5	Component 3: Project Management and Specialized Support	2	-	2	205,023.00	137,099.08	137,099.08	67,923.92
	Total Budget	12		12	1,335,703.00	571,966.62	571,966.62	763,736.38

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	
Technical Design of Project	Moderate	Moderate	Moderate	
Institutional Capacity for Implementation and Sustainability	Moderate	Moderate	Moderate	
Fiduciary	Substantial	Substantial	Substantial	
Environment and Social	Moderate	Moderate	Moderate	
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

Covid-19 restrictions hampered travel/face to face meetings by regional and country staffs	Regional/ national consultation meetings, user needs assessment activities, e.g., survey, interviews, etc. are conducted virtually
MOF -Nepal requires official project endorsement by the Bank before it can be implemented	Official communication sent by IAs to the Bank RIMES pursued some project activities through its focal point, DHM

Frequent turnover of SFPs due to transfer, retirement	Regular follow ups with focal agencies
Technical access to back-end portal of systems, e.g., AMIS required	MOU with DAE Bangladesh was drafted to facilitate access to BAMIS, while official endorsement by MOF-Nepal, as required by MOALD, is being pursued through various mechanisms, both at the World Bank and RIMES end
Recruitment of national staffs were delayed due to difficulty in selecting suitable candidates	Ministries are providing applicant recommendations

6. Integration of Crosscutting Issues

Intra- and inter-institutional data sharing is an issue that is met across the beneficiary countries. RIMES facilitates data sharing, via mutually beneficial mechanisms, among partner national/sub-national institutions.

7. Stakeholders Participation and Involvement

Across the beneficiary countries, stakeholders' participation and involvement have been encouraging. This support provided by stakeholders has been largely due to the flexibility of the project to assimilate stakeholders' requirements in the process of project implementation.

8. Compliance with Safeguard, Procurement, Financial Management

There are no issues to be reported during this semester.

9. Lessons Learned

Context and implementing environment	
Project strategy and design	○ Support from stakeholders due their
Advocacy, communications, and capacity building	○ Use of virtual platforms to increase awareness and user engagement such as webinar events, online FGDs, are crucial interventions, amid Covid-19 restrictions
Gender inclusion	
Implementation and institutional arrangements	○ Smooth coordination and implementation of project activities is possible through multi-agency cooperation in the countries ○ Flexibility in accommodating stakeholder requirements, within the purview of the project, e.g., revisions to the work plan, requirements for consulting firms, MoU process, etc., is key in ensuring stakeholder participation and commitment to the project
Any other areas	

10. Planned Activities for Next Semester

Sub-component 1.1: SAR RDAS

- RDAS prototype system development (continuation)
- RDAS full system development: solution architecture design, data management module, and data visualization and interface module

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

- Desk review and user needs assessment (continuation)
- Technical assessment of DSSs (continuation)
- DSS development: development of framework, data management module, and engine
- SFP Meeting for presentation of assessment outcomes
- SFP Meeting for soft launch of priority DSSs

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 RDAS prototype system development
2. Desk review report for planning sector, Pakistan
3. Desk review report for finance sector, Pakistan
4. User needs assessment materials for finance sector, Pakistan
5. Desk review report for agriculture sector, Pakistan
6. Technical report on DSS development for agriculture, Pakistan
7. Desk review report for water sector, Pakistan
8. User needs assessment materials for water sector, Pakistan
9. Desk review report for agriculture sector, Bangladesh
10. User needs assessment materials for agriculture sector, Bangladesh
11. Technical report on assessment of BAMIS portal, Bangladesh
12. Technical report on DSS enhancement for livestock sector, Bangladesh
13. Desk review report for finance and planning sector, Bangladesh
14. User needs assessment materials for finance and planning sector, Bangladesh
15. Technical report on assessment of DMH's needs and requirements, Nepal
16. Technical report on DSS portal enhancement for DMH, Nepal
17. Desk review report for agriculture sector, Nepal
18. User needs assessment materials for agriculture sector, Nepal
19. Desk review report for finance sector, Nepal
20. User needs assessment materials for finance sector, Nepal
21. Procurement status matrix as of 30 June

Regional Facility. Regional Integrated Multi-Hazard Early Warning System for Africa & Asia,
Asian Institute of Technology Campus, PO Box 4
Klong Luang, Pathumthani 12120, Thailand
(t) +662 516 5900 – 01 **(f)** +662 516 5902 **(e)** rimes@rimes.int
(w) www.rimes.int