CARE | SOUTH ASIA

3rd Bi-Annual Progress Report

1 July to 31 December 2021

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RIMES

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CONTENTS

Contents	i
List of Tables and Figures	ii
Introduction and basic data	1
Executive Summary	2
1.Narrative Report	8
1.1 Programmatic Progress	9
1.2 Summary of Results	22
2. Financial Progress	67
3. Risks and Assumptions	70
4. Performance Issues	70
5. Issues and Actions	70
6. Integration of Crosscutting Issues	71
7. Stakeholders Participation and Involvement	71
8. Compliance with Safeguard, Procurement, Financial Management	71
9. Lessons Learned	71
10. Planned Activities for Next Semester	72
11. Appendices	72

LIST OF TABLES AND FIGURES

Table 1. List of sectoral focal points in Pakistan as of 31 December 2021 21
Table 2. List of sectoral focal points in Bangladesh as of 31 December 2021 31
Table 3. List of sectoral focal points in Nepal as of 31 December 2021 48
Table 4. Project budget with expenditure from 1 July to 31 December 2021 64

Figure 1. Crop calendar vis-à-vis annual rainfall in Bangladesh 11
Figure 2. Climate data visualization and model comparison 12
Figure 3. Interview with farmers 25
Figure 4. SESAME prototype for Punjab dashboard showing weather and crop information for decision-making and crop advisory panel integrating meteorological and crop data 26
Figure 5. FGD with farmers in Babuganj, Barishal 33
Figure 6. Visit to Union Parishad buildings in Barishal for validating the effectiveness of the weather boards 35
Figure 7. FGD with DLO/ULO officers, NGO representatives, and LSPs and visit

to Naba Dairy and Cattle Farm in Rajshahi District 36

Figure 8. FGD with DLO farmers representatives, NGO representatives, and LSPs, and discussion with local dairy farmers in Satkira District 36

Figure 9. Moran's scatter plot, hotspots and risk map of FMD cases in 2020 37

Figure 10. Interpolation of bias-corrected temperature to country grid and district level 38

Figure 11. Interactive sunburst visualization of division/district-wise observed maximum temperature 38

Figure 12. Statistics of exposed versus risk elements distributed by different hazard return periods 50

Figure 13. Visualization of exposed roads and flood risk level in a 2-year return period 50

Figure 14. Details of the 3rd webinar episode on DSS for Understanding and Reducing Climate Risks, focusing on DSS for Climate-Informed Water Resources Management 59

Figure 15. Mobile application for PMIS 64

ACRONYMS

AADT	Average Annual Daily Traffic
ADB	Asian Development Bank
ADPC	Asian Disaster Preparedness Center
AIT	Asian Institute of Technology
AMISDP	Agro-Meteorological Information System Development Project
AMS	Asset Management System
API	Application Programming Interface
BAD	Balochistan Agriculture Department
BAMIS	Bangladesh Agro-Meteorological Information System
BAU	Bangladesh Agricultural University
BID	Balochistan Irrigation Department
BIPAD	Building Information Platform Against Disaster
BDP	Bangladesh Delta Plan 2100
BIPAD	Building Information Platform Against Disaster
BIWTA	Bangladesh Inland Water Transport Authority
BLRI	Bangladesh Livestock Re search Institute
BMD	Bangladesh Meteorological Department
BMS	Bridge Management System
BPC	Bangladesh Planning Commission
BRAC	Bangladesh Rural Advancement Committee
BRTA	Bangladesh Road Transport Authority
BRTC	Bangladesh Road Transport Corporation
BWDB	Bangladesh Water Development Board
CAP	Common Alerting Protocol
CARE	Climate Adaptation and Resilience
CCDMC	City Corporation Disaster Management Committee
CCMD	Climate Change Management Division
CEGIS	Center for Environmental and Geographic Information Services
CIPRB	Centre for Injury Prevention and Research Bangladesh
CIS	Criminal Investigation System
CMIP5	Coupled Model Intercomparison Project Phase 5
CReLIC	Climate Resilient Local Infrastructure Center
CRIMP	Climate Resilient Infrastructure Mainstreaming Project
CSA	Climate Smart Agriculture
CSS	Cascading Style Sheets
CWG	Coordination Working Group
DAE	Department of Agricultural Extension
DDM	Department of Disaster Management
DFID	Department for International Development
DG	Director General
DHM	Department Hydrology and Meteorology
DIA	Disaster Impact Assessment
DMIS	Disaster Management Information System
DLO	District Livestock Officer
DLS	Department of Livestock Services
DoLI	Department of Local Infrastructure
DoED	Department of Electricity Development
DoLI	Department of Local Infrastructure
DoR	Department of Road
DoTM	Department of Transport Management
DoWRI	Department of Water Resources and Irrigation
DPNET	Disaster Preparedness Network

DSS	Decision Support System
E&S	Environment and Social
EIA	Environment Impact Assessment
EIS	Emergency Information System
EMD	Economic Management Division
EFP	External Finance Policy
EPMS	Electronic Project Monitoring System
ERD	Economic Relations Division
ESD	Environmental and Social Development
FCAN	Federation of Contractors' Associations of Nepal
FFWC	Flood Forecasting and Warning Center
FGD	Focus Group Discussion
FIAC	Farmers' Information and Advisory Center
FloCAST	Flood Forecasting and Warning Systems
FMD	Foot Mouth Disease
FMIS	Financial Management Information System
FNCCI	Federation of Nepalese Chamber of Commerce and Industry
FNNTE	Federation of Nepalese National Transport Entrepreneurs
GED	General Economics Division
GESU	Geo-Environment and Social Unit
GIS	Geographic Information System
GIZ	Gesellschaft für Internationale Zusammenarbeit
GRM	Grievance Redress Mechanism
HDM	Highway Development and Management
HEC	Hydrologic Engineering Center
HMG	His Majesty's Government
HMIS	Highway Management Information System
HMS	Hydrologic Modeling System
IA	Implementing Agency
IBF	Impact-based Forecasting
ICEM	International Centre for Environmental Management
ICIMOD	International Centre for Integrated Mountain Development
ICKM	Information, Communication and Knowledge Management
ICT	Information and Communications Technology
IEE	Initial Environmental Examination
IDC	Institutional Development Consultant
iPAS	Intelligent Project Automation System
IRSA	Indus River System Authority
ISET	Institute for Social and Environment Transition
ISR	Implementation Support and Reporting
IT	Information Technology
IUFR	Interim Unaudited Financial Report
KII	Key Informant Interview
KPMG	Klynveld Peat Marwick Goerdeler
LDDP	Livestock and Dairy Development Project
LDMC	Local Disaster Management Committee
LGED	Local Government Engineering Department
LRN	Local Road Network
LSP	Local Service Provider
M&E	Monitoring and Evaluation
MDMC	Municipal Disaster Management Committee
MIS	Management Information System

MoA	Ministry of Agriculture
MoALD	Ministry of Agriculture and Livestock Development
MoCC	Ministry of Climate Change
MoDMDR	Ministry of Disaster Management and Relief
MoEFCC	Ministry of Forests and Environment
MoEWRI	Ministry of Energy, Water Resources and Irrigation
MoF	Ministry of Finance
MoFE	Ministry of Forests and Environment
MoFL	Ministry of Fisheries and Livestock
MoHA	Ministry of Home Affairs
MoPDSI	Ministry of Planning, Development and Special Initiatives
MoPIT	Ministry of Physical Infrastructure and Transport
MoU	Memorandum of Understanding
MoWR	Ministry of Water Resources
NAMIS	Nepal Agriculture Management Information System
NASA	National Aeronautics and Space Administration
NASC	Nepal Administrative Staff College
NAST	Nepal Academy of Science and Technology
NDMA	National Disaster Management Authority
NDRI	National Development Research Institute
NDRRMA	National Disaster Risk Reduction and Management Authority
NEOC	National Emergency Operation Centre
NERI	Nepal Environment Research Institute
NGO	Non-governmental Organization
NPC	National Planning Commission
NRP	National Resilience Programme
OLAP	Online Analytical Processing
OXFAM	Oxford Committee for Famine Relief
PAD	Punjab Agriculture Department
PDO	Project Development Objective
PIU	Project Implementing Unit
PMD	Pakistan Meteorological Department
RAIMS	Road Accident Information Management System
RBN	Roads Board Nepal
RCIP	Rural Connectivity Improvement Project
RDAS	Regional Data Analytics Services
REDD	Reducing Emissions from Deforestations and Forest Degradation
REOI	Request for Expression of Interest
RHD	Roads and Highways Department
RIMES	Regional Integrated Early Warning System for Africa and Asia
RSDMS	Road and Structure Database Management System
RUBIMS	Rural Bridge Information Management System
SAAO	Sub Assistant Agriculture Officer
SAARC	South Asian Association for Regional Cooperation
SAC	SAARC Agriculture Centre
SAP	Systems, Applications and Products
SAR	South Asian Region
SESAME	Specialized Expert System for Agro-Meteorological Early Warning
SFP	Sectoral Focal Point
SIBDP	Support to Implementation of Bangladesh Delta Plan 2100
SID	Sindh Irrigation Department
SMS	Short Messaging Service
SOE	Statement of Expenditure
SQL	Structured Query Language
SRN	Strategic Road Network

SSTN	Safe and Sustainable Travel Nepal
SuPRB	Supporting Rural Bridges
ToR	Terms of Reference
TWG	Technical Working Group
UDMC	Union Disaster Management Committee
ULO	Upazila Livestock Officer
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNESCAP	United Nations Economic and Social Commission for Asia and the Pacific
UNOPS	United Nations Office for Project Services
USAID	United States Agency for International Development
VMB	Voice Message Broadcasting
WAPDA	Water and Power Development Authority
WARPO	Water Resources Planning Organization
WB	World Bank
WECS	Water and Energy Commission Secretariat
WRF	Weather Research and Forecasting

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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	3,039,287	0	0	1,882,944	1,535,721

[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

RIMES implements Component 1: Promoting Evidence-based Climate Smart Decision-Making of the World Bank-funded Climate Adaptation and Resilience for South Asia (CARE) for South Asia Project. Component 1, contributing to CARE's Project Development Objective (PDO) of advancing to an enabling environment for climate resilience policies and investments in South Asia, targets the completion of the following at the end of the project implementation:

- ***Regional Resilience Data and Analytics Service (RDAS),*** a cloud-based, open-access platform for making available climate and sectoral data, and analytics capacities, for climate-informing policy, planning and investment decisions in the region, targeting to provide benefits for development institutions and their stakeholders, governments of inclusive countries, research institutions, and other relevant entities;

- ***National sectoral decision support systems (DSSs)*** in Bangladesh, Nepal, and Pakistan, that are linked to RDAS, for integrating climate information of relevant timescales in decision processes, at various levels, for robust and resilient decisions in finance, planning, agriculture, water resources management, transport and disaster risk management; and

- ***Training of regional and national/sub-national stakeholders*** in utilizing the RDAS and DSSs platforms, respectively, and generating/applying differential RDAS/DSSs data/products in planning and decision making.

Highlights

This is the third bi-annual report for the project and covers the reporting period from 1 July to 31 December 2021. The highlights, capturing key project accomplishments for this reporting period, are presented against Component 1's three (3) sub-components, viz.: 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. Key accomplishments during this period, build on key accomplishments reported in the preceding reporting period[2]. Moreover, challenges and lessons learnt are included herein.

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

The RDAS prototype has been completed within the reporting period and was demonstrated to the Bank on 3 December 2021. Building on earlier work on system architecture and framework for handling data ingestion, processing, and analysis, and data/information presentation on the portal; data catalogue framework and database, and master data management system, for creating and maintaining a catalogue of resources to support data integration; data analytics, for Online Analytical Processing (OLAP) queries, computation, machine learning, generating reports and visualization; data and analytical services catalog using open-source tools; data and analytics visualization, for integrating climate, sectoral and other pertinent data into the system; and data access subsystems, for making data available to users, RIMES System Development Team has accomplished the following during this reporting period, thus, completing the RDAS prototype: i) literature review and documentation of existing regional/national datasets, and sensitivity/resilience of various crops to climate parameters, and exploration and downloading of relevant data resources, and metadata preparation; ii) development of comprehensive data and metadata catalog for sectoral data requirements both regionally and country-specific for Bangladesh, Nepal and Pakistan; iii) integration and analysis of climate (CMIP5), agriculture, social indicators, and other relevant datasets, including free and open source data points such as cropping extent data, livestock density, forest cover, etc., and water quality and watershed maps from

[2] *Accomplishments in gray fonts were undertaken from January to June 2021; those in black fonts were undertaken during this reporting period (i.e. July to December 2021); those in green bold fonts are priority prototype systems that are completed during this reporting period.*

SARCARE, soil moisture from Resource Watch, and satellite-based precipitation data from NASA; iv) development of visualization platform and interactive dashboard/portal for climate data (including geospatial datasets) and indicators, climate-agriculture indicators, potential impact and adaptation measures, and implementation of dynamic components for resolving issues relevant to the rendering of multiple components; v) creation of climate data API and mechanism for demonstrating the use of the APIs; and vi) creation of profile page, and generation of maps and dynamic components.

The RDAS prototype is ready for public demonstration/launching and for full development by the consulting firm once on-board.

Sub-Component 1.2 Strengthening national level DSSs for participating countries

[Pakistan]

In Pakistan, all national sectoral expert positions have been filled, except for those associated with new activities (i.e. inventory of greenhouse gas [GHG] emissions in Pakistan's transport sector and replication of SESAME in Balochistan), as outcomes from the World Bank ISR Mission from 20 to 29 September 2021. The positions Transport Expert (Clean and Green Energy) and Agriculture Expert for Balochistan have been approved by the Bank, and the procurement process is to be initiated for both positions. Upon the integration of the new activities, stakeholder partner institutions in Pakistan indicated no objection to CARE Component 1 2021-2022 work plan.

All partner government institutions have identified sectoral focal points, including for Balochistan Agriculture Department (BAD); MoPDSI takes charge of the activity in inventory of GHG emissions in the transport sector.

The national sectoral experts in finance, planning, agriculture, and water resources management in Pakistan are in different stages of consultations, desk reviews, user needs assessments and technical assessments; similarly, IT experts are in different stages of technical review of relevant existing management information systems/DSSs. Based on findings thus far from these assessments, the following encapsulates the recommendations for DSSs development in Pakistan:

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

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

- **SID:** *Improving the existing SID DSS*, through the inclusion of i) drought risk management; ii) dynamic integration of weather forecasts for predicting forecast-based potential flood situations; iii) integration of vulnerability datasets for potential impact assessment; iv) inclusion of dissemination and alert mechanism; v) hydrological modeling for water availability forecasting and determination of Sindh's allocation per the Water Apportionment Accord (1991); vi) real-time operational model for barrages and canals of the Sindh irrigation system; vii) investigations of water table fluctuation

in the irrigation system; viii) water table fluctuation maps; ix) hydraulic models for all main and branch canals of the Sindh Irrigation System; x) links between databases of relevant organizations such as PMD, IRSA and WAPDA; xi) analytics vis-a-vis difference of irrigation water requirement and rainfall; xii) mechanism for optimizing reservoir operational data; xiii) mechanism for provision of alternative dry route/s, in case of channel flooding; xiv) provision of alternative water demand priorities and allocations to meet water shortages in years anticipated to be significantly drier than normal; xv) provision of irrigation area coverage and current unmet water demands; xvi) suggestions/response options for minimizing water losses; and xvii) integration of projections of future consumption demands based on current trends and other relevant data.

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

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

  The SESAME for Punjab prototype is completed within the reporting period and ready for public demonstration and full development by the consulting firm.

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

[Bangladesh]

All national sectoral positions in Bangladesh have been filled. The SFPs and other stakeholders in partner government institutions in the country affirmed support to CARE Component 1 2021-2022 work plan, as presented during the World Bank ISR Mission in Bangladesh from 21 September to 11 October 2021. SFPs across all the partner government institutions have been identified, albeit there have been some changes due to staff turnover.

The national sectoral experts (planning and finance, agriculture, livestock, water resources, and transport) are in various stages of undertaking consultations, desk review, and user needs assessments; IT experts are likewise in varying levels of technical assessment of relevant systems. The assessments undertaken thus far, in relation to priority sectors in Bangladesh, underscore the following courses in sectoral DSSs development/enhancement:

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

- **DAE:** *Enhancement of BAMIS*, through i) customization of functionality to various user levels; ii) integration of localized information; iii) incorporation of climate projection data; iv) automation of processes vis-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; ix) shifting of the entire system to open source web framework for scalability and sustainability; x) incorporation of local inputs from Upazila Agricultural Officers for automation of advisories generation; xi) multi-channel information/advisory dissemination

mechanism (i.e. voice message, mobile applications, SAAO, lead farmers, call centers, digital display boards, etc.); and xii) systematic feedback collection and impact assessment mechanisms.

The priority interventions for BAMIS enhancement, under CARE Component 1, shall be finalized upon presentation/discussion/validation of the assessment outcomes, and recommendations for DSS development/enhancement, with DAE, BMD, BWDB, field level representatives of extension agents, farmer leaders/representatives, and other agriculture stakeholders

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

  The prototype DSS for livestock has been completed within the reporting period with work undertaken on enhancement of DSS framework and finalization of data parameters, enhancement of data management module, and enhancement of DSS engine. The prototype system is ready to be publicly demonstrated/launched and for full development by the consulting firm.

- **LGED/RHD:** *Improvement of the Online Road Network and Transport DSS*, through integration of dynamic climate and asset databases, risk information, and early warning. The transport DSS should be shared/common, systematic, comprehensive, builds on existing management information systems and integrates climate and transport information to be used by relevant units of LGED and RHD, municipalities, city corporations, union councils, ward commissioners, and villages for decision making vis-à-vis climate-resilient road network, prompt evacuation during hazard/disaster events, and debris removal, among others. The proposed DSS includes: i) integration of hydrological, weather/climate, and transport infrastructure information ii) automated generation of relevant risk estimation on transport infrastructure based on climate risk-related standards/thresholds; iii) automated generation of advisory bulletins for pre, during, and post-disaster periods, and for long-term preparedness, including construction-related recommendations, and iv) distribution of bulletins to stakeholders in the transport sector through email and voice messages, mobile application and social media platforms

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

- **MoWR/WARPO:** *Enhancement of the Delta Portal,* through inclusion of multi-layered system framework including data, processing, and user interface layers; development of APIs, archiving mechanisms, and GIS and graphic engines for improved data processing

[Nepal]

All sectoral experts in Nepal have been hired. SFPs have been identified across all the partner government institutions, with some changes due to staff turnover. Stakeholder institutions, during the World Bank ISR Mission in Nepal, from 21 September to 10 October 2021, indicated support to CARE Component 1 activities, subject to the official project endorsement by the government.

While the persisting delay in project formalization continues to impede implementation of project activities, key undertakings were pursued by RIMES through its long-standing relationship with country partners. The summary of requirements for DSSs development in Nepal, underpinning on the varying preparatory activities thus far conducted by the sectoral experts, is provided below:

- **MoF:** *Improvement of Public Financial Management,* for climate budget allocation, expenditure tracking, sustainability monitoring, and assessment of investment results in climate-sensitive sectors. Details of the DSS required for MoF will be threshed upon formal endorsement of the Government of Nepal of CARE Project

- **DoR/DoLI:** *DSS for resilient rural/local roads network* that integrates i) existing climate hazard/risk assessments; ii) other relevant data and climate information of various timescales; iii) analytics and improved data management, sharing, and accessibility of information; and iv) identified/customized weather/climate thresholds for transport infrastructure and safety in the country

- **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 DHM include: i) system design along with languages and technology stack for development of impact-based forecasting system; preliminary analysis and identification of the system for the hydrology component; detailed analysis of the system for the meteorology component; ii) preliminary analysis of RIMES FloCAST system for impact-based forecasting; review of other existing flood systems; review of different impact modeling methods for calculating risk; design and development of enhanced FLoCAST for DHM; development of integrated data acquisition platform; integration of hazard and exposure datasets and algorithm for generating hazard impacts; integration of forecast from DHM and ensemble forecast products; classification of various parameters according to appropriate thresholds; and customization of graphic user interface for the DSS; iii) updating and integration of HEC-RAS model in the existing system for integrating daily updates; updating of HECHMS 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. During this reporting period, the following activities have been completed, for addressing DHM's FloCAST enhancement: i) refreshed input DSS files (Karnali, Narayani, Babai) for HEC HMS model execution with raw WRF rainfall forecast data from January 2017 to present; ii) fixed 3-day rainfall forecast data and updated visualization mechanism; iii) improved algorithm for flood impact-based forecasting; and iv) processing and integration of relevant datasets. The onward enhancement of FloCAST shall be addressed upon completion of user needs assessment and on-boarding of the consulting firm.

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

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

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

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

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

Challenges encountered

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

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

Lessons learned

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

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

NARRATIVE REPORT

1.1 PROGRAMMATIC PROGRESS

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

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

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

Summary of activities contributing to overall progress and achievement 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 Analysts
1.1.1.3 Data collection and digitization	Jan21 – Jun25	Completed preliminary data catalog and questionnaires for stakeholder consultations
1.1.2 RDAS Prototype System		
1.1.2.1 RDAS prototype system development	Nov20 – Sep21	Completed
1.1.2.2 Technical support	Sep21 – Dec22	Ongoing
1.1.3 RDAS Full System		
1.1.3.1 Solution architectural design	Apr21 – Jun22	Further expansion upon onboarding of RDAS CF
1.1.3.2 Development of data management module	Jul21 – Dec22	Initial activity started through prototype; further activities and expansion will be carried out once RDAS CF is onboard
1.1.3.3 Development of data analytics module	Jan22 – Sep23	
1.1.3.4 Development of data visualization and interface module	Oct21 – Mar23	Activity will commence once consultations are completed and RDAS CF is onboard
1.1.3.5 Development of dissemination module	Apr23 – Dec23	
1.1.3.6 System Audit	Oct23 – Sep24	
1.1.3.7 Preparation of RDAS user guide and technical manual	Jan24 – Jun24	
1.1.3.8 RDAS deployment	Jul24 – Sep24	
1.1.3.10 Post RDAS deployment support	Oct24 - Jun25	

Status Legend

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

Detailed progress, per activity, is provided below:

Activity 1.1.1
Preliminary activities:
Assessment of existing data portals

Procurement

GIS Specialist for Bangladesh, Mr. Neamul Ahsan Khan, joined the team in August. ToRs for 4 Data Analysts are under review by the World Bank.

Data collection and review

Completed activities for this reporting period include:

- Literature review and documentation of existing regional/national datasets, and sensitivity/ resilience of various crops to climate parameters; understanding applications and data sources developed by other regional entities such as ICIMOD, UNESCAP, and ADPC; exploration, locating/ downloading relevant data resources; and metadata preparation. Data from ICIMOD could not be fully explored due to data access restrictions for regular users; an MoU for data sharing/ exchange, may be necessary for unabridged data access
- Development of comprehensive data and metadata catalog for all sectoral data requirements for the RDAS and national DSSs
- Collection of agricultural production and yield data for Bangladesh, Nepal and Pakistan, and integration into the RDAS
- Co-established, with ADPC, a data coordination and sharing mechanism, for aligning and optimizing data collection and analysis

Data Catalog

COMPLETED : in Appendix 1

The following are activities, completed within the reporting period, related to development of a comprehensive data catalog:

- Data categorized for agriculture, livestock, planning and finance, transport, and water sectors; about 100+ datasets have been identified in the preliminary data catalog
- Questionnaires have been prepared for assessing data gaps and requirements (e.g., indices, parameters, thresholds, etc.) and for guiding stakeholder consultations in each sector

Activity 1.1.2
RDAS Prototype System

Procurement

Development of the RDAS Prototype System has been undertaken by the RIMES System Development Team.

RDAS Prototype System Development

COMPLETED : in Appendix 2

The development of the RDAS prototype system has been completed by the RIMES Team.
Activities undertaken, for completing the prototype system, were:

- Integration and analysis of climate (CMIP5), agriculture, social indicators, and other relevant datasets
- Development of visualization platform and interactive dashboard/portal for climate data (including geospatial datasets) and indicators, climate-agriculture indicators, and potential impact and adaptation measures; and implementation of dynamic components to resolve issues related to rendering multiple components
- Creation of Climate Data API and a showcase within the RDAS portal to demonstrate use of the APIs
- Creation of profile page; integration of free and open source data points such as cropping extent data, livestock density, forest cover, etc., and water quality and watershed maps from SARCARE, soil moisture from Resource Watch, and satellite-based precipitation data from NASA; and creation of map and dynamic components

Figure 1. Crop calendar vis-à-vis annual rainfall in Bangladesh

Figure 2. Climate data visualization and model comparison

The RDAS prototype has been demonstrated to the Bank on 3 December 2021; the following were the key highlights during the discussion:

- Data architecture and framework of the RDAS are robustly built and would be able to handle large scale data and processing
- Onward development should continue to focus on i) clearly defining target users and ensuring that various tiers of users have different access levels; ii) user-oriented and simplified design for ease of access to, and use, by the user; iii) integration of recent and latest open source data and technologies (e.g. https://earthmap.org/); and iv) keeping users' decision contexts/points as the nexus of full development, and linking the data points to those

Public demonstration/launching of the RDAS prototype system, to receive further feedback and recommendations for full development, is being planned for early 2022.

Activity 1.1.3
RDAS Full System

Procurement

The REoI for RDAS consulting firm has been submitted to the Bank for review and approval. The full development of RDAS will be pursued by the consulting firm upon on-boarding.

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 contributing 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 – Sep24	
1.2.3 Development of DSS for Ministry of Finance -Pakistan		
1.2.3.7 System transfer and deployment	Jul23 – Sep23	
1.2.4 Development of SESAME -Punjab, Pakistan (Priority system)		
1.2.4.8 System transfer and deployment	Jul23 – Sep23	
1.2.5 Improving DSS for Sindh Irrigation Department -Pakistan		
1.2.5.9 System transfer and deployment	Jan24 – Mar24	
1.2.6 Upgrading BAMIS for Agriculture - Bangladesh		
1.2.6.9 System transfer and deployment	Jul23 – Sep23	
1.2.7 Improving DSS for Livestock Subsector -Bangladesh (Priority system)		
1.2.7.9 System transfer and deployment	Jul23 – Sep23	
1.2.8 Upgrading the Online Road Network Portal -Bangladesh		
1.2.8.9 System transfer and deployment	Jul23 – Sep23	
1.2.9 Enhancement of FloCAST -Bangladesh		
1.2.9.9 System transfer and deployment	Jan24 – Mar24	
1.2.10 Enhancement of the Delta Portal -Bangladesh		
1.2.10.8 System transfer and deployment	Jul23 – Sep23	
1.2.11 Development of Portal for Finance, ERD and Planning -Bangladesh		
1.2.11.7 System transfer and deployment	Jul23 – Sep23	
1.2.12 Supporting DHM -Nepal (Priority system)		
1.2.12.8 System transfer and deployment	Oct23 – Dec23	

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

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

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

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

Summary of activities contributing to overall progress and achievement 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 – Jun22	Pending completion of all user needs assessments
1.2.1.4 Meeting for presentation of assessment outcomes	Apr21 – Jun22	Preparations underway, activities postponed to 1st semester 2022
1.2.1.5 Meeting for soft launch of priority DSS systems	Oct21 – Dec21	Demonstrated to WB; preparations for national demonstrations underway
1.2.1.6 Technical meeting on RDAS and DSS systems	Nov20 – Jun25	Project Steering Committee Meeting in September 2021
1.2.2 Development of DSS for Ministry of Planning, Development and Special Initiatives - Pakistan		
1.2.2.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Dec22	Desk review & UNA completed; ongoing assessments
1.2.2.2 Development of DSS framework and finalization of data parameters	Apr21 – Sep22	Ongoing consultations with MoPDSI
1.2.2.3 Development of data management module	Apr21 – Sep23	Activity will commence once consultations are completed and DSS CF is onboard
1.2.2.4 Development of DSS engine and data visualization and report generation modules	Jul21 – Mar24	Activity will commence once consultations are completed and DSS CF is onboard
1.2.2.5 System audit	Jan23 – Jun24	
1.2.2.6 Preparation user guide and technical manual	Jan23 – Jun24	
1.2.2.7 System transfer and deployment	Jul23 – Sep24	

1.2.3 Development of DSS for Ministry of Finance -Pakistan		
1.2.3.1 Assessment of user needs (refer to Activity 1.2.1.3)	Dec20 – Dec21	Desk review & UNA completed; draft assessment outcomes and recommendations for review
1.2.3.2 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Pending MoF confirmation for a separate DSS & onboarding of DSS CF
1.2.3.3 Development of data management module	Apr21 – Dec22	Activity will commence once consultations are completed and DSS CF is onboard
1.2.3.4 Development of DSS engine and data visualization and report generation modules	Jul21 – Dec22	Activity will commence once consultations are completed and DSS CF is onboard
1.2.3.5 System audit	Jan23 – Mar23	
1.2.3.6 Preparation user guide and technical manual	Jan23 – Jun23	
1.2.3.7 System transfer and deployment	Jul23 – Sep23	
1.2.4 Development of SESAME -Punjab (Priority system) and Balochistan - Pakistan		
1.2.4.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review & UNA completed; draft assessment outcomes and recommendations for review
1.2.4.2 Development of DSS framework and finalization of data parameters	Dec20 – Jun22	DSS framework completed; DSS development started; DSS prototype developed.
1.2.4.3 Development of data management module	Apr21 – Dec22	PMD weather forecast data integrated
1.2.4.4 Development of DSS engine	Jul21 – Dec22	Crop database and crop calendar developed; further analytics shall be developed
1.2.4.5 Development of dissemination module	Apr22 – Dec22	
1.2.4.6 System audit	Jan23 – Mar23	
1.2.4.7 Preparation user guide and technical manual	Jan23 – Jun23	
1.2.4.8 System transfer and deployment	Jul23 – Sep23	
1.2.5 Improving DSS for Sindh Irrigation Department -Pakistan		
1.2.5.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Dec21	Desk review & UNA completed; draft assessment outcomes and recommendations for review
1.2.5.2 Technical assessment of existing DSS with the SID	Nov20 – Apr21	Completed
1.2.5.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Ongoing initial consultations; further actions once DSS CF is onboard
1.2.5.4 Enhancement of data management module	Apr21 – Dec22	Further enhancement upon DSS CF onboarding
1.2.5.5 Development of DSS engine	Jul21 – Jun23	Further enhancement upon DSS CF onboarding
1.2.5.6 Development of web-based dissemination system	Jan23 – Sep23	
1.2.5.7 System audit	Oct23 – Dec23	
1.2.5.8 Preparation of user guide and technical manual	Jul23 – Dec23	
1.2.5.9 System transfer and deployment	Jan24- May24	
1.2.6 Upgrading BAMIS for Agriculture -Bangladesh		
1.2.6.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Dec21	Desk review & UNA completed; draft assessment outcomes for review
1.2.6.2 Technical assessment of BAMIS	Sep20 – Apr21	Completed

1.2.6.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Pending onboarding of DSS CF
1.2.6.4 Enhancement of data management module	Apr21 – Dec22	Consultations ongoing; further development upon onboarding of DSS CF
1.2.6.5 Development of DSS engine	Jul21 – Dec22	Further design and development once DSS CF is onboard
1.2.6.6 Development of dissemination module	Jan23 – Jun23	
1.2.6.7 System audit	Apr23 – Jun23	
1.2.6.8 Preparation of user guide and technical manual	Jan23 – Jun23	
1.2.6.9 System transfer and deployment	Jul23 – Sep23	
1.2.7 Improving DSS for Livestock Subsector -Bangladesh (Priority system)		
1.2.7.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Dec21	Desk review & UNA needs materials completed; ongoing assessments
1.2.7.2 Technical assessment of DSS for Livestock Subsector	Aug20 – Apr21	Completed
1.2.7.3 Enhancement of DSS framework and finalization of data parameter	Dec20 – Jun22	Completed design of framework; ongoing preparation of technical design document
1.2.7.4 Enhancement of data management module	Apr21 – Dec22	Completed data management module and testing of bias correction methods
1.2.7.5 Development of DSS engine	Jul21 – Dec22	Activity started under priority system prototype development
1.2.7.6 Development of dissemination module	Jan23 – Jun23	
1.2.7.7 System audit	Apr23 – Jun23	
1.2.7.8 Preparation of user guide and technical manual	Jan23 – Jun23	
1.2.7.9 System transfer and deployment	Jul23 – Sep23	
1.2.8 Upgrading the Online Road Network Portal -Bangladesh		
1.2.8.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review & UNA needs materials completed; ongoing assessments
1.2.8.2 Technical assessment of Online Road Network portal	Mar21 – Dec 21	On the process of completion
1.2.8.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Initial activity started; further activities upon onboarding of DSS CF
1.2.8.4 Enhancement of data management module	Apr21 – Dec22	Initial activity started; further activities upon onboarding of DSS CF
1.2.8.5 Enhancement of DSS engine	Jul21 – Dec22	Further activities upon onboarding of DSS CF
1.2.8.6 Development of web-based dissemination module	Jan23 – Jun23	
1.2.8.7 System audit	Apr23 – Jun23	
1.2.8.8 Preparation of user guide and technical manual	Jan23 – Jun23	
1.2.8.9 System transfer and deployment	Jul23 – Sep23	
1.2.9 Enhancement of FloCAST -Bangladesh		
1.2.9.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Water Expert onboarded in December 2021; ongoing desk review
1.2.9.2 Technical assessment of FloCAST	Dec20 – Sep21	On the process of completion
1.2.9.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Initial activity started; further activities upon onboarding of DSS CF

1.2.9.4 Enhancement of data management module	Apr21 – Dec22	Initial activity started; further activities upon onboarding of DSS CF
1.2.9.5 Development of DSS engine	Jul21 – Jun23	Further activities upon onboarding of DSS CF
1.2.9.6 Development of dissemination module	Jan23 – Sep23	
1.2.9.7 System audit	Oct23 – Dec23	
1.2.9.8 Preparation of user guide and technical manual	Jul23 – Dec23	
1.2.9.9 System transfer and deployment	Jan24 – Mar24	
1.2.10 Enhancement of the Delta Portal -Bangladesh		
1.2.10.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Water Expert onboarded in December 2021; ongoing desk reivew
1.2.10.2 Technical assessment of the Delta Portal	Jan21 – Sep21	Completed
1.2.10.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun23	Initial activity started; further activities upon onboarding of DSS CF
1.2.10.4 Enhancement of data management module	Apr21 – Dec22	Initial activity started; further activities upon onboarding of DSS CF
1.2.10.5 Development of DSS engine	Jul21 – Dec22	Further activities upon onboarding of DSS CF
1.2.10.6 System audit	Apr23 – Jun23	
1.2.10.7 Preparation of user guide and technical manual	Jul23 – Sep23	
1.2.10.8 System transfer and deployment	Jul23 – Sep23	
1.2.11 Development of Portal for Finance, ERD and Planning -Bangladesh		
1.2.11.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Dec21	Desk review & UNA materials completed; ongoing consultations
1.2.11.2 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Initial activities started; further development upon onboarding of DSS CF
1.2.11.3 Development of data management module	Apr21 – Dec22	Initial activities started; further development upon onboarding of DSS CF
1.2.11.4 Development of portal interface	Jul21 – Dec22	Further development upon onboarding of DSS CF
1.2.11.5 System audit	Jan23 – Mar23	
1.2.11.6 Preparation user guide and technical manual	Jan23 – Jun23	
1.2.11.7 System transfer and deployment	Jul23 – Sep23	
1.2.12 Supporting DHM -Nepal (Priority system)		
1.2.12.1 Assessment of DHM's hydrological and climate collection and data management system, and climate products (refer to 1.2.1.3)	Dec20 – Jun22	Desk review completed; ongoing consultations
1.2.12.2 Technical assessment of DHM hydrological forecasting portal	Jul20 – Apr21	Completed
1.2.12.3 Enhancement of DSS framework and finalization of data parameter	Dec20 – Jun22	DHM priority: improvement of flood forecasting system
1.2.12.4 Enhancement of data management module	Dec20 – Dec22	Initial activities started; further development upon onboarding of DSS CF
1.2.12.5 Enhancement of DSS engine and dissemination module	Oct21 – Jun23	Further development upon onboarding of DSS CF
1.2.12.6 System audit	Jul23 – Sep23	
1.2.12.7 Preparation of user guide and technical manual	Jul23 – Sep23	

1.2.12.8 System transfer and deployment	Oct23 – Dec23	
1.2.13 Upgrading NAMIS -Nepal		
1.2.13.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review & UNA materials completed; ongoing consultations
1.2.13.2 Technical assessment of NAMIS	Oct20 – Jun22	Access to NAMIS pending project formalization
1.2.13.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Pending onboarding of DSS CF & project formalization
1.2.13.4 Enhancement of data management module	Apr21 – Dec22	Pending onboarding of DSS CF & project formalization
1.2.13.5 Enhancement of DSS engine	Jul21 – Dec22	Pending onboarding of DSS CF & project formalization
1.2.13.6 Enhancement of dissemination module	Oct22 – Jun23	
1.2.13.7 System audit	Jul23 – Sep23	
1.2.13.8 Preparation of user guide and technical manual	Apr23 – Sep23	
1.2.13.9 System transfer and deployment	Oct23 – Dec23	
1.2.14 Development of DSS for Transport Sector -Nepal		
1.2.14.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Desk review & UNA materials completed; ongoing consultations
1.2.14.2 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Initial activities started; further development upon onboarding of DSS CF & project formalization
1.2.14.3 Development of data management module	Apr21 – Dec22	Initial activities started; further development upon onboarding of DSS CF & project formalization
1.2.14.4 Development of DSS engine	Jul21 – Dec22	Further development upon onboarding of DSS CF & project formalization
1.2.14.5 System audit	Jan23 – Mar23	
1.2.14.6 Preparation user guide and technical manual	Oct22 – Mar23	
1.2.14.7 System transfer and deployment	Apr23 – Jun23	
1.2.15 Enhancing the Public Finance Management System for MoF - Nepal		
1.2.15.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Pending project formalization; desk review and UNA materials completed
1.2.15.2 Technical assessment of existing portal	Apr21 – Jun22	Pending project formalization
1.2.15.3 Development of DSS framework and finalization of data parameters	Apr21 – Jun22	Pending onboarding of DSS CF & project formalization
1.2.15.4 Development of data management module	Apr21 – Dec22	Pending onboarding of DSS CF & project formalization
1.2.15.5 Development of DSS engine	Jul21 – Dec22	Pending onboarding of DSS CF & project formalization
1.2.15.6 System audit	Jan23 – Mar23	
1.2.15.7 Preparation of user guide and technical manual	Jan23 – Jun23	
1.2.15.8 System transfer and deployment	Jul23 – Sep23	
1.2.16 Enhancing the DSS for NDRRMA -Nepal		
1.2.16.1 Assessment of user needs (refer to 1.2.1.3)	Dec20 – Jun22	Ongoing desk review
1.2.16.2 Technical assessment of NDRRMA portal	Feb21 – Jun22	Pending project formalization
1.2.16.3 Development of DSS framework and finalization of data parameters	Apr21 – Dec22	Pending onboarding of DSS CF & project formalization

1.2.16.4 Enhancement of data management module	May21 – Jun23	Pending onboarding of DSS CF & project formalization
1.2.16.5 Enhancement of DSS engine and dissemination module	Jul21 – Jun24	
1.2.16.6 System audit	Jul22 – Jun24	
1.2.16.7 Preparation of user guide and technical manual	Jul23 – Jun24	
1.2.16.8 System transfer and deployment	Jan24 – Sep24	

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


PAKISTAN

[PAKISTAN]

Procurement

All positions for national sectoral experts in Pakistan have been filled, except for i) Transport Expert (Clean and Green Energy) and ii) Agriculture Expert for Balochistan, which are new positions following the integration of new activities (i.e. inventory of greenhouse gas emissions in Pakistan's transport sector and replication of SESAME in Balochistan). Both positions have been included in CARE Component 1's procurement plan and approved by the Bank; ToRs will be submitted for review and approval of the Bank. REoIs for Project Associate position and consulting firm for DSSs development have been published.

Sectoral Focal Points

Sectoral focal points (SFPs) in Pakistan underwent some changes due to staff turnover. Table 1 provides the status of SFPs in the country.

Table 1: List of sectoral focal points in Pakistan as of 31 December 2021

Sector	Ministry/ Agency	Focal Point Details
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)**	**Ms. Marium Ayub** Section Officer cum Deputy Secretary, EFP3
Agriculture	**Punjab Agriculture Department (PAD)**	**Mr. Rana Mahmood Akhtar** Chief, Planning and Evaluation Cell
	Balochistan Irrigation Department (BAD)	**Mr. Juma Khan Tareen** Director General Research
Water	**Sindh Irrigation Department (SID)**	**Mr. Ehsan Leghari** General Manager
Cross-cutting	**Pakistan Meteorological Department (PMD)**	**Dr. Muhammad Riaz** Director General

Work Plan

The World Bank ISR online meetings organized by the Bank, in collaboration with RIMES and ADPC, from 20 to 29 September 2021 in Pakistan presented project accomplishments to, and received feedback on project implementation and proposed 2021-2022 work plan from, government beneficiary institutions/ stakeholders. Eight (8) institutions including MoPDSI, MoF, MoCC, PAD, SID, BAD, NDMA and PMD reviewed and provided feedback on CARE activities and 2021-2022 work plan. For Component 1, the following additions to key activities to be undertaken under the project have been recommended by MoPDSI, and accepted by the Bank and RIMES; these have been integrated into the 2021-2022 work plan:

- Inventory of greenhouse gas emissions for Pakistan's transport sector; assessment outcomes to be integrated into MoPDSI's DSS
- Customization of SESAME for Balochistan Agriculture Department

Activity 1.2.2
Development of DSS for MoPDSI:

Consultations

Consultation meetings were held with MoPDSI for firming up the DSS development for the planning sector. These include:

- Meeting between MoPDSI and RIMES Teams, on 27 July 2021, for discussion of priority CARE interventions for the sector. Dr. Jalil indicated the requirement for the inventory of GHG emissions in the transport sector, for guiding initiatives at cleaning and greening the sector. RIMES indicated that it will consult with the Bank for the feasibility of including the inventory of GHG emissions in the transport sector, in CARE Component 1
- ISR Mission meeting, hosted by MoPDSI, on 20 September 2021, where RIMES shared updates on the preparatory activities (i.e. desk review, technical review and user needs assessment) for DSS development, and the proposed CARE work plan for 2021-22. The following were articulated requirements for the sector, as reported by the Planning Expert for Component 1: i) a tool for assisting MoPDSI in quantitative climate-informed projects appraisal (MoPDSI to decide whether the tool would be independent or part of the Intelligent Project Automation System [iPAS]), and ii) integration of dashboards of all sectoral DSSs being developed in Pakistan into the planning sector DSS. MoPDSI recommended the inclusion of inventory of GHG emissions and replication of SESAME for Balochistan in Component 1. MoPDSI's recommendations, on the inclusion of inventory of GHGs and replication of SESAME for Balochistan, were accepted by WB and RIMES during ISR Wrap Up meeting in Pakistan on 29 September 2021

Desk Review

ONGOING

RIMES has recommended improvements in the draft Desk Review Report submitted by the Planning Expert. In its draft form, the following are key information from the Desk Review Report:

- Climate information of various timescales is not integrated into the project planning process
- The introduction of climate analysis tools for project appraisal and for prioritization of projects will be beneficial

Technical Assessment

The technical assessment shall be undertaken upon the decision of MoPDSI to integrate the DSS to be developed in CARE Component 1, into the IPAS.

User Needs Assessment

ONGOING

The user needs assessment shall be undertaken by the Planning Expert, once the proposed user needs assessment materials and methodologies have been revised and approved by RIMES.

DSS Development

The functionalities of the DSS underpin on the requirements of planning sector stakeholders, for addressing capacity gaps vis-a-vis climate-informed project planning. Hence, the development of the DSS will be undertaken as the final desk review, technical review, and user needs assessment reports become available and upon on-boarding of the consulting firm for DSS development.

Activity 1.2.3
Development of DSS for Ministry of Finance

Consultations

The World Bank ISR Mission engaged MoF and relevant stakeholders in the finance sector in an online meeting on 24 September 2021. Progress of, and initial recommendations from, the assessment activities, including the desk review and user needs assessment materials, were presented. The MoF is to decide whether its DSS will be integrated with that of MoPDSI or a standalone/dedicated system for the institution.

Desk Review

COMPLETED

Technical Review

Technical assessment of the Systems, Applications and Products (SAP), a financial information management tool used by MoF, shall be undertaken as may be required.

User Needs Assessment

ONGOING :

draft reports on assessment outcomes and recommendations for DSS in Appendices 3 and 4, respectively

The i) assessment outcomes and ii) recommendations and inputs to DSS reports, which have been submitted by the Finance Expert, are being revised following review and comments by RIMES. The following are the key information/findings/recommendations from the reports:

- The SAP does not integrate climate information
- While a tool for integrating climate information into MoF investments is not currently available, sensitivity of MoF data is a hindrance to developing one. Due to this sensitivity of select data in MoF, stakeholders in the institution recommend the following options:
  - Linking weekly data of commodity prices from MoF's Statistics Division with crops grown in Pakistan for deducing economic impacts
  - Instead of a tool in MoF, a tool for integrating climate information for evaluation/appraisal of projects in MoPDSI be lodged. The tool in MoPDSI can further integrate climate information and relevant economic data and analytics, for generating various reports weekly, monthly and/or annually, as may be relevant. MoF can be given access, by MoPDSI, to the tool and its products
- Capacity building would be required for MoPDSI/MoF staff for maintaining/utilizing the DSS, once completed

DSS Development

The development of the DSS shall be commenced upon the completion of the final reports on assessment outcomes and recommendations for DSS for MoF, and upon on-boarding of the consulting firm.

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

Consultations

ISR Mission meeting for the agriculture sector, on 23 September 2021, presented project updates, discussed issues and challenges, and received feedback from stakeholders. The following were issues/concerns clarified during the meeting:

- Data from observation equipment for integration into the DSS are from PMD weather stations (temperature, rainfall, soil moisture, etc.)
- Crop data available in Pakistan are in hard copy and requires digitization before integration into the DSS
- For small-scale farmers located in rural areas without internet connectivity, relevant DSS products can be disseminated via SMS, voice messaging, etc.; requisite climate-informed advisories would be available in local language

Desk Review

COMPLETED

Technical Review

COMPLETED

User Needs Assessment

ONGOING :

draft reports on assessment outcomes and recommendations for DSS are for final review and validation by PAD; in Appendices 5 and 6, respectively

The following are key information/findings/recommendations from the reports:

- Data from interviews/discussions undertaken in 6 districts of Punjab (i.e. Sialkot, Gujranwala, Okara, Faisalabad, Multan, Muzaffaragarh) on 24-27 May 2021, involving 18 farmers, indicate the following:
  - Farmers are using climate information from various sources in their crop production decisions but information is not easily accessible, does not cover all information required by farmers, has unknown reliability, and sometimes reaches the farmers belatedly
  - Capacity of farmers to understand and utilize climate information is to be enhanced. Based on the above-mentioned interviews/discussions: 24% of farmers can access and understand weather/climate information, and implement climate-informed decisions; 26% can understand weather/climate information, and implement climate-informed decisions; 23% can understand weather/climate information, and implement climate-informed decisions, with guidance from others; and 27% are unable to access and understand weather/climate information, and implement climate-informed decisions

Figure 3. Interview with farmers

- While agriculture-related weather/climate information like Tehsil Forecast, Agro-met Bulletins, Crop Reports, Agro-Advisories and Agro Climate Outlook are available in PMD's Regional Agro-met Centers (RAMCs), there is no comprehensive mechanism at customizing and disseminating climate-informed agriculture information that responds to, and receives feedback on, evolving requirements of agriculture planners, decision makers, and farmers in Punjab. The DSS for PAD should comprehensively address the varying requirements of different stakeholders
- Crop-wise analysis and recommendations, in relation to climate change, e.g., provision of available options such as changing sowing or harvesting schedules, selection of different crop varieties that can tolerate adverse conditions, etc., could be integrated into the DSS to aid farmers in their decision-making
- The development of the DSS could be guided by an agro-meteorology technical group, the composition thereof can be from PAD, PMD, academe, research institutions, farmers/farmer leaders, and others relevant
- Key components of the DSS to include:
  - Database, containing climate/ weather, soil, crop, and other required data from various sources, including internal data from organizations, data generated by different applications, and external data mined online, etc.
  - Analytical modeling system, consisting of various mathematical and analytical models for analyzing complex data and producing required information, advisory and recommendations, e.g., statistical models for establishing relationships between occurrences and related factors, sensitivity analysis models for addressing what-if scenarios, optimization analysis models for guiding decision relate to optimum utilization of resources, forecasting models, and backward analysis sensitivity models
  - User interface
- Capacity building of users of the DSS, and its outputs, including but not limited to farmers, extension workers, and PAD officials, has to be pursued
- For enhancing farmers' capacity, the following are recommended: i) awareness sessions about climate change; ii) use of gadgets to get climate information; iii) practical demonstrations; and iv) training sessions on climate change and DSS

A consultation/validation workshop is targeted by the first quarter of 2022 for presentation of the reports to PAD stakeholders, obtaining their feedback and recommendations, and acceptance of the same.

Launching of the SESAME prototype for PAD is being organized in January/February 2022.

DSS Development

SESAME FOR PAD PROTOTYPE COMPLETED : Report in Appendix 7

The prototype of SESAME for PAD has been completed by the RIMES Systems Development Team. Key activities undertaken are as follows:

- Agricultural DSS framework and database architecture and schema
- Data management module developed with crop database, climate data and other localized data and parameters
- DSS engine built into the web-based application (full development requires data integration into system for generation of agricultural advisories)

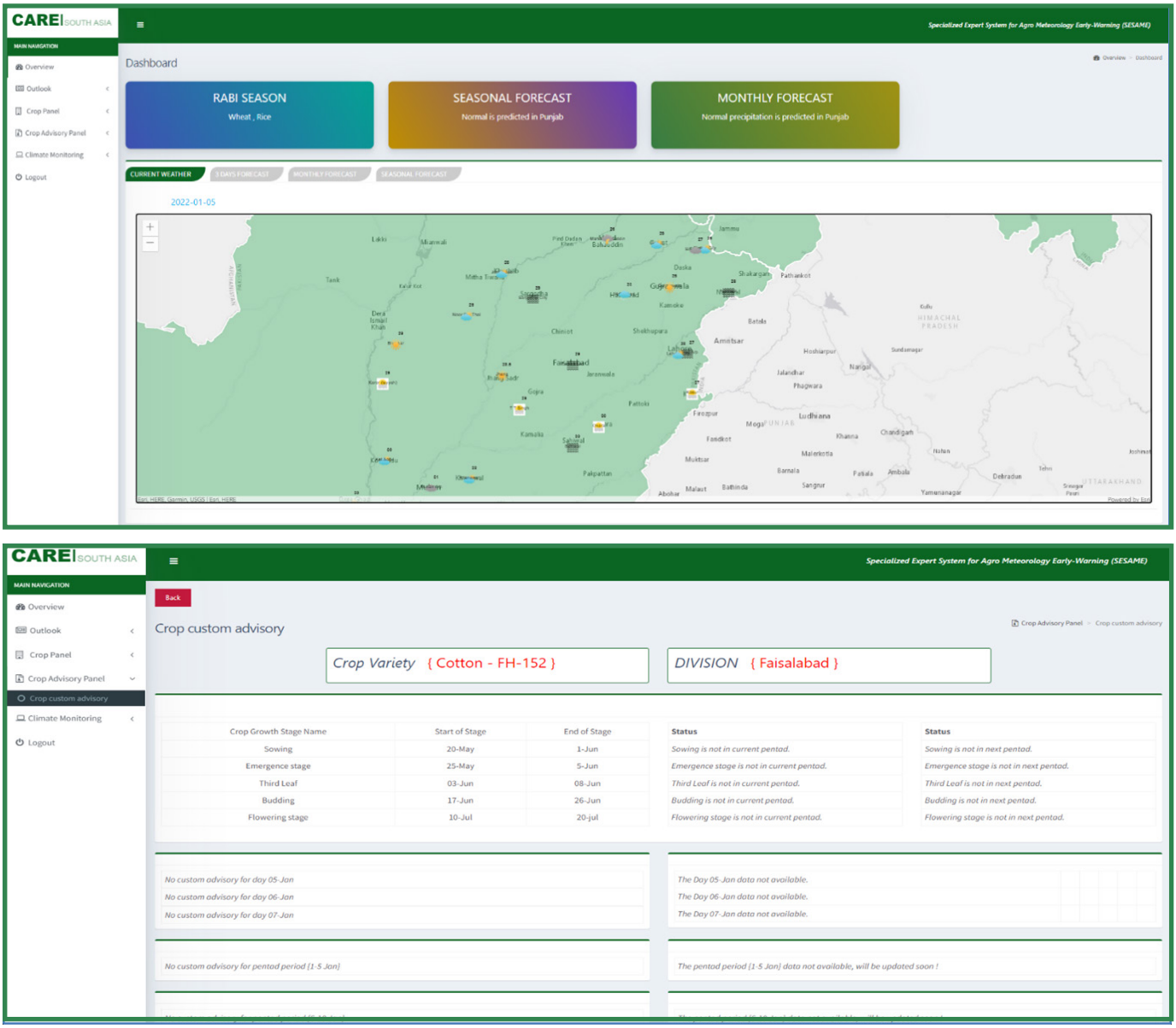

Figure 4.SESAME prototype for Punjab dashboard showing weather and crop information for decision-making and crop advisory panel integrating meteorological and crop data

Activity 1.2.4b
Development of SESAME for Balochistan

Consultations

The requirement for replication of SESAME for BAD was articulated during the ISR Mission meetings with MoPDSI on 20 and 29 September 2021. Both the Bank and RIMES accepted the inclusion of the requested tool customization in CARE Component 1.

Desk Review

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

Technical Review

Upon identification of relevant system/s available in BAD, RIMES shall undertake a technical review, with assistance from the Agriculture Expert for Balochistan.

User Needs Assessment

The user needs assessment shall be undertaken by the Agriculture Expert for Balochistan upon submission, and approval by RIMES, of user needs assessment materials report.

DSS Development

SESAME will be customized for Balochistan once the desk review, technical review and user needs assessment are completed, for guiding the said SESAME customization; and upon the on-boarding of the consulting firm for DSSs development in Pakistan.

Activity 1.2.5
Improving DSS for Sindh Irrigation Department

Consultations

Several meetings were carried out with SID and other water management stakeholder institutions during this reporting period, including:

- Consultative meeting, on 13 July 2021, with Dr. Sana Ulla, Risk Assessment Specialist, Sindh Provincial Disaster Management Authority (PDMA), discussed the different systems in place in Sindh PDMA to manage the province's flood issues including another World Bank-funded system, the Disaster Management Information System (DMIS)
- Consultative meeting, on 14 July 2021, with the Special Secretary of SID, deliberated project objectives with emphasis given to the DSS, requirements for its development, and potential benefits from operationalization. SID took keen interest in project activities and assured provision of support. SID noted that another World Bank-funded DSS, implemented by AIT Extension, is almost completed and recommended visiting the Sindh Resilience Project for further discussion on the system. A follow up meeting with Engr. Zahid Sheikh noted opportunities for improving the said DSS through CARE Component 1
- Meeting, on 15 July 2021, Dr. Syed Sarfaraz, Chief Meteorologist, PMD Regional Meteorological Centre, Karachi, discussed the effects of climate variability and change on water and agriculture. Systems used for recording real-time weather and historical data were also discussed
- ISR Mission for the water sector, on 23 September 2021, presented project updates and recommendations for DSS preparatory activities. SID suggested that farmer organizations and relevant stakeholders may be consulted for CSA activities, noting that policy guidelines and regulations may be developed for better groundwater management

Desk Review

COMPLETED

Technical Review

COMPLETED

User Needs Assessment

ONGOING :

Ongoing, draft reports on assessment outcomes and recommendations for DSS for revision; in Appendices 7 and 8, respectively

Draft reports on assessment outcomes and recommendations and inputs to DSS design have been submitted by the Water Expert and are being finalized with the guidance of the RIMES CARE Team. The following are key information/findings/recommendations from the draft reports:

- While the usefulness of the DSS is acknowledged by SID (particularly on the context of climate impacts, variability of available water for domestic consumption, irrigation, flood, drought patterns, population growth, maintenance of existing water reservoirs and planning of new resources), there are concerns on the operationalization, continued relevance and sustainability of the system due to the static nature of past systems and inability of technical team in SID to operate the same. The DSS to be developed under CARE, therefore, should be scalable to other provinces in the future, easy to use, and be able to evolve per user requirements

- The enhanced DSS is suggested to be capable of delivering the following: i) carrying out hydrological modeling for water availability forecasting and determination of Sindh's allocation per the Water Apportionment Accord (1991); ii) put in place real-time operational model for barrages and canals of the Sindh irrigation system; iii) carrying out investigations of water table fluctuation in the irrigation system; iv) assisting in the preparation of water table fluctuation maps; v) developing hydraulic models for all main and branch canals of the Sindh Irrigation System; vi) establishing links between databases of relevant organizations such as PMD, IRSA and WAPDA; vii) analysis of difference of irrigation water requirement and rainfall; viii) optimize reservoir operational data; ix) providing alternative dry route/s, in case of channel flooding; x) providing alternative water demand priorities and allocations to meet water shortages in years anticipated to be significantly drier than normal; xi) providing irrigation area coverage and current unmet water demands; xii) suggestions/response options for minimizing water losses; xiii) integrating drought management; and xiv) integrating projections of future consumption demands based on current trends and other relevant data
- Key components of the DSS should include:
  - Data Warehouse, to coordinate use of available datasets and efficiently convert data into information. The data repository must be centralized and offer open access to decision-makers, academics, and researchers for analysis of impacts of changing hydrologic conditions related to climate change
  - Water system modeling framework, used for water supply and demand management in river basins, must be in compliance with datasets and user requirements, robust and capable of analyzing complex data and transforming into useful information (e.g., on general water resources management, flood management, drought management, climate change analysis, etc.), and capable of multi-criteria analysis for assessing substitute plans, cost-benefit analysis, and benefit sharing. The DSS should be flexible and adaptable, such that it is able to store relevant model results and connect to new tools that will be developed in the future and include the following features and functionalities, e.g., statistical models, sensitivity analysis, forecasting models that will aid flood management and rerouting excess water to dry channels, optimization analysis to optimize utilization of resources, etc.
  - User interface, to showcase results/reports in comparison with historical data, e.g., reports on main canal functioning (weekly), volumes issued, difficulties in implementation, trends in variation of parameters, proposals for maintenance, and achievement in implementation
- Along with DSS enhancement, training and operations manuals have to be prepared, and capacity building of professional technical staff, through "on-the-job" training and other training programs, have to be undertaken

A workshop will be organized with the water sector stakeholders, by 1st quarter of 2022, to validate, and as may be necessary, and provide further inputs to, the reports on assessment outcomes and final report with recommendations and inputs to DSS design.

DSS Development

Enhancement of the DSS for SID will be undertaken by the consulting firm, once on-board.

BANGLADESH

[BANGLADESH]

Procurement

All national sectoral expert positions in Bangladesh have been filled. REoI for consulting firm for DSSs development has been published.

Sectoral Focal Points

In Bangladesh, SFPs underwent some changes due to staff turnover. The updated SFPs are in Table 2.

Table 2: List of sectoral focal points in Bangladesh as of 31 December 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	**Bangladesh Planning Commission**	**Nazrul Islam** Additional Secretary, GED **Dr. Nurun Nahar** Joint Chief, Programming Division
Agriculture	**Department of Agricultural Extension (DAE)**	**Dr. Md. Shah Kamal Khan** Project Director, AMISDP
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

Work Plan

The World Bank ISR online meetings organized by the Bank, in collaboration with RIMES and ADPC, from 22 September to 10 October 2021, in Bangladesh presented project accomplishments to, and received feedback on project implementation and proposed 2021-2022 work plan from, government beneficiary institutions/stakeholders. The MoF, DAE, LGED, DLS, MoWR, WARPO, FFWC, BWDB, GED of BPC, MoEFCC, and RHD (11 institutions) gave feedback on the activities thus far completed and provided recommendations on moving forward with the project. There was no objection, from beneficiary institutions/stakeholders, on the proposed 2021-2022 work plan for CARE Component 1.

Activity 1.2.6
Upgrading BAMIS for Agriculture

Sectoral focal points

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

- Meeting with Dr. Md. Shah Kamal Khan, Project Director, AMISDP and SFP of DAE, on 29 July 2021, discussed project updates, status of MoU with DAE, and recommendations for enhancing BAMIS. DAE expressed its keen interest in the Voice Message Broadcasting (VMB), a voice messaging system developed by RIMES for disseminating flood forecasts, weather forecasts and forecast-based advisories. DAE recommended to integrate this system into BAMIS, for addressing illiteracy and speed of information dissemination. DAE suggested for RIMES to organize a small training program for AMISDP project officials on the VMB and share access to the system for testing. DAE noted that recent development of Upazila Weather Forecast by BMD and RIMES will aid in enhancing BAMIS through delivery of location-specific agrometeorological advisories. Meanwhile, discussion on the progress of MoU signing highlighted MoA's recommendations to reflect 5 year collaboration with RIMES with automatic renewal for another 5 years and noted delays in the process due to stringent Covid-19 lockdown measures. Following this meeting, a training program on operation and dissemination using the VMB tool was organized for AMISDP 9 project staff on 5 September 2021
- ISR Mission Meeting for agriculture sector, on 4 October 2021, presented project updates and key accomplishments for the sector under Component 1. DAE appreciated the CARE project staff, recommended arranging a few inception workshops on climate smart agriculture, timely delivery of activities, and expressed cooperation and desire to contribute to nation building through this project. The meeting put forward the following for BAMIS enhancement through CARE Component 1:
  - Integration of VMB into BAMIS for scaling up beneficiaries
  - Collaboration with ADPC vis-a-vis assessment of existing training modules for researchers, agriculture officers, and farmers under the AMISDP can be incorporated in the capacity building process
  - DAE has i) different methods for disseminating advisories to stakeholders/farmers including mass media (both electronic and print), Agriculture Information Service; union-level weatherboards; ii) organized farmers' trainings; and iii) plans to involve a wider range of stakeholders, improve advisories, and include crop, livestock and fisheries information via the BAMIS which is to be complemented by a mobile application
  - The Farmers' Information and Advisory Center (FIAC), under the WB-funded National Agriculture Technology 2 project, can be a complementary mechanism to the enhanced BAMIS, for bringing advisories to the farmers

The MoU with DAE is at the final review stage and is expected to strengthen collaboration between RIMES and DAE, and facilitate access to the BAMIS, for required system enhancements.

Desk Review

COMPLETED

Technical Review

COMPLETED

User Needs Assessment

ONGOING

The Agriculture Expert carried out the following, in coordination with DAE, using approved data collection tools and methodologies:

- FGDs (total of 6) in 3 locations in the country, i.e. Rangpur (2 November 2021), Sylhet (14 November 2021), and Barishal (24 November 2021) with farmers and extension agents
- FGDs with DAE officials in Rangpur (3 November 2021), Sylhet (15 November 2021), and Barishal (25 November 2021)

Figure 5. FGD with farmers in Babuganj, Barishal

Key information gathered from the engagement with stakeholders are:

- There is need for location-specific weather forecasts and crop stage-specific advisories, in contrast with the generic advisories currently provided. Further research on crop-weather relationship on local context, verifying thresholds for diseases and pests outbreak is necessary
- Automation of the process of advisories generation in BAMIS and incorporation of local inputs from Upazila Agricultural Officers are imperative; these imply that the current practice should be decentralized
- Multi-channel dissemination mechanism (Voice message, Mobile applications, SAAO, Lead farmers etc.) is required. This could be complemented/supplemented by an effective feedback mechanism and call center for personalized suggestions regarding climate services. Further, installation of digital display boards instead of current manual ones in conspicuous areas can be helpful to popularize the agro-meteorological service. Activation of kiosks and maximization of its utilization by using it for advisory/content dissemination would also be an advantage
- Systematic feedback collection and impact assessment mechanisms are required
- Extensive multi-tier capacity building program for extension officials to farmers, for interpreting and applying weather/climate information should be pursued; formation of farmers field school on climate services and development of farmers database for agro-meteorological advisory dissemination should also be considered priorities

Figure 6. Visit to Union Parishad buildings in Barishal for validating the effectiveness of the weather boards

Upon completion, and approval of RIMES,
of the reports on assessment outcomes and recommendations and inputs to DSS development, a validation workshop will be convened with DAE, BMD, BWDB, field-level representatives of extension agents, and farmer leaders/representatives, for validation and acceptance of the reports.

DSS development

The enhancement of BAMIS will be undertaken upon grant of system access, by DAE, to RIMES and upon on-boarding of the consulting firm.

Activity 1.2.7
Improving DSS for Livestock Subsector (Priority system)

Consultations

Meetings have been conducted with DLS and relevant stakeholders in the livestock sector. These include:

- Meeting with TWG, including Dr. Ashis Kumar Samanta, Senior Program Specialist, SAARC Agricultural Centre, and Dr. Rafiqul Islam, Upazila Livestock Officer, DLS, on 8 July 2021, discussed previous advisory dissemination and response, preparation of special flood advisory bulletins for anticipated flood, and determined the modality of dissemination and recipients of advisory bulletins. Key points from the meeting include:
  - Special flood preparedness advisory can be disseminated with consent of DG, DLS on an experimental basis to district and upazila levels
  - Some lead farmers' mobile number can be included in the voice message dissemination for maximizing reach of forecast-based advisories; information of lead farmers can be collected through LDDP project
  - Interactive and catchy slogan can be disseminated, through radio, to flood prone areas for catching interest of farmers
  - Vaccination advisories should be included in the flood preparedness messages to increase awareness and and for sending reminder to the farmers
  - Advisories should: i) be customized based on available lead time and recipient (to be indicated whether marginal or commercial farmers) , ii) include emergency contact numbers for a specific upazila, iii) avoid use of technical terms, iv) be more specific and provide appropriate instruction for farmers (i.e. practical and doable, and with other details); v) include manure management in the flood shelter or during flood situations for commercial farmers; and vi) be stated in a way that eliminates panic among recipients
- ISR Mission meeting for the livestock sector, on 4 October 2021, presented CARE Component 1 project updates, discussed issues and challenges, and received feedback from stakeholders. DLS noted the timeliness of the project for enhancing the capacity of the livestock sector to address issues related to disaster risk management and climate change; DLS expressed support and cooperation to ensure that activities are implemented timely

Draft MoU, between DLS and RIMES, is currently being reviewed by MoFL.

Desk Review

COMPLETED : in Appendix 9

Key findings and recommendations:

- Key stakeholder departments/ institutions vis-a-vis the livestock sector:
  - **DLS**, mandated to deal with the overall development of the livestock sector; for capacitating and mobilizing farmers in integrating weather/climate information in livestock-related operations and management
  - **BMD and FFWC**, for generating weather/climate/flood forecast products of various timescales, including warnings
  - **Academic and research institutions,** for studies on sensitivity of livestock to weather/ climate parameters and determination of threshold levels, and provision of inputs to TWG
  - **NGOs,** for contributing to capacity building of farmers to implement weather/ climate advisories effectively
  - **Policy makers**, for putting in place policies for development of livestock DSS and advisories and inclusion of DSS products and early warning for weather/ climate hazards for protection of

livestock in future policy papers
- **Farmers,** for implementing weather/ climate related early warning and advisories distributed by DLS, for optimizing livestock health, production, and reproduction, and for mitigating risks and for providing continuous feedback for enhancement of the DSS
- **Paravet,** for aiding in treatment of ailing livestock due to weather/ climate-related injuries or hazards
- **Local Service Providers (LSPs),** for helping farmers in various problems/challenges including the process of implementation of advisories by subsistence farmers; and
- **Market actors,** for assisting in marketing of livestock and their products as per weather/ climate advisories

- Key climate-livestock interaction, current capacities, gaps and other relevant information
  - Climate change is a threat to livestock production because of its impact on yield and quality of feed crop and forages, growth and milk production, livestock diseases, animal reproduction, and biodiversity. Most natural hazards that adversely affect livestock production and diseases such cyclone, storm surge, tornadoes, thunderstorm, hailstorm, flood, flash flood, droughts, heavy rain, heatwaves, cold waves, salinity intrusions are meteorological and hydrological in nature and are very common in Bangladesh
  - BMD is responsible for data collection and generation, monitoring and issuance of weather forecasts (daily, weekly, decadal, monthly, quarterly) and warnings of all meteorological extreme events, e.g., tropical cyclone, severe thunderstorm/tornadoes, heavy rainfall, drought, cold and heat wave, etc. BMD shares these products with DDM, MoDMR, DAE, FFWC and other relevant stakeholders. BMD also issues the following special forecast products: i) tropical cyclone warning, ii) Nor'wester/Kalboishakhi warning, iii) heat wave warning, and iv) cold wave and fog warning
  - FFWC is responsible for data collection and generation of flood forecasts in Bangladesh in coordination with MoDMDR, BMD, DDM, DAE during the pre-monsoon and monsoon for flood disaster mitigation and management. Following are FFWC products: i) daily monsoon bulletin & river situation report; ii) river water level deterministic forecasts for 24, 48, 73, 96, and 120 hours at 54 locations; iii) probabilistic 10-daily water level forecast (limited places and experimental basis) at 38 locations; iv) structure-based forecast at 4 locations; v) warning messages; vi) special flood situation report; vii) monthly flood report; viii) dry season bulletin (weekly); ix) annual flood report
  - Climate information from BMD/FFWC is not fully applied in livestock-related operations and management, due to various gaps in accessing, understanding and utilizing weather/climate information of various timescales, including, but not limited to: i) absence of mechanism for systematically translating short- and long-term climate information into impacts and response options in the livestock sector; ii) no comprehensive system for archiving and analyses of required data, and generation of advisories; iii) non-availability of location-specific, well-formatted, and usable weather/ climate data; iv) lack of available/customized data on weather and climate sensitivity of livestock, particularly in the context of different species and breeds in Bangladesh; and v) lack of technical staff in/capacity building of DLS officials in weather/climate information-based risk management

- **Challenges in DSS development:**
  - Risk communication considering language barrier issues and information that can induce panic
  - Integration of new/updated data into the system, as livestock data evolves fast
  - Thresholds vis-a-vis climate-related impacts on livestock have to be customized for Bangladesh
- **Recommendations:**
  - Generation of advisory bulletins for livestock sectors, taking into account weather/climate parameters (temperature, rainfall, humidity, etc.) vis-a-vis animal health, growth and reproduction, milk production, disease outbreak or pest infection, fodder production and quality, feed-grain availability and economic losses. Advisories have to be location-specific, threshold/index-based, and provides adaptive/response measures pre-, during, and post-events
  - Based on lessons from other countries, the DSS development should be a co-production of information by teams of experts from various relevant disciplines; institutional partnerships

relevant thereto have to be sustained; and information products have to be disseminated via various channels and different frequencies/periods, for responding to user requirements
- Integration of vaccination alerts into the DSS for guiding DLS plans, particularly on stocking-up vaccines prior to high risk events

Technical Review NO RELEVANT SYSTEM CURRENTLY IN DLS OR IN ALLIED INSTITUTIONS

User Needs Assessment

ONGOING :

using materials and methodologies indicated in the approved User Needs Assessment Materials Report, in Appendix 10.

Key activities completed, during the semester, are as follows:
- KIIs involving 10 key personnel of DLS, BLRI, BMD, BWDB, BAU, and SAC.
- 10 FGDs (15 people per group) in 5 vulnerable regions in the country (Satkhira, Sunamganj, Rajshahi, Gaibandha, and Sirajganj. Participants to the FGDs were rural subsistence farmers, commercial farmers, government officials, BMD officials, FFWC officials, university and research Institute officias, NGO officials, and market actors


Figure 7. FGD with DLO/ULO officers, NGO representatives, and LSPs and visit to Naba Dairy and Cattle Farm in Rajshahi District


Figure 8. FGD with DLO farmers representatives, NGO representatives, and LSPs, and discussion with local dairy farmers in Satkira District

DSS Development

PROTOTYPE SYSTEM COMPLETED

The prototype system for DLS DSS was completed by December 2021. The following are the activities undertaken:

- **Enhancement of DSS framework and finalization of data parameters**
  - Climate variables at earth's surface and above were collected. Data collected includes temperature, precipitation, cloud cover, and wind speed that affects livestock health, growth, production, diseases, fodder, and shelter. Data has been extracted, transformed and loaded into python data-frames and later populated into SQL databases in relational table format using in-house developed Django API. The climate parameters have been integrated with the weather API to generate climate risk indices and correlated with sectoral data
  - Foot-and-mouth disease (FMD) is highly endemic in Bangladesh. Using passive surveillance data (case records from all 64 districts of Bangladesh, 2014-2017) and district domestic ruminant population estimates, calculated FMD cumulative incidence per 10,000 animals at risk per district, conducted cluster (Moran's spatial autocorrelation and scan statistics) and hotspot analysis (local indicator of spatial association statistic), created predictive maps and identified risk factors using a geographically weighted regression model

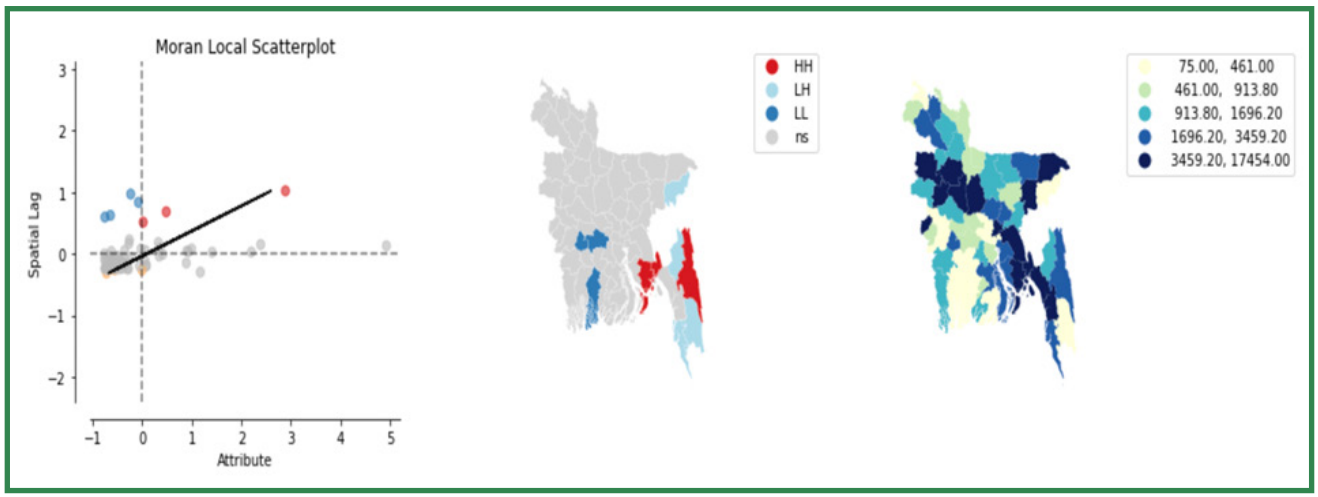

Figure 9. Moran's scatter plot, hotspots and risk map of FMD cases in 2020.

  - Interpolation of station-observed rainfall at district and sub-district levels was requested by BMD. The accuracy of several interpolation methods was evaluated; result of the evaluation will provide inputs to weekly bulletin generation through the Livestock DSS
  - Observed datasets from 2015 to date, from 34 stations, have been extracted from BMD server site and populated into SQL database. Also, 9km forecast dataset have been extracted and mean, mode, median, max, and min temperature has been computed for mapping with observed data. Training and test datasets were produced for applying several machine learning techniques and algorithms

- **Enhancement of data management module**
  - Bias correction of forecast temperature was necessary while successfully visualizing heat stress over the country map. Model forecast from BMD reveals some level of overestimation of high temperatures and underestimation of low temperatures which has been verified against station observation data
  - A methodology for correcting 3-hourly forecast temperature has been derived to assimilate machine learning models. Learned models have been saved and tested with present day test dataset. Thirty machine learning models have been used on monthly mean, max, media, and mode temperature to identify results with better accuracy
  - Deployment of the API to the Linux server is completed. The bias correction API is capable of automatically correcting bias of 3-hourly temperatures with a lead-time of 240 hours for all stations

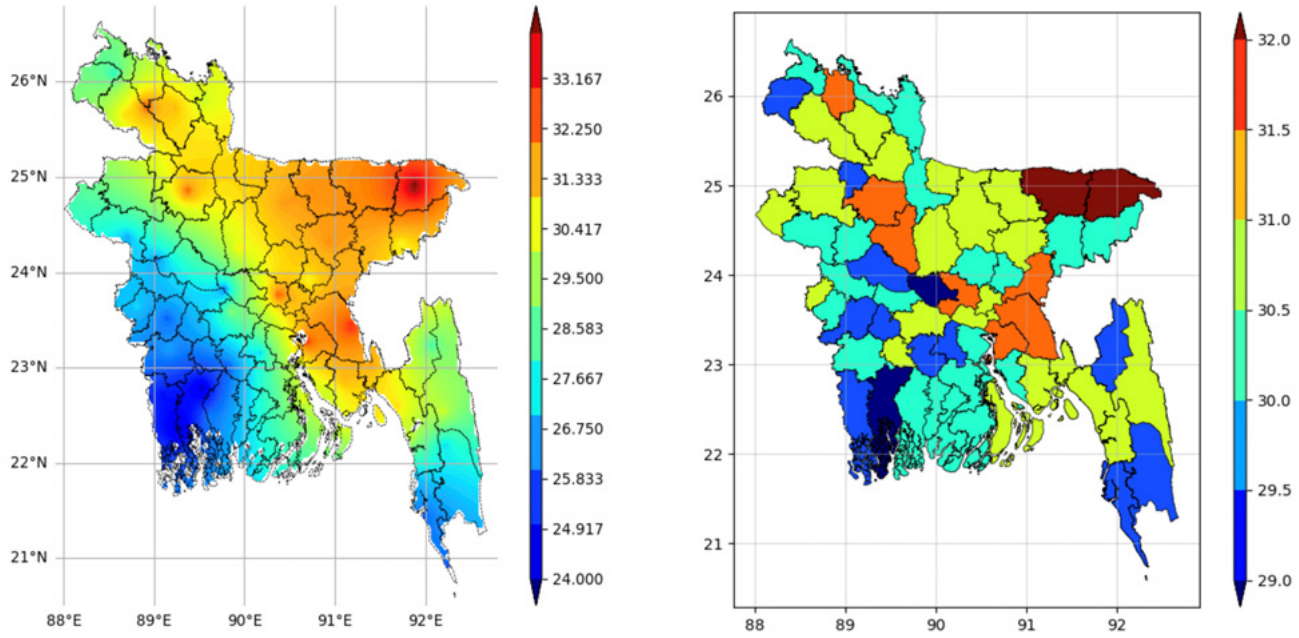

Figure 10. Interpolation of bias-corrected temperature to country grid and district level

- **Enhancement of DSS engine**
  - Modified the design template of RDAS portal with the Livestock DSS front-end. Information retrieved from the database and visualizing the decision components was made possible with Serialization, JavaScript, and web-components.

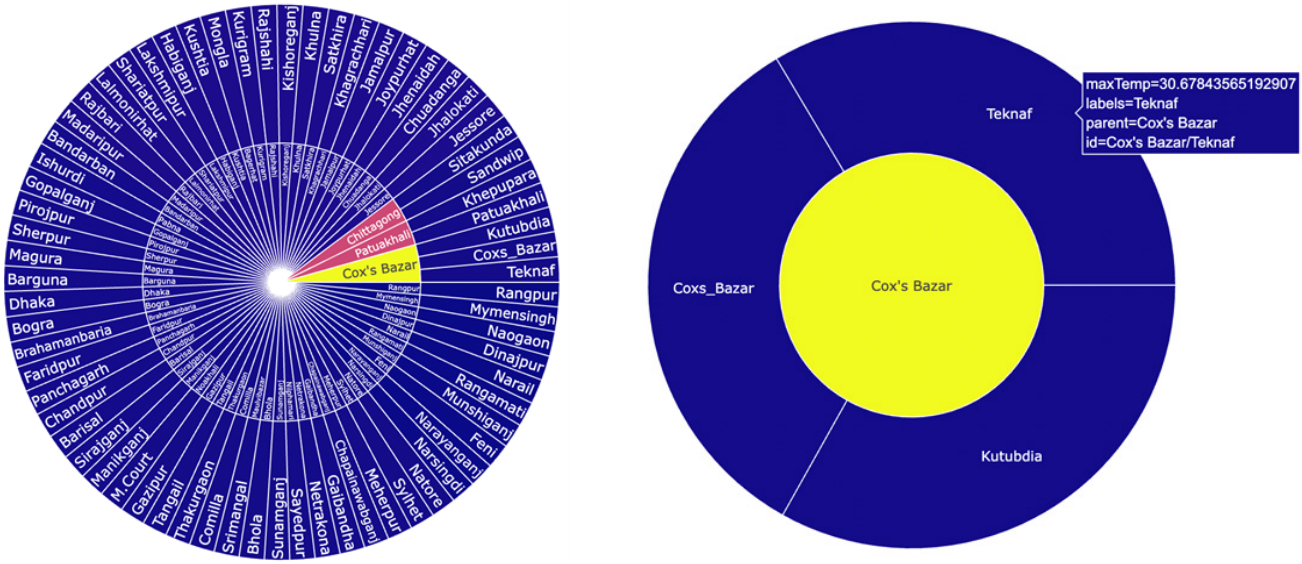

Figure 11. Interactive sunburst visualization of division/district-wise observed maximum temperature

The prototype DSS for livestock is expected to be launched/publicly demonstrated by early 2022.

Activity 1.2.8
Upgrading the Online Road Network Portal

Consultations

Several meetings organized with RHD and LGED include:

- Meeting with RHD officials, Mr. A.B.M. Sertajur Rahman Superintending Engineer, Highway Development and Management (HDM) Circle, Mr. Amir Hossain, Executive Engineer, HDM Circle, Ms. Annesha Das Hasi, on 21 and 22 September 2021, discussed the background of the transport sector DSS, data and inventory at RHD, and the process for identifying areas for intervention of CARE Component 1. Highlights of the meeting are as follows:
  - Temperature variation, flood, rainfall etc. are the key climatological concerns for RHD. RHD uses high flood level data for its design purpose but this data is not always available relative to specific road network; determining high flood levels across different benchmarks along the RHD network will be very useful. On the other hand, RHD is mainly using observed data from BWDB and BIWTA; there is no predictive modeling or long-term climate projection data used for planning and designing of road infrastructure in Bangladesh
  - HDM maintains the road network database of RHD, archives the Annual Average Daily Traffic (AADT) data and has plans to collect the road elevation data. RHD will install intelligent road traffic system in the future; weather data can be linked with this system to provide quick advisories to drivers
  - Flood inundation and coastal inundation information due to sea level rise will be useful for RHD to determine critical sections of road networks. Real-time flood risk analysis can be established to monitor and take tactical measures for road operation and maintenance. Salinity intrusion is thought to be another emerging area vis-à-vis climate change that needs to be addressed
  - Development of risk and vulnerability index for road network and alternative route forecasting considering impending disaster can also be considered while developing the DSS analytics
  - RIMES proposed a TWG with the following members, in response to RHD recommendation: Additional Chief Engineer, Technical Services Wing; Superintending Engineer, Social and Environment Circle; Superintending Engineer, HDM Circle; Executive Engineer, Bridge Design Division 2; Executive Engineer, Road Design and Standard Division; Executive Engineer, Planning Division 2; Executive Engineer, Material Testing and Maintenance Division; Executive Engineer, Environment Division; Executive Engineer, Database Division
- Meeting with LGED officials, Mr. AKM Lutfur Rahman, Additional Chief Engineer & Director, CReLIC, Ms. Nazreen Zaman, Senior Assistant Engineer, CReLIC, Mr. Golam Kibria, Deputy Team Leader, IDC -CReLIC, Mr. Banda Hafiz, Training Specialist, IDC - CReLIC, and Mr. Nazmul Hakim, ICT Specialist, IDC - CReLIC, on 28 October 2021, tackled existing DSSs and data inventory at LGED, and the process of identifying areas for intervention by CARE Component 1. Key meeting points are as follows:
  - Road and Structure Database Management System (RSDMS), a desktop application which LGED plans to convert into a web application for easy access under the ongoing ADB-funded project "Rural Connectivity Improvement Project (RCIP)", consists of various inventories on road, colleges, bridge culverts, detailed condition/ roughness survey, etc. which are used for annual road maintenance, and can be used for distributing yearly government allocated budgets to different districts
  - Rural Bridge Information Management System (RuBIMS), a tool currently being developed under the World Bank-funded Supporting Rural Bridges (SupRB) Project, is to provide operational flowchart (substructural, non-structural) for maintenance of major or minor bridges
  - RCPA project will be launched for the digital road network along with its attributes
  - LGED GIS unit manages geospatial road network data and MIS unit for road inventory, road length and description (kacha, paka PVC road, etc.)

- Electronic Project Monitoring System (EPMS), a system developed to prepare progress reports and monitor ongoing projects, has been launched mainly for contract management and progress reporting
- Asset Management System (AMS), a comprehensive system which LGED plans to implement with support from UNOPS to facilitate field-level inspection of roads, bridges, and buildings. Under the SupRB project, various issues and solutions will be identified in relation to this system
- In general, temperature, rainfall, salinity, historical climate data and projected climate data could be useful for future road design purposes
- LGED plans to develop a carbon emission calculation for structural intervention and develop an action plan to reduce infrastructure development with high GHG emissions, noting infrastructure being one of the major sectors which contributes to carbon emissions
- CARE project could potentially collaborate with CRIM project on the development of a climate resilience tool

- Meeting LGED officials, Mr. Md. Faruque Biswas, Knowledge Management Specialist (Climate Change), IDC-CReLIC, Mr. Antonio Arenas, project Lead, CReLIC, on 25 November 2021, deliberated transport-related activities under the CReLIC, scope of intervention under CReLIC's Climate Resilient tool, and outputs from the project that can be inputs to CARE Component 1. Highlights of the meeting are as follows:
  - LGED has established CReLIC under the umbrella of CRIM Project to make urban and rural infrastructures like roads, bridges, culverts, growth centers, etc. climate-resilient. This tool will be used for assessing climate resilience (particularly in the context of temperature, wind, and water level, and weather/climate-related hazards) of existing and upcoming infrastructure projects. LGED requires climate-related information for the development of the tool and will provide a list thereof. Aside from weather/climate-related information, RIMES can assist LGED in model development
  - LGED is going to make two types of decisions: i) suitability of the location for infrastructure projects and ii) financial feasibility of all projects. Adaptation actions will be determined based on the developed climate model and recommendations from the CReLIC tool. Information like population growth, land-use change, vulnerability, etc. is also going to be integrated into later stages of tool development
  - The DSS could assist in assessing risks of infrastructures vis-à-vis weather/climate parameters for guiding infrastructure design, construction, operation and site selection
- ISR Mission Meeting for the transport sector, on 5 and 7 October 2021, for LGED and RHD, respectively, presented project updates, discussed issues and challenges, and received feedback from transport stakeholders on CARE Component 1. LGED shared the challenges of rural roads in asset management and provided a brief background on CReLIC, noting that a knowledge management system has been established at LGED and appreciated RIMES assistance towards their existing system. On the DSS, LGED indicated the existing RSDBMS where a road database is maintained and decisions are taken; and RuBIMS. RIMES committed to include in its technical assessments, the available systems in both RHD and LGED, for building into the systems and their data/products, and integration of relevant climate information, in the development of the DSS for transport under CARE Component 1. The development of the DSSs, in addition to the underpinning assessments, will be guided by a TWG

Desk Review

ONGOING : draft Desk Review Report in Appendix 13

Key information/findings/recommendations from the draft report are:

- Stakeholder mapping identified primary and secondary institutional stakeholders, as follows:
  - ***LGED,*** for ensuring communication with cyclone/ disaster shelters and for repair of link road immediately, if required, to operate an emergency control room and provide assistance to Local Disaster Management Committee (LDMC) in operating evacuation, search and rescue; etc.
  - ***RHD,*** for strengthening patrol on essential roads, operating an emergency control room and undertakng arrangements with the necessary manpower and equipment to quickly remove

broken trees and barriers due to hazards/disasters
- ***BMD,*** for collecting, processing and generating weather/ climate observation and forecast data and prepare various types of hazard warning, e.g., cyclone warning, heavy rainfall, heatwave warning, etc. for use by all transport stakeholders
- ***NGOs,*** such as BRAC, Centre for Injury Prevention and Research Bangladesh (CIPRB), AIP Foundation, etc., for contributing to capacity building
- ***Bangladesh Road Transport Authority (BRTA)***, for operating an emergency control room and maintaining full-time communication with National Emergency Operation Centre (NEOC) of the Ministry of Disaster Management and Relief (MDMR)
- ***Bangladesh Road Transport Corporation (BRTC),*** for arranging dispatch for evacuation of people, providing trucks for transport of humanitarian aid materials, debris, etc., assisting in rescue, evacuation, rehabilitation activities, and identifying private vehicles for use during emergencies.
- ***City Corporation Disaster Management Committee (CCDMC),*** for organizing capacity building activities, preparing contingency plans, and conducting emergency rescue
- ***Municipal Disaster Management Committee (MDMC),*** for organizing capacity building activities and emergency rescue activities; and
- ***Union Disaster Management Committee (UDMC),*** for organizing capacity building activities, operating an emergency control room, and conducting emergency rescue activities

- Key climate-transport interaction, current capacities, gaps, and other relevant information
  - Extreme weather events (e.g., flood, snowstorm, landslides) are becoming more frequent and their climatological trends are changing, resulting in high risks of disruption of transportation services; notable impacts of climate events to road and rail networks in Bangladesh include increased flood and erosion damage, and increased fatigue damage due to exposure to extreme temperatures, among others
  - RHD and LGED share responsibilities vis-a-vis the entire road network of Bangladesh. While RHD is responsible for managing, operating, and maintaining National, Regional, and District level roads, LGED focuses on Upazila, Union, and Village level roads. RHD's Planning and Maintenance and Bridge Management and Mechanical Wings undertake work relevant to disaster risk management. LGED incorporates vulnerability assessment, susceptibility analysis, climate-resilient road design standards, etc. during decision making and has started integrating average annual daily traffic (AADT), elevation of roads, highest flood level/ inundation, etc. within their system
  - RHD and LGED both have numerous systems for information management; these do not dynamically integrate climate information of various timescales for enhancing planning and decision making; systems in RDH and LGED are managed, operated and maintained isolatedly. BMD and FFWC archive and generate weather/climate data/forecasts/warnings that would be useful for RHD and LGED for provision of location-specific, climate-informed transport-relevant information/advisories

- **Challenges in developing/enhancing transport DSS:**
  - The concept of transport-related DSS is new and its development requires consideration of multiple factors and establishment of common data sharing platform; the development of DSS has to obtain support from government officials
  - Thresholds vis-a-vis maximum and minimum temperature, humidity, rainfall, cloud cover, and wind speed for transport sector have not yet been identified in the country, while standards for other countries may not apply in Bangladesh
  - Changes in the road network, particularly in the villages, are occurring fast; this dynamicity has to be recorded in relevant databases
  - Risk communication has to address location-specific language barrier issues and should not drive panic
  - Capacity building of stakeholders has to address location-specific requirements

- **Recommendations:**
  - RHD and LGED needs to develop a systematic and comprehensive mechanism of integrating climate and transport information to be used by its relevant units, and municipalities, city corporations, union councils, ward commissioners, and villages to make appropriate decisions on different aspects of the sector including development of climate-resilient road network, prompt evacuation during hazard/disaster events, debris removal, etc.
  - The proposed framework includes: i) integration of hydrological, weather/climate, and transport infrastructure information collected from BMD, FFWC, LGED, RHD, etc.; ii) automated generation of relevant risk estimation on transport infrastructure based on climate risk-related standards/ thresholds; iii) automated generation of advisory bulletins for pre-, during, and post-disaster periods, and for long-term preparedness, including construction-related recommendations, e.g., construction of elevated roadways, alternative routes, bridges, provision of cyclone centers, maintenance requirements, etc. in hazard-prone and other critical/significant areas; iv) distribution of bulletins to stakeholders in the transport sector through email and voice messages, including mobile application and social media platforms

Technical Review

ONGOING

Technical experts are assessing the online road network portal of RHD and cataloging the RHD database.

User Needs Assessment

TO BE UNDERTAKEN :
upon approval of user need assessment materials, in Appendix 14

Proposed materials and methodologies for undertaking KIIs and FGDs are being revised by the Transport Expert, as reviewed and recommended by RIMES. The following are the proposed activities, once the User Needs Assessment Materials Report is approved:

- KIIs with a select group of personnel (minimum of 12) from RHD, LGED, BMD, and BWDB
- Consultation workshops (2) to identify scope for integration of LGED/RHD databases, existing decision-making processes/systems that use climate information within the agencies, DSS data and system requirements, capacity building requirements, etc.
  - First consultation workshop: Representatives from HRD and Environment Unit, ICT Unit, and Planning Unit of LGED, BMD and FFWC
  - Second consultation workshop: Representatives from RHD TWG, BRTA, BRTC, BMD, and FFWC

DSS Development

The development/enhancement of the transport DSS will be undertaken once the consulting firm for DSSs development in Bangladesh is on-board.

Activity 1.2.9
Enhancement of FloCAST

Consultations

RIMES is in discussion with MoWR, WARPO and BWDB for enhancing FloCAST; meetings include:

- Meeting with Mr. Arifuzzaman Bhuyan, on 27 June 2021, deliberated project updates and FloCAST DSS customization. RIMES noted several types of flood forecast products generated at FFWC and the various data inputs; RIMES emphasized that the DSS being customized for FFWC under the CARE project provides a platform for integrating these products and facilitating different analytics to aid forecasters in their decision-making. In preparation for the need assessment processes being planned, Mr. Bhuyan recommended to organize an in-house brainstorming session involving FFWC professionals to determine required features for the DSS
- Meeting with FFWC officials including Mr. Arifuzzaman Bhuiyan, Executive Engineer, Mr. Sarder Udoy Raihan, Sub-Divisional Engineer, Mr. Preetom Kumar Sarker, Assistant Engineer, and Mr. Mehadi Hasan, Assistant Engineer, on 19 August 2021, discussed and received feedback and recommendations on proposed methodology for impact-based forecasting (IBF), including appropriate thresholds and mechanisms for impact generation
- Follow up meeting with FFWC officials including Mr. Arifuzzaman Bhuiyan, Executive Engineer, Mr. Sarder Udoy Raihan, Sub-Divisional Engineer, Mr. Preetom Kumar Sarker, Assistant Engineer, and Mr. Mehadi Hasan, Assistant Engineer, on 29 August 2021, dealt with existing challenges with the flood forecasting system and website, and the possible enhancements under CARE Component 1. Building on the existing system (www.ffwc.gov.bd), following recommendations were made: i) integrate different modeling schema and data used by FFWC into the system, and ii) proposed DSS can have 2 major parts, one for public to access forecast information and advisories, and another for forecasters to access data and analytics
- ISR Mission Meeting for the water sector, on 4 October 2021, presented relevant updates, issues and challenges, and received feedback from stakeholders. WARPO appreciated the project teams' efforts in communicating details of the project and updated on WARPO's work such as taking initiatives to upgrade the water policy, switching from NWMP to NWRP, etc. FFWC/BWDB noted several initiatives that FFWC is doing in collaboration with RIMES

Desk Review

ONGOING

Dr. Mizanur Rahman is undertaking the desk review for the water sector.

Technical Review

ONGOING

RIMES IT Team is undertaking review of existing FloCAST.

User Needs Assessment

TO BE UNDERTAKEN

User needs assessment materials, for RIMES' review and approval, are being prepared by Dr. Mizanur Rahman.

DSS Enhancement

Enhancement of FloCAST shall be undertaken upon the on-boarding of the consulting firm for DSSs development in Bangladesh and shall build on the outcomes of the desk review, technical review and user needs assessment.

Activity 1.2.10
Enhancement of the Delta Portal

Consultations

Various meetings were organized, during the semester, for setting the direction of the enhancement of the Delt Portal. These include:

- Meeting with Mr. Shahriar, on 28 June 2021, deliberated progress of the project and plans for water sector development. Mr. Shahriar expressed his keen interest to support the project since he had been actively involved with the formulation of the Delta Plan. He noted that although WARPO is providing clearance for various projects concerning the water resources sector, that there is no systematic DSS in place to facilitate this process and that project screening does not include assessment for climate sensitivity. Mr. Shahriar explained that the Delta Knowledge portal, hosted by CEGIS, is outdated and hence not used for operational purposes, and that RIMES work on the Delta Knowledge Portal could complement ADPC's work on M & E framework on the same. RIMES was advised to organize a joint meeting with GED and WARPO to finalize requirements for the system
- ISR Mission Meeting for the water sector, on 4 October 2021, presented CARE Component 1 updates, discussed issues and challenges, and received feedback from stakeholders. GED noted the need for close coordination between GED and WB activities on the Delta Knowledge Plan which is part of the BDP 2100. WARPO discussed relevant climate change parameters that are critical for the water sector; and the need for a common database for all relevant data for avoiding duplication of work and reducing costs associated with building such databases. RIMES brought forward the need to organize a coordination meeting with WARPO, GED, CEGIS, and Support to Implementation of Bangladesh Delta Plan (SIBDP)

Technical Review

COMPLETED : in Appendix 15

The following gaps were identified in the system:

- The current portal contains data layers from different studies conducted during the Delta Plan 2100 formulation, most of which are outdated
- The information visualization mechanism is static and not updated since the end of the Delta Plan project formulation
- The web framework used to develop the portal is obsolete, making it nearly impossible to scale up; development of new framework seems more feasible
- GED of Planning Commission does not have the technical capacity to operate and maintain the portal

Recommendations for enhancing the Delta Portal include:

- Framework could include 3 layers: data layer (open/restricted data), processing layer, and user interface
- RIMES could develop APIs, archiving mechanisms, GIS and graphic engines to process data in a more meaningful way, e.g., analytics, maps, reports, etc.
- Integration of M&E framework into the Delta Portal

User Needs Assessment

TO BE UNDERTAKEN

User needs assessment shall be undertaken upon submission of the user needs assessment materials by the Water Expert, and approval by RIMES of the proposed materials and methodologies for data collection.

DSS Development

Enhancement of the Delta Portal shall build on the outcomes of the desk review, technical review and user needs assessment, and upon the on-boarding of the consulting firm for DSSs development in Bangladesh

Activity 1.2.11
Development of Portal for Finance, ERD and Planning

Consultations

Meetings were organized within the semester, for the finance and planning sector, to present CARE Component 1 details and requirements. Among these were:

- ISR Mission Meeting for the policy and finance sectors, on 5 October 2021, presented CARE Component 1 updates, discussed issues and challenges, and received feedback from stakeholders
- Meeting with Dr. Nuhun Nahar, on 19 December 2021, tackled ongoing initiatives by the Planning Commission for climate/disaster risk assessment and possible interventions under the CARE project for enhancing climate screening of projects approved by the Planning Commission. Dr. Nurun informed that although climate change/disaster risk management was introduced in the development project proforma (DPP) for investment projects in 2016, and then later in 2018, and while the Programming Division undertook the National Resilience Programme (NRP) to integrate disaster impact assessment (DIA) in project planning and appraisal, there are no systematic mechanisms at climate risk assessment/screening of projects in the Planning Commission. This is an area that CARE can address/contribute to, particularly and initially by reviewing i) DPPs especially sections 23 and 24 for determining how climate risk information is currently assessed and how it can be improved, and ii) relevant initiatives by GIZ and UNDP for building on ongoing projects related to climate risk assessment and tracking climate financing

Desk Review

COMPLETED

Technical Review

RIMES shall pursue assessment of relevant systems, upon further discussion with the SFP.

User Needs Assessment

ONGOING

RIMES has reviewed and approved the user needs assessment materials and methodologies proposed by the Finance and Planning Expert for undertaking surveys and KIIs. Survey and KII questionnaires have been shared with concerned stakeholders for completion. A workshop is planned for facilitating

further data acquisition once completed survey questionnaires have been received.

DSS Development

Development of required DSS shall underpin on the result of the desk review, technical review, and user needs assessment, and shall be tacked by the consulting firm for DSSs development in Bangladesh once on-board.


NEPAL
Pashupati Paints

[NEPAL]

Procurement

Contracts for IT Expert, Mr. Amir Rajak, and Country Technical Lead in Nepal, Dr. Dilip Kumar Gautam, ended in October and November 2021, respectively. A replacement for the IT Expert will be procured next year. All other country positions in Nepal are filled.

Sectoral Focal Points

Table 3: List of sectoral focal points in Nepal as of 31 December 2021

Sector	Ministry/ Agency	Focal Point Details
Nepal		
Finance *(Convener of SFP in Nepal)*	**Ministry of Finance (MoF)**	**Mr. Yug Raj Pandey** Undersecretary
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

Work Plan

The World Bank ISR online meetings organized by World Bank in collaboration with RIMES and ADPC, from 21 September to 6 October 2021 in Nepal presented project accomplishments to, and received feedback on project accomplishments and proposed 2021-2022 work plan from government beneficiary institutions/stakeholders. Nine (9) institutions, vis: MoFE, DHM, NDRRMA, DoR, DoLI, MoEWRI, DoED, DoWRI and Water and Energy Commission Secretariat (WECS), provided their feedback/comments on CARE. While some activities relevant to Component 1 are on-going largely due to existing relationships between RIMES and country partners, the project implementation is hampered by its formalization by the Government of Nepal. Across the beneficiary institutions/stakeholders, there was a consensus that the project formalization has to be addressed foremostly.

Activity 1.2.12 **Supporting DHM** (Priority system)

Consultations

The delay in formalizing CARE in Nepal has limited the engagement of RIMES with stakeholder institutions. Work with DHM has proceeded due to RIMES-DHM long-standing collaboration. There have been continued consultations, albeit informal, with DHM during the semester; formal consultation was during:

- ISR Mission for DHM, on 28 September 2021, which presented CARE Component 1 updates, discussed issues and challenges, and received feedback from DHM and other stakeholders. RIMES shared the Desk Review Report on DHM's capacities and gaps. RIMES clarified that installation of more weather observation stations, while identified as DHM requirement in the report, will not be addressed by CARE Component 1; CARE Component 1 is focused on institutional capacity building for climate-informed planning and decision-making, hence, the window for capacity building of communities may not be fully addressed under the project. World Bank recommended sharing the report with DHM for obtaining feedback and for validating the reported information. DHM expressed its appreciation to the World Bank, RIMES and ADPC, and advocated for the formalization of the project

Desk Review

COMPLETED

Technical Review

COMPLETED

User Needs Assessment

While official data gathering is stalled due to the official project approval, RIMES has:

- Completed the questionnaires for KIIs and agenda for FGDs
- Conducted informal discussions with user agencies, e.g., NDRRMA, DoR, DoLI, MoALD

DSS Development

ONGOING :

Technical Report on activities undertaken for system enhancement is in Appendix 16

The following have been pursued for enhancing DHM's FloCAST:

- Refreshed input DSS files (Karnali, Narayani, Babai) for HEC HMS model execution with raw WRF rainfall forecast data from January 2017 to present
- Fixed 3-day rainfall forecast data and visualization in the FloCAST system
- Updated visualization of the FloCAST system, for visualizing raw WRF forecast data
- Improved algorithm for flood impact-based forecasting system by computing intersected regions between inundation maps, road network and demographics data to extract exposed and vulnerable roads and population; intersected regions were rendered in the web application
- Processed and integrated relevant datasets, viz.: i) analysis of gridded world population and conversion into usable format in the system (e.g., shapefile population data of Babai region); ii)

imported, cleansed and analyzed bridge data; identified parameters to classify level of risks for each type of datasets (e.g., roads, population, land use, etc.) to build the risk matrix; iii) classified vulnerability of each dataset (roads, population, and land use); iv) calculated risk for data based on hazard, exposure, and vulnerability; v) setup geospatial database and added hazard, exposure, vulnerability and risk data to the geospatial database; flood impact data also stored in geospatial database; and vi) applied new CSS template to the web portal.

Figure 12. Statistics of exposed versus risk elements distributed by different hazard return periods

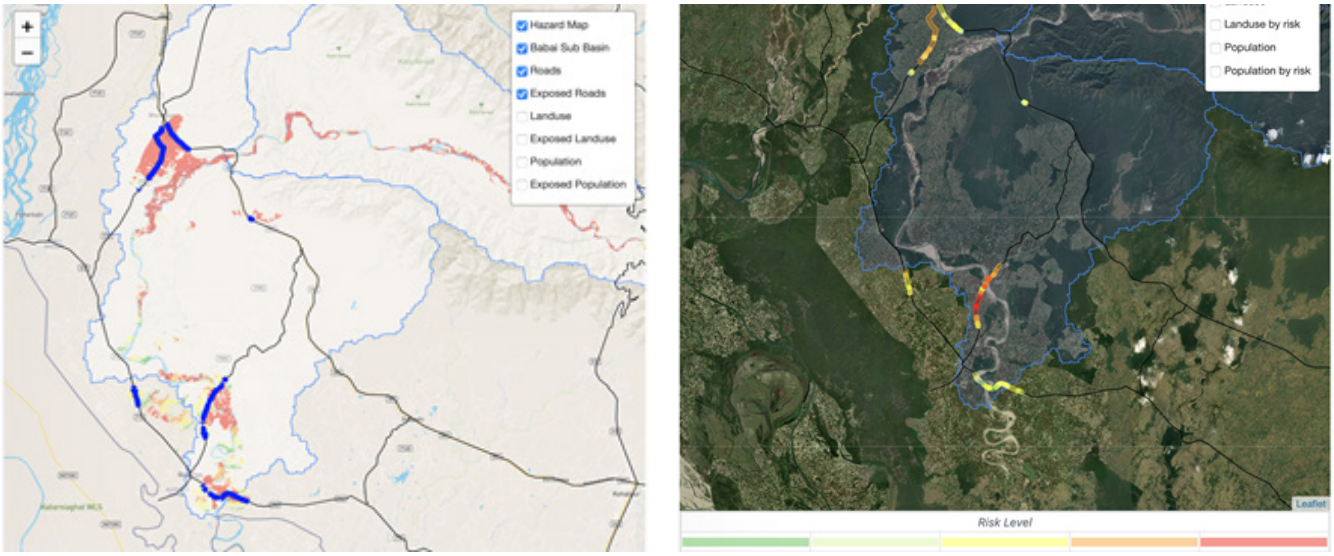

Figure 13. Visualization of exposed roads and flood risk level in a 2-year return period

Onward enhancement of FloCAST shall be undertaken upon completion of the user needs assessment and on-boarding of the consulting firm for DSSs development consulting firm in Nepal.

Activity 1.2.13
Upgrading NAMIS

Consultations

Official consultations with MoALD have been highly limited due to the delay in government indorsement of the project. Discussions relevant to capacities, gaps, and areas for enhancement vis-a-vis climate-informed planning and decision-making will be pursued immediately once CARE has been officially approved by the Government of Nepal.

Desk Review

COMPLETED

Technical Review

Technical review of relevant systems shall be undertaken upon discussion and agreement with MoALD.

DSS Development

The full development of the DSS will be undertaken by the consulting firm, once on-board.

Activity 1.2.14
Development of DSS for Transport Sector

Consultations

The following consultations were undertaken with transport sector stakeholders:

- Meeting with DoR officials, Mr. Arjun Jung Thapa, Director General, Ms. Pushpanjali Khanal, Er. Bhim Arjun Adhikari, Deputy Director General, and Mr. Deepak Shrestha, Deputy Director General, on 13 August 2021, deliberated DoR related activities in CARE Component 1 work plan, priorities for enhancement of existing DSS at DoR, data sharing and plans for user needs assessment. DoR indicated that information on rainfall intensity and forecast, and integration of traffic and road accident data into the DSS will be very useful, noting there is an existing desktop application for road closure information and that it will be more helpful if a mobile application can be developed. DoR also noted that EIA, IEE or any environment related data are available with GESU unit; bridge data has been shared with ADPC; and that request for data from the CARE project has already been sent for approval to the Ministry. DoR shared that a major problem in the road sector is created by improper planning of drainage and haphazard road construction by local governments, noting that actual problems are not identified properly. A TWG involving DoR, RIMES, and ADPC will be formed

to facilitate project activities.

- ISR Mission for the transport sector, on 24 September 2021, presented project updates, discussed issues and challenges, and received feedback from stakeholders. DoR appreciated all presenters and work done by RIMES and ADPC. On CARE Component 1, DoR agreed with the findings, particularly on the requirement for linkage with DHM, systematic weather/climate data management and MIS, and capacity building. On the other hand, CARE Component 1 will assess DoLI's requirements vis-a-vis Rural Transport Information System, for understanding where CARE can provide intervention.

Desk Review

ONGOING : draft Desk Review Report in Appendix 17

Key findings and recommendations:

- **Key stakeholders departments/institutions:**
  - ***NPC*,** for formulating national development policies and plans
  - ***MoF,*** for allocating financial resources and providing fiscal management
  - ***MoPIT,*** for implementing national policy, law, standards and regulation on national transport development and management
  - ***MoEWRI,*** for implementing policy, law standards and regulation of water resources and energy development, conservation, use and water allocation
  - ***MoHA,*** for implementing policy, law, standards and regulations on DRRM
  - ***MoFE,*** for implement policy and standards for environment, climate change adaptation and mitigation, carbon service, and carbon reservoirs
  - ***NDRRMA,*** to develop national policy and plan for DRRM, provide guidance to provincial and local level DRRM policy, conduct hazard research and studies, and serve as central repository of DRRM
  - ***DHM,*** for collecting, processing and generating hydro-meteorological data and forecast information
  - ***CCMD,*** under MoFE, for developing and implementing climate change policy and programs
  - ***DoR,*** for developing and expanding climate resilient road network
  - ***DoLI,*** for implementing agriculture and rural road program and introducing disaster mitigation measures in the infrastructure development activities
  - ***DoTM*,** for providing safe, reliable and easy transportation service to the public and goods carrier
  - ***Research institutions,*** e.g., ICIMOD, NAST, NASC, NERI, NDRI, etc., for relevant studies, particularly on identifying sensitivity of transport elements to weather/climate parameters and hazards
  - ***NGOs,*** e.g., DPNET, Practical Action, SSTN, Eco, ISET, Clean Energy, REDD, OXFAM; 15) private sectors, e.g., FNCCI, FNNTE, FCAN, etc., for assisting in capacity building processes
  - ***International/development organizations,*** e.g., USAID, JICA, ADB, World Bank, UNEP, UNDP, ICEM, for collaborations on similar work

- **Key climate-transport interaction, current capacities, gaps and other relevant information**
  - The following weather/climate parameters/events are relevant for the transport sector: temperature, rainfall, floods, landslides and fog, among others
  - Although climate change vulnerability mapping of Nepal has been established as a tool to help identify areas most vulnerable to climate hazards and plan for suitable adaptive measures needed for transportation infrastructure, lack of comprehensive data and enhancements in existing information systems impede climate-informed planning and investments
  - The transport sector development in Nepal is guided by the National Transport Policy, 2001 (HMG, 2001) which provides classification of roads, e.g., Strategic Road Network and Local Road Network (LRN); Federal ministries, including NPC, MoPIT, Ministry of Federal Affairs and Local Development, Ministry of Culture, Tourism and Civil Aviation, and Ministry of Urban Development, are the apex government body responsible for growth and development of the transport sector. With NPC leading the advisory body, role of these ministries involves

preparation and harmonization of plans, policies, and programs regarding development of physical infrastructure, and linkage of rural areas to markets to support various economic activities and projects.

- Overall management of national highways and feeder roads (SRN), including construction and maintenance of bridges, comes within the responsibility of DoR, while management of district and urban roads (LRN) falls under the responsibility of DoLI.
- The following are relevant management information systems in the transport system that are isolatedly operated:
  - Highway Management Information System (HMIS), developed to improve and maintain the central database and support DoR in effective planning and investment for resilient road network development in Nepal, is a computer-based system for storing, processing and report presentation of road data including inventories, condition and traffic data. HMIS (http://ssrn.aviyaan.com) which serves as an online repository and portal to receive information and advisory related to the transport sector, consists of organizational database, bridge and road database (e.g., traffic, roughness, road condition, pavement inventory, etc.), road maintenance management system, project monitoring system, tender database, contractor database, training database, and document database and network certification.
  - Bridge Management System (BMS), developed for bridge inventory management, systematic planning, and prioritization for bridge sector investment in Nepal, is a computer-based system used throughout the various stages of bridge management including design, construction, operation, and maintenance. BMS (http://bms.softavi.com) is a tool for managing inventory and inspection databases, planning for maintenance, repair, and rehabilitation, and optimizing allocation of financial resources. DoR uses BMS to better evaluate bridge assets and networks, engage in proactive and informed decision making at a programmatic level, and leverage limited funds across significant transportation needs.
  - Road Accident Information Management System (RAIMS) (https://raims.nepalpolice.gov.np) is a web-based system for collecting data from accident sites for verification and submission to Nepal Police Data Centre. DoR, as the concerned agency for planning and management of the road network in Nepal, is ultimately responsible for analyzing road traffic accidents and implementing countermeasures at accident black spots and hazardous locations and has been recommended by traffic police to identify and implement up-to-date accident data and countermeasures for accident reduction and prevention.
  - Emergency Information System (EIS) service for Sindhuli Road enables users to access vital information regarding condition of road (including heavy rainfall, landslides, road accidents along highways) in advance, via mobile phones or the web. The EIS (http://eis.dor.gov.np) provides rainfall-based warning for predicting disasters due to continuous rainfall and for carrying out immediate rescue operation and clearance of traffic blockage. Moreover, a Crash Investigation System (CIS) can be used in conjunction with the EIS for investigating a crash event through online inspection and interviews.
  - Financial Management Information System (FMIS), developed to manage and operate government accounting systems, aids DoR finance managers to plan, prepare, and approve budgets, approve payments, monitor and report on financial resources collected, available and expended, and facilitate development of appropriate resource allocation and borrowing strategies.

- **Gaps in, and challenges for, DSS development:**
  - Lack of common platform and comprehensive integration of relevant data impedes climate-informed planning and investments; various management information systems are in place but are isolated and does not integrate climate/hydrological information for guiding planning and decision making
  - Climate-informed budget, policies and other practices, are yet to be addressed for road sector development
  - There is lack of system for supporting emergency service organizations during a hazard/disaster
  - Lack of capacity in DoR to manage and maintain DSS

- **Recommendations:**
  - Enhance existing management information systems in DoR, though integration of other relevant data and climate-information of various timescales, and analytics, and improving the data management, sharing and accessibility of information
  - DSS development should consider thresholds, in the transport sector (including safety) in Nepal, vis-a-vis temperature (extreme high and low), rainfall, floods, landslides, and fog
  - Capacity building of DoR officials in understanding and applying climate information of various timescales from DHM and in managing and maintaining the DSS
  - Coordination and collaboration with stakeholders during the development process and implementation of climate-informed DSS
  - Integration of available hazard/risk maps, from ongoing hazard/ risk assessment of roads, into the DSS

Technical Review

TO BE UNDERTAKEN

Technical review to be undertaken upon further discussion and agreement with transport sector stakeholders.

User Needs Assessment

TO BE UNDERTAKEN :
based on approved user needs assessment materials, in Appendix 18

User needs assessment materials including approach and methodology, assessment tools, and list of key officials for undertaking KIIs and FGD with, have been approved by RIMES. Data gathering activities, as below, are proposed following the project formalization:

- KIIs among 15 key personnel from the transport institutions including MoPIT, DoR, NPC, DoLI, Roads Board Nepal (RBN), DoTM, and DHM
- FGDs among the following stakeholder agencies: NPC, MoF, MoPIT, Ministry of Home Affairs (MoHA), MoFE, MoEWRI, DoR, DoLI, DHM, DoTM, NP, NDRRMA, Federation of Nepalese Chamber of Commerce and Industry (FNCCI), Federation of Nepalese National Transport Entrepreneurs (FNNTE), ICIMOD, Nepal Academy of Science and Technology (NAST)
- Half-day stakeholder's consultation workshop with DoR, DoLI, NPC, DHM, and MoF

DSS Development

The development/enhancement of existing DSS for the transport sector in Nepal shall build on the outcomes of the desk review, technical review, and user needs assessment, and shall be undertaken once the consulting firm is on-board.

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

Consultations

Meeting with MoF officials, Mr. Ishwari Prasad Aryal, Joint Secretary, Mr. Harish Chandra Dhakal, Undersecretary, Mr. Khem Hari Kunwar, Undersecretary, Mr. Yug Raj Pandey, Undersecretary, Mr. Karna Timilsina, Undersecretary, and Mr. Shib Neupane, Section Officer, on 28 December 2021, discussed updates on CARE project formalization and plans moving forward. MoF welcomed both RIMES and ADPC and introduced Mr. Yug Raj Pandey as focal point for CARE project. RIMES provided updates on Component 1 activities, noting first year accomplishments, e.g., desk review reports and preparation of user needs assessment materials for identified sectors. RIMES also noted delays in consultation meetings due to requests for a formal acceptance of the project by MoF by various line ministries. MoF responded that formal communication with all government institutions is necessary and that a steering committee and technical committee will be established after formalization of the project for monitoring, guiding, and ensuring smooth implementation of activities. On MoF's concerns over potential duplication of project activities with other projects, RIMES and ADPC ensured that all planned activities will be duly consulted with sectoral ministries.

Desk Review

COMPLETED

User Needs Assessment

TO BE UNDERTAKEN :
Tools and methodologies completed and approved.

The user needs assessment shall be undertaken, using the approved tools and methodologies, following the project formalization.

Technical Review

TO BE UNDERTAKEN

The technical review shall be undertaken upon formalization of the project.

DSS Development

TO BE UNDERTAKEN

The development of DSS for Nepal's planning and finance sectors shall take forward the outcomes of the desk review, technical review and user needs assessment, and shall be undertaken once the consulting firm is on-board.

Activity 1.2.16
Enhancing the DSS for NDRRMA -Nepal

Consultations

Various meetings with NDRRMA have been organized. These include:

- Meeting with Mr. Anil Pokhrel, Chief Executive, Ms. Anita Niraula, Joint Secretary (Administrative), Mr. Amrit Shrestha, Joint Secretary (Technical), Mr. Rajendra Sharma, Undersecretary, Mr. Sundar Sharma, Undersecretary, and Mr. Arun Poudel, IT Officer, on 20 July 2021, discussed proposed priority activities of NDRRMA in CARE Component 1, and other key points, viz:
  - i)Integration of information/warning for key hazards: floods, landslides, forest fire, and lightning; ii) Common Alerting Protocol (CAP); and iii) capacity building of municipal/local level staff
  - For avoiding duplication of work, the DSS should integrate relevant data/outputs from other existing work/relevant government agencies including, but not limited to, hazard/risk assessments
- ISR Mission Meeting for disaster risk management sector, on 24 September 2021, presented project updates, discussed issues and challenges, and received feedback from stakeholders. RIMES shared proposed activities for developing a DSS (multi-hazard early warning system) for addressing demands from NDRRMA. NDRRMA expressed its appreciation and support for CARE Component 1
- Meeting with Mr. Anil Pokhrel, Mr. Rajendra Sharma, Undersecretary, Mr. Sushil Kumar Shrestha, Civil Engineer, Mr. Bipin Acharya, Joint Secretary, Mr. Bijaya Kumar Maharjan, Section Officer, and Mr. Arun Poudel, UNDP, on 16 December 2021, threshed out NDRRMA's proposed priority activities and requirements for the same including data, inter-institutional collaboration particularly between NDRRMA and DHM, and communication mechanism

Desk Review

ONGOING

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

Technical Review

TO BE UNDERTAKEN

Technical review will be undertaken upon grant of access, to RIMES, to BIPAP and other relevant existing systems.

User Needs Assessment

TO BE UNDERTAKEN

The following preparatory activities, for the user needs assessment, are undertaken:

- Materials for KIIs, FGDs, and workshops
- Discussions with NDRRMA to identify gaps and requirements

DSS Development

While discussions with NDRRMA have been on-going on the development/enhancement of DSS for disaster risk management, work thereto would build on the outcomes of the desk review, user needs assessment and technical review, once completed. The full completion/enhancement of the DSS will be undertaken by the consulting firm once on-board.

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. 2022. Data analytics have been initiated in the priority DSSs in 2021; functionality for gender disaggregation will commence in 2022.

Activity/ Sub-Activity	Status*	Remarks
1.1.3 RDAS full system		
1.1.3.3 Development of data analytics module	Jan22 – Sep23	
1.2.2 Development of DSS for Ministry of Planning, Development and Reforms -Pakistan		
1.2.2.4 Development of DSS engine and data visualization and report generation modules	Jul21 – Mar24	
1.2.3 Development of DSS for Ministry of Finance -Pakistan		
1.2.3.4 Development of DSS engine and data visualization and report generation modules	Jul21 – Dec22	
1.2.4 Development of SESAME -Punjab, Pakistan (Priority system)		
1.2.4.4 Development of DSS engine	Jul21 – Dec22	
1.2.5 Improving DSS for Sindh Irrigation Department -Pakistan		
1.2.5.5 Development of DSS engine	Jul21 – Jun23	
1.2.6 Upgrading BAMIS for Agriculture -Bangladesh		
1.2.6.5 Enhancement of DSS engine	Jul21 – Dec22	
1.2.7 Improving DSS for Livestock Subsector -Bangladesh (Priority system)		
1.2.7.5 Enhancement of DSS engine	Jul21 – Dec22	
1.2.8 Upgrading the Online Road Network Portal -Bangladesh		
1.2.18.5 Enhancement of DSS engine	Jul21 – Dec22	
1.2.9 Enhancement of FloCAST -Bangladesh		
1.2.9.5 Development of DSS engine	Jul21 – Jun23	
1.2.10 Enhancement of the Delta Portal -Bangladesh		
1.2.10.5 Development of DSS engine	Jul21 – Dec22	
1.2.11 Development of Portal for Finance, ERD and Planning -Bangladesh		
1.2.11.4 Development of portal interface	Jul21 – Dec22	
1.2.12 Supporting DHM -Nepal (Priority system)		
1.2.12.5 Enhancement of DSS engine and dissemination module	Oct21 – Jun23	
1.2.13 Upgrading NAMIS -Nepal		
1.2.13.5 Enhancement of DSS engine	Jul21 – Dec22	
1.2.14 Development of DSS for Transport Sector -Nepal		
1.2.14.4 Development of DSS engine	Jul21 – Dec22	
1.2.15 Enhancing the Public Finance Management System for MOF - Nepal		
1.2.15.5 Development of DSS engine	Jul21 – Dec22	
1.2.16 Enhancing the DSS for NDRRMA -Nepal		
1.2.16.5 Development of DSS engine and dissemination module	Jul21 – Jun24	

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

Activities that will contribute to overall progress and achievement in outcome 1.3 are expected to commence in 2024.

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

Activity 1.3.1
User engagement

Video Production

ONGOING

A video highlighting project objectives and outcomes, e.g., RDAS and DSSs is being developed.

Webinar

The third of a 6-part webinar series on Decision Support System (DSS) for Understanding and Reducing Climate Risks, entitled DSS for Climate-Informed Water Resources Management, was aired on 29 November 2021. The episode focused on climate-related risks in water resources management and the development/ customization and potential applications of DSS for enhancing water resources management in a changing climate. The event has been participated by approximately 38 participants from various project stakeholders in the water and other relevant sectors in 7 countries, e.g., DAE-Bangladesh, LGED-Bangladesh, Bangladesh Rice Research Institute, Sylhet Agriculture University-Bangladesh, Nepal Agriculture Research Council-Nepal, Karma Group-Nepal, DoLI-Nepal, MoPDSI-Pakistan, Agriculture Research and Development Center-Bhutan Local Government Unit-Philippines, Maldives Meteorological Service, Met office-United Kingdom and UNDP.

Five presentations, namely i) Impact of Climate Change on Water Resource Management, ii) Flood and Drought Management Challenges, iii) Flood Impact-based Forecasting Concept and Implementation, iv) Delta Knowledge Portal/ Integrated Water Resources Management, and v) DSS for Water Resources Management: Context, Development and Potential Applications were delivered by various speakers from Bangladesh, Nepal, Netherlands, and Thailand. A Q&A followed the presentations to address questions raised by stakeholders and to receive inputs crucial to DSS development.

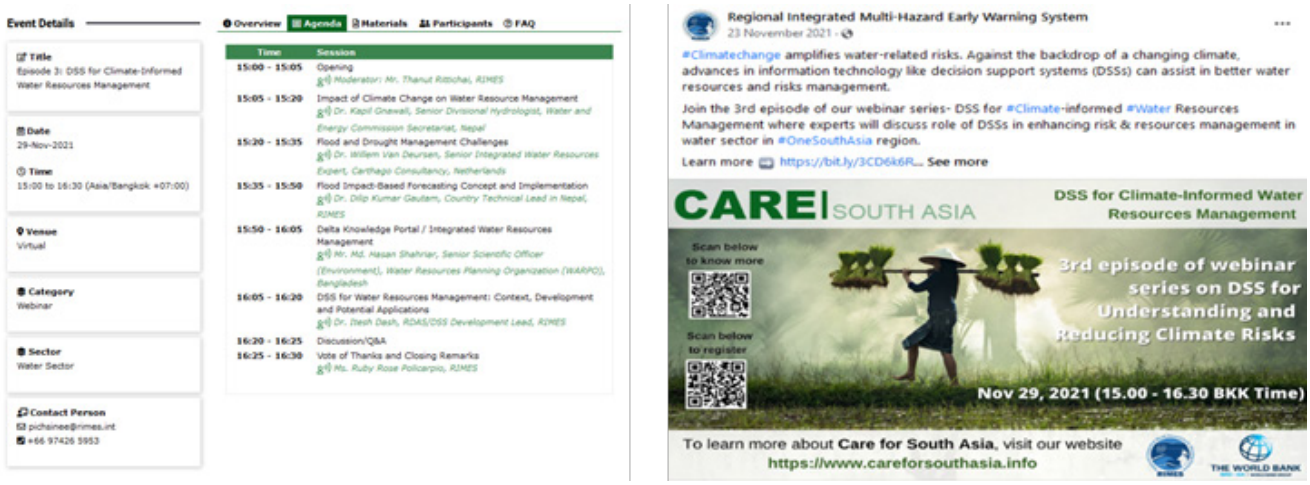

Figure 14. Details of the 3rd webinar episode on DSS for Understanding and Reducing Climate Risks, focusing on DSS for Climate-Informed Water Resources Management

Plans for subsequent webinar episodes on DSS for Climate-Resilient Transport System, DSS for Climate-Induced Disaster Risk Management, and DSS for Climate-Informed Planning and Financing will be firmed up in 2022.

Hackathon

Virtual hackathon events will be considered upon on-boarding of consulting firms for DSSs development in focus countries.

Activity 1.3.2
Regional and national trainings

Activities are expected to commence in Year 2023.

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

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

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

Component 3: Project Management and Implementation Support

Following activities in the third semester of project implementation were conducted under this component: completion of staff recruitment; publication of REoI of consulting firms for RDAS/DSSs; submission of annual work plan, budget and procurement plans for the year 2021-22; user engagement activities, e.g., webinar to capture stakeholder interest and feedback, ongoing development of the project MIS; coordination mechanisms with ADPC; documentation, monitoring and reporting of key project accomplishments.

Activity 3.1.1
Enhancement of HR, procurement, and finance systems

Procurement

Draft Request for Proposal (RFP) is currently being reviewed by the project team. Customization and operationalization of the accounting software is ongoing.

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

Activity 3.1.2 **Documentation, dissemination/ knowledge-sharing**

ICKM

For this reporting period, activities focused on development of content and maintenance of website and social media platforms, including webinar materials, and documentation of relevant project meetings, e.g., CARE ISR Mission 2021. In addition, brochures and a promotional video highlighting the use and benefit of RDAS and DSSs are currently being developed to increase stakeholder engagement.

Meetings

The following online meetings organized by the World Bank, RIMES and ADPC were held to present updates and raise stakeholder awareness of the project:

- CARE Project ISR Meeting -Pakistan in 20-29 September 2021 (organized by World Bank, RIMES and ADPC)
- CARE Project ISR Meeting Nepal in 21 September to 10 October 2021 (organized by World Bank, RIMES and ADPC)
- CARE Project ISR Meeting -Bangladesh in 21 September to 11 October 2021 (organized by World Bank, RIMES and ADPC)
- 13th RIMES Council Meeting in 23-24 November 2021 (organized by RIMES)

Documentation

The following project documents have been submitted during this period:

- Annual work plan – following stakeholder requirements, the annual work plan for 2021-22 has been revised and submitted on 22 October 2021 for World Bank's review and approval
- Annual budget plan – following adjustments made to the revised work plan, the annual budget plan for 2021-22 has been revised and submitted together with the revised annual work plan on 22 October 2021 for the World Bank's review and approval
- Annual procurement plan - following stakeholder discussions, the annual procurement plan has been revised to integrate stakeholder requirements and approved by the World Bank on 7 December 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:

- 3 desk review reports for the livestock and transport sectors in Bangladesh and Nepal
- 3 user needs assessment materials and tools for the livestock and transport sectors in Bangladesh and Nepal
- 3 assessment outcomes reports for the agriculture and finance sectors in Bangladesh and Pakistan
- 3 recommendations and inputs report for the agriculture, water, and finance sectors in Pakistan
- 3 technical assessment reports for Online Road Network Portal, FloCAST, and Delta Portal for Bangladesh
- 4 technical reports on development of priority systems, e.g., RDAS, DSSs for agriculture in Pakistan, livestock in Bangladesh, and DHM for Nepal

Activity 3.1.3
Project implementation support, monitoring, evaluation and reporting

Coordination

Smooth implementation of the CARE ISR Mission for 2021 was made possible through the coordination mechanism established between RIMES, ADPC, and World Bank; while IA-level coordination between RIMES and ADPC teams ensures the efficient coordination of inter-agency activities, e.g., joint consultation meetings with stakeholders, organization of regional events, monthly CWG and TWG meetings, including data sharing, etc.

Procurement

APPROVED PROCUREMENT PLAN : IN APPENDIX 19

- **Staffing.** As of 31 December 2021, hiring of sectoral consultants and GIS Specialist for Bangladesh have been completed, while contracts about to expire have been extended until December 2021 to provide experts ample time to complete user need assessment activities which have been hampered by Covid-19 restrictions during the past semester. Additional consultants for Pakistan, Transport Expert - Clean and Green Energy and Agriculture Expert for Balochistan will be procured for onboarding next year based on MoPDSI requirements, while contracts for Country Technical Lead and IT Expert in Nepal have been completed. A replacement for IT Expert will be procured by next year. Following World Bank's approval of ToRs for consulting firms for DSSs developmement and Project Associate - Pakistan, REoIs have been published and will be closing in January 2022. Delays in the procurement process of these firms slowed down development of DSSs in the countries. On a regional note, REoI for RDAS consulting firm and Procurement Specialist has been published and will be closing in January 2022; ToRs for 4 Data Analysts are currently under review by World Bank; contract for financial audit has been signed; while a draft RFP for consultant for strengthening RIMES procurement and finance systems is being reviewed by the project team. As of December 2021, the project team consists of 53 out of a 60-member team. This includes the following:
  - **PIU Staff (11/14):** Onboard- Project Director, M&E Specialist, Project Analyst, Finance Management Specialist, Project Accountant, ICKM Specialist, ESD Specialist, 3 Country Coordinators, and consultant for financial audit. Not yet onboard- Procurement Specialist, Project Associate, and consulting firm for strengthening RIMES procurement and finance systems

- **Sectoral Team (23/27):** Onboard- Climate Application Specialist, Climate Scientist, Disaster Management Specialist, Regional Agriculture Expert, Regional Water Expert, Regional Transport Expert, Regional Planning and Finance Expert, eLearning Specialist, 3 GIS Specialists, 3 Agriculture Experts, 1 Livestock Expert, 2 Water Experts, 2 Transport Experts, 4 Planning and Finance Experts. Not onboard- 4 Data Analysts.
- **System Development Team (18/22):** RDAS-DSS Lead, RDAS Developer, RDAS Quality Assurance Specialist, RDAS Data Scientist, RDAS System Administrator, 3 consultants for RDAS prototype system; DSS Developer for Agriculture, Water, Disaster, and Hydromet, DSS Developer for Planning, Finance and Transport, DSS Quality Assurance Specialist, DSS Data Scientist for Agriculture, Water, Disaster, and Hydromet, DSS Data Scientist for Planning, Finance and Transport, DSS System Administrator for Agriculture and Water, DSS System Administrator for Planning and Finance, DSS Administrator for Transport, Disaster and Hydromet; 2 IT Experts. Not onboard- 3 DSS consulting firms and IT Expert -Nepal.

- **Office.** Office arrangements for in-country staff is ongoing.

- **Procurement of goods.** Video equipment and computing equipment for RDAS -regional has been procured in August and October 2021, respectively.

Budget and Finance

- **Budget, Disbursement and Expenditure.** The fourth disbursement has not yet been made as funds have remained enough to cover forecasted expenditures from July to December 2021. Expenditure from 1 July to 31 December 2021 covered RIMES technical inputs, staff salaries based on the number of days allotted by each staff to the project; goods, e.g., computing equipment for RDAS activities -regional and video equipment; operating expenses, e.g., travel costs for user needs assessment in Pakistan, stock photos, office rental and utilities; communication, e.g., stationery and other consumables. The annual budget plan for 2021-22, submitted on 22 October 2021, is currently being reviewed by the World Bank. The project budget with expenditure from 1 July to 31 December 2021 is provided in Table 2. Variances in excess of 10% for RIMES PIU (23.35%), Goods (-100%), Individual Consultants (32.31%), Consulting Firms (100%), and Operating Costs (84%) are attributed to the following: i) delay in onboarding of Procurement Specialist, regional and national consultants, and consulting firms, ii) goods budgeted in the first semester have been procured only during this semester, and iii) postponements in international/local travel and physical meetings.

- **Reporting.** IUFR for January to June 2021 was submitted to the Bank on 13 August 2021, while there were no SOEs submitted to the Bank within this period.

Table 4: Project budget with expenditure from 1 July to 31 December 2021

Description	Planned	Actual	Variance		Forecast For the next 6 mos.
			Amount	%	
RIMES Technical Inputs	$209,385	$208,535	$850	0%	$181,949
RIMES PIU Staff	$121,699	$93,276	$28,422	23%	$139,672
Goods	-	$16,252	-$16,252	-100%	$174,100
Individual Consultants	$265,372	$176,823	$88,549	33%	$344,421
Consulting Firms	$948,897	-	$948,897	100%	$557,400
Non-consulting services	-	-	-	-	-
Operating Costs	$160,233	$25,228	$135,005	84%	$249,803
Total	**$1,705,586**	**$520,114**	**$1,185,471**	**70%**	**$1,647,345**

Environment and Social Management

- **Meetings.** Joint meetings with the World Bank and ADPC are held monthly to discuss latest updates, issues and challenges related to E&S and stakeholder engagement. The CARE GRM has been discussed and recommendations were made by World Bank staff for integration into the GRM manual, particularly in managing and addressing anonymous complaints.

- **Training.** Following completion of the GRM manual, online trainings will be held for CARE project staff in the countries.

Monitoring, Reporting and Evaluation

- **M&E system.** Regular progress reporting and monitoring against agreed timelines, milestones and budget is being carried out through monthly PIU, CWG, and bi-monthly TWG meetings among regional and country staff; submission of monthly progress reports and deliverables; stakeholder consultation meetings, etc. In addition, an earlier developed tracking system using level 5 output indicators is being employed to streamline and quantitatively measure progress of each activity vis-à-vis PDO outcomes and intermediate indicators.

- **Project MIS.** Regional and national project staff are utilizing the system to upload timesheets and deliverables, monitor progress/ status of activities against targets and project indicators, and organize/ manage knowledge-sharing events such as webinars. PMIS work for this period focused on back-end improvements to the Reporting (e.g., organization of reports and integration of reporting template) and Procurement (e.g., pre-award process) modules, development of the dashboard and mobile application/version of the system, and functionality fixes and refinements. Regular meetings with MIS developers are held to update on the progress and provide guidance for further customization of the modules. System manuals (e.g., printed and video) are being developed for guidance of users, while a demonstration training is being planned for ADPC to introduce the system. Further work on the system shall focus on customization of the Procurement module (i.e., contract management and evaluation), enhancement of the GRM, budget and finance modules, and continuation of dashboard and mobile application development.

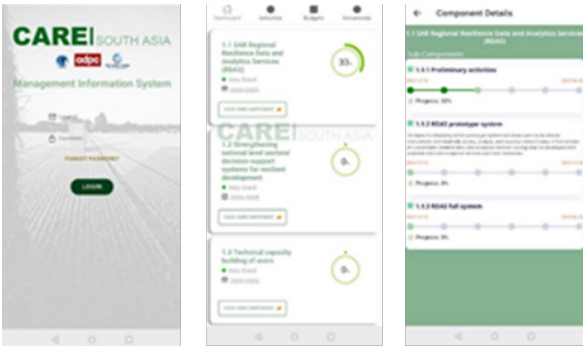

Figure 15. Mobile application for PMIS

Activity 3.1.4
External audit and evaluation

Financial Audit

Contract for financial audit, with KPMG, has been signed and will start in February 2022.

1. 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	30 June 2021	31 Dec 2021	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	30 June 2021	31 Dec 2021	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	30 June 2021	31 Dec 2021	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	30 June 2021	31 Dec 2021	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	30 June 2021	31 Dec 2021	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	30 June 2021	31 Dec 2021	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	30 June 2021	31 Dec 2021	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	30 June 2021	31 Dec 2021	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	30 June 2021	31 Dec 2021	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	30 June 2021	31 Dec 2021	12 May 2025
Remarks				

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

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

FINANCIAL PROGRESS

2. Financial Progress

Year-wise allocation and utilization of grant

Financial Year	Provision in Original approved PAD	Allocation as per Approved Annual Work Plan	Released Amount	Expenditure incurred	Expenditure as % of Annual Work Plan Allocation
2020	$537,770	$537,770	$499,374	$443,640	82%
2021	$3,039,287	$3,039,287	$1,383,570	$1,092,081	36%
2022					
2023					
2024					
2025					

Component-wise allocation and utilization of grant

#	Component Description	Contribution from (US$ Million)			Authorized Budget for Semester 2 of Year 2021 (A)	Actual expenditure for Semester 2 of Year 2021 (B)	Cumulative Expenditure for Year 2021 (C)	Balance (E= (A-C))
		WB	DFID	Total				
1	Component 1: Promoting Evidence-based Climate Smart Decision Making	10	-	10	$2,584,574	$410,714	$845,582	$ 1,738,993
2	Sub-component 1.1: SAR Regional Resilience Data and Analytics Services (RDAS)	3.5	-	3.5	$870,670	$133,069	$242,224	$ 628,446
3	Sub-component 1.2: Strengthening national level sectoral decision-support systems for resilient development	6	-	6	$1,676,630	$263,815	$578,893	$ 1,097,738
4	Sub-component 1.3: Technical capacity building of users	0.5	-	0.5	$37,274	$13,830	$24,465	$ 12,809
5	Component 3: Project Management and Specialized Support	2	-	2	$454,713	$109,400	$246,499	$ 208,214
	Total	**12**		**12**	**$3,039,287**	**$520,114**	**$1,092,081**	**$ 1,947,207**

OTHER PROGRESS AREAS

3. Risks and Assumptions

Risk Category	Risk Level			Describe mitigation measure
	Rating at Approval	Previous Rating	Current Rating	
Political and Governance	Substantial	Substantial	Substantial	
Macroeconomic	Low	Low	Low	
Sector Strategies and Policies	Moderate	Moderate	Moderate	
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

In Bangladesh, access to BAMIS is not yet provided by DAE to RIMES Technical Team. While discussions are on-going, the unclear position/decision of DAE poses uncertainty to the initiatives to be undertaken for the agriculture sector under CARE Component 1.	Meetings are continuously pursued, with DAE, to come to a common understanding of the interventions, under CARE Component 1, for BAMIS. RIMES involves BAMIS' Project Director in undertaking user needs assessment activities, for giving the latter a perspective of user requirements against the existing BAMIS capacity. A validation workshop, with DAE and other agriculture stakeholders, is planned in 2022 for presenting outcomes of the desk review, technical review and user needs assessment, and for agreeing on interventions for BAMIS.
Delay in project indorsement by the Government of Nepal	Informal consultations are undertaken by RIMES with stakeholder institutions. Where possible, such as in DHM FloCAST, initial work on system enhancements have been initiated.
The protracted COVID-19 pandemic has stalled many project activities	RIMES pursues stakeholder engagements through remote discussions, where possible. However, activities which have to be conducted face-to-face have been moved.
Delay in on-boarding of consulting firms for RDAS and DSSs has pushed back system development work	Initial activities on system development have been undertaken by RIMES Technical Team.

6. Integration of Crosscutting Issues

Continuous engagement of stakeholder institutions facilitate integration of relevant cross-cutting issues into the project implementation.

7. Stakeholders Participation and Involvement

Partner institutions, through their SFPs and other relevant stakeholders, are continuously engaged in the project activities for ensuring meaningful direction of the initiatives, and ownership and sustainability thereof.

8. Compliance with Safeguard, Procurement, Financial Management

There are no issues to be reported during this semester.

9. Lessons Learned

Context and implementing environment	Consultations with stakeholders institutions in focus countries identify areas which can address both climate change mitigation and adaptation. Future projects can be designed to address both issues
Project strategy and design	The project, particularly as it covers several years, should be equipped with flexibility to adjust to changing stakeholders requirements
Advocacy, communications, and capacity building	
Gender inclusion	
Implementation and institutional arrangements	TWGs are beneficial for providing guidance and overall direction to the project
Any other areas	

10. Planned Activities for Next Semester

Sub-component 1.1: SAR RDAS
- RDAS full system development: Solution architecture

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 launching of prototype systems
- SFP Meeting for presentation of assessment outcomes

Sub-component 1.3: Technical capacity building of users
- Video production
- Webinars
- Hackathon

Component 3:
- Enhancement of HR, procurement and finance systems
- Documentation, dissemination/ knowledge-sharing
- Project implementation support, monitoring, evaluation, and reporting
- External audit

11. Appendices

1. Technical report on data catalog development
2. Technical report on RDAS prototype system development
3. Assessment outcomes report for finance sector, Pakistan
4. Recommendations and inputs to DSS report for finance sector, Pakistan
5. Assessment outcomes report for agriculture sector, Pakistan
6. Recommendations and inputs to DSS report for agriculture sector, Pakistan
7. Technical report on DSS prototype development for agriculture, Pakistan
8. Recommendations and inputs to DSS report for water sector, Pakistan
9. Assessment outcomes report for agriculture sector, Bangladesh
10. Desk review report for livestock sector, Bangladesh
11. User needs assessment materials for livestock sector, Bangladesh
12. Technical report on DSS prototype development for livestock, Bangladesh
13. Desk review report for transport sector, Bangladesh
14. User needs assessment materials for transport sector, Bangladesh
15. Technical report on assessment of Delta Portal, Bangladesh
16. Technical report on DSS enhancement for DHM, Nepal
17. Desk review report for transport sector, Nepal
18. User needs assessment materials for transport sector, Nepal
19. Procurement Plan as of 31 December 2021

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Regional Integrated Multi-Hazard
Early Warning System for Africa and Asia (RIMES)
2nd Fl. Outreach Bldg., AIT Campus, P.O. Box 4
Klong Luang, Pathumthani 12120, Thailand
Tel: +662 516 5900 to 01
Fax: +662 516 5902
E-mail: rimes@rimes.int
www.rimes.int