REQUEST FOR EXPRESSIONS OF INTEREST
(CONSULTING SERVICES – FIRMS SELECTION)

Thailand
Climate Adaptation and Resilience for South Asia (CARE) Project
Loan No./ Credit No./ Grant No.: IDA-D6220

Assignment Title: Developing DSSs – Nepal
Reference No. (as per Procurement Plan): TH-RIMES-231649-CS-QCBS

The Regional Integrated Multi-Hazard Early Warning System (RIMES) has received/has applied for financing from the World Bank toward the cost of the Climate Adaptation and Resilience for South Asia (CARE) Project and intends to apply part of the proceeds for consulting services.

The consulting services ("the Services") include consulting firm for Developing DSSs in Nepal – for developing/enhancing the DSSs/portals for DHM, agriculture, transport, disaster management and finance sectors in Nepal. The firm will ensure integration of sectoral stakeholder needs and requirements in the design and development of the DSSs/portals, and will provide technical as well as user capacity-building materials and resources to ensure continued maintenance, updating and use of the systems by beneficiary ministries/agencies in Nepal, with scope of work to include stocktaking of stakeholder institutions' capacities, gaps, and requirements for enhanced climate-informed decision making; assessing decision support framework; designing and developing the required sectoral DSSs/portals; interfacing with RDAS; facilitating capacity development of stakeholders; and regular reporting on work progress.

The detailed Terms of Reference (TOR) for the assignment are attached to this request for expressions of interest.

The Regional Integrated Multi-Hazard Early Warning System (RIMES) now invites eligible consulting firms ("Consultants") to indicate their interest in providing the Services. Interested Consultants should provide information demonstrating that they have the required qualifications and relevant experience to perform the Services. The shortlisting criteria are: proven track record, technical expertise, and human resources and operational capacity to undertake assignments described in the ToR. Experience in developing DSSs/portals in the sectors of agriculture, transport, finance in Nepal is an advantage. The consulting firm should be comprised of Team Leader, Technical Lead and Quality Assurance Specialist, Senior Web Application Developer, Senior Data Scientist, Senior Visualization Expert, Mobile App Developer, GIS and Remote Sensing Specialist, Software Engineers, and Experts in Agriculture, Livestock, Water, Transport, Planning and Finance. Key Experts will not be evaluated at the shortlisting stage.

The attention of interested Consultants is drawn to Section III, paragraphs, 3.14, 3.16, and 3.17 of the World Bank's "Procurement Regulations for IPF Borrowers" July 2016 ("Procurement Regulations"), setting forth the World Bank's policy on conflict of interest.

Consultants may associate with other firms to enhance their qualifications, but should indicate clearly whether the association is in the form of a joint venture and/or a sub-consultancy. In the case of a joint venture, all the partners in the joint venture shall be jointly and severally liable for the entire contract, if selected.

A Consultant will be selected in accordance with the QCBS method set out in the Procurement Regulations.

Further information can be obtained at the address below during office hours 0800 to 1700 Bangkok Standard Time.

Expressions of interest must be delivered in a written form to the address below (in person, or by mail, or by fax, or by e-mail) by February 15, 2022.

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TERMS OF REFERENCE
Consultancy for Developing DSSs in Nepal

1. About RIMES

The Regional Integrated Multi-Hazard Early Warning System for Africa and Asia (RIMES) is an international and intergovernmental institution that is owned and managed by its 48 Member and Collaborating States for building capacities in the generation and application of user-relevant multi-hazard early warning information. RIMES was established on 30 April 2009 through the signing by collaborating countries of the RIMES regional cooperation agreement. RIMES was registered with the United Nations under Article 102 of the UN Charter on 1 July 2009. RIMES operates from its regional early warning center, located at the campus of the Asian Institute of Technology in Pathumthani, Thailand.

RIMES' purpose is to provide early warning services according to differing needs and demands of its Member States, for enhanced preparedness and response to and mitigation of natural hazards. Its specific objectives are:

a) Facilitate the establishment and maintenance of core regional observing and monitoring networks to ensure data availability for early warning;
b) Provide earthquake and tsunami services within the framework of the Intergovernmental Oceanographic Commission of the United Nations Educational, Scientific and Cultural Organization (IOC-UNESCO);
c) Support National Meteorological and Hydrological Services (NMHSs) for providing localized hydro-meteorological risk information within the framework of the World Meteorological Organization (WMO); and
d) Enhance warning response capacities at all levels (national to community) within each national early warning framework.

RIMES provides a portfolio of options for Member States to avail from or contribute to any of these objectives.

2. Background

Socio-economic impacts of climate-related hazards in South Asian countries continue to threaten the countries' economic growth, particularly in key sectors such as agriculture, water, and infrastructure. In particular, Nepal is highly vulnerable to climate change and is considered to have experienced changes in temperature and precipitation at a relatively faster rate than the global average. A landlocked country in the Himalayan mountain range, Nepal is exposed to various water-related hazards like floods and landslides triggered by rapid snow- and ice-melt in the mountains or extreme rainfall in the foothills during the monsoon season. The country is home to 28.6 million people, of which an estimated 83% live in rural areas.

Climate projections for Nepal (USAID, 2017) indicate i) 1.6 – 2.2^{0}C increase in temperature by 2050, ii) 3.9 – 5.1% increase in annual rainfall and consecutive dry days, and iii) 35-52% increase in extreme rainfall events by 2050, all of which are expected to negatively impact the following sectors:

- **Agriculture**. Only 17% of Nepal's total land area is suitable for agriculture. The most productive agricultural area in the country is the Terai floodplain, which is vulnerable to droughts, floods and river bank cutting. In general, the agriculture sector is vulnerable to

increased temperatures, changes in rainfall patterns, increased drought and storms resulting in increased pests and disease incidence, reduced crop yields and increased food and livelihood insecurity.

- **Water**. Nepal's hydrology is monsoon-driven, most of which occurring during the months of June to September. The variability in rainfall and runoff suggests potential excess water during the monsoon season and potential scarcity during the dry season. Climate stressors like increased temperatures, changes in precipitation and increased drought are expected to increase water stress, reduce water quality and hydropower potential. These can lead to water shortages for agriculture and domestic uses.
- **Transport**. The country's transport infrastructure is expected to be negatively affected by increases in temperatures, glacial lake outburst floods (GLOFs) and frequency of extreme weather events that cause damage to roads, bridges and related critical infrastructures. This suggests potential increase in investment/construction, repair, operations and maintenance costs of the country's transport network.

During the 16th Summit of the South Asian Association for Regional Cooperation (SAARC) in 2010, Nepal together with countries in South Asia, resolved to strengthen climate resilience. The World Bank financed Climate Adaptation and Resilience for South Asia (CARE) Project aims to contribute in translating this policy into actions through enhanced regional cooperation and knowledge on climate resilience and adaptation, and development of standards and guidelines to facilitate climate-resilient planning and investments.

The Project's Development Objective is to create an enabling environment for climate-resilient policies and investments across South Asia, with the following indicators:

- Increased access to regional climate data and analytics for climate-informed decision-making;
- National-level decision-making and planning that are better climate risk-informed;
- Regional climate resilience guidelines incorporated into national standards;
- Sectoral investments supported to include climate risks and resilient design; and
- Institutional capacities strengthened to undertake climate-informed policies and planning.

The project has three components, for implementation over 5 years:

1) Promoting evidence-based climate-smart decision-making, to enhance access to data required for risk-informed planning and investments;
2) Enabling climate-resilient policies and standards for development, to enhance transformation of policies and capacities for climate resilience and adaptation across South Asia; and
3) Project management and implementation support.

Component 1 is implemented by RIMES. This component involves the creation of a regional resilience data and analytics service (RDAS) platform and decision-support systems (DSSs) for selected sectors of agriculture, water, road transport, planning and finance in Bangladesh, Nepal, and Pakistan. Component 1 also includes capacity development of users of these systems and their products. The RDAS is a cloud-based open-access platform for acquiring, storing, managing, processing, analyzing, visualizing, and reporting data, for use in screening climate risks to inform investments. The DSSs are sector-specific systems developed to assist users in sectoral planning and decision-making. This ToR supports the enhancement or development of the following DSSs/portals in Nepal, and linking them with the RDAS.

- Enhance the department of Hydrology and Meteorology (DHM)'s Hydro-met portal and Flocast DSS to increase access and use of meteorological, hydrological and climatological

information products and services among user ministries and agencies. The enhancements proposed include i) automated collection and management of hydrological and climate data; ii) streamlined data processing, use and archiving; iii) integration of weather, flood and climate forecast information, models and systems, and iv) linking the DHM's API to DSSs/portals of user ministries/agencies.

- Improve dataflows and functionalities of Nepal Agriculture Management Information System (NAMIS) for Ministry of Agriculture and Livestock Development (MoALD). The proposed improvements include i) integration of near real-time weather and climate data in the portal; ii) development of crop database featuring crop calendars, growth stages and requirements; iii) integration of available pest and disease data and models; iv) use of geo-referenced locations of relevant agriculture-related offices, facilities and markets; and v) semi-automated generation of agro-meteorological advisories for major crops.
- Develop a DSS that underpins hazard/risk assessments for resilient rural/local roads network in Nepal for supporting the Department of Roads (DoR)/Department of Local Infrastructure (DoLI). The proposed development includes i) GIS-based layers of the latest available multi-hazard maps and assessments in the country (e.g., flood, landslide, earthquake); ii) multi-timescale weather/climate information including near-real time weather forecasts; iii) geo-referenced locations of hotspots and critical facilities (e.g., hospitals, police stations); and iv) impact assessments and advisories for rural road transport especially during inclement weather.
- Enhance the Ministry of Finance (MoF)'s public finance management information system (PF-MIS) for climate budget allocation, tracking expenditure, monitoring sustainability and assessing investment results in climate-related sectors. The improvements proposed include i) streamlined data collection, processing and management of data among the Divisions and Departments in the Ministry; ii) integration of climate-related information in the system, as required; and iii) customization of data visualization and reporting.
- Enhance the National Disaster Risk Reduction and Management Authority (NDRRMA)'s bipad portal for use in disaster response and emergency management. The proposed enhancements focus on integrating near real-time forecasts and multi-hazard information into the portal.

3. Objective

The Consulting Firm is responsible for developing/enhancing the DSSs/portals for DHM, agriculture, transport, disaster management and finance sectors in Nepal. The firm will ensure integration of sectoral stakeholder needs and requirements in the design and development of the DSSs/portals, and will provide technical as well as user capacity-building materials and resources to ensure continued maintenance, updating and use of the systems by beneficiary ministries/agencies in Nepal.

4. Scope of Work

The Consulting Firm is expected to provide end-to-end DSS/portal development services and capacity-building support. This includes the following tasks.

A. Stocktaking

- Assess the critical decision points (i.e. decision-makers, decision-making institutions, current decision processes and information utilized, decision making gaps, and information and formats desired/required for improved climate-informed decision making) for each stakeholder
- Assess existing data and analytic services

- Identify and develop a catalog for all relevant sectoral data, including data from existing DSSs/portals available in the country
- Assist national institutions in translating data into online services (both public and restricted use) using OGC standards and well-documented APIs to support the work on DSS and the RDAS platform
- Identify additional regional and global data to support national and sub-national level decision-making
- Work with RIMES to suggest publicly available data and analytical services for integration in the RDAS platform
- Explore available key online documentation (e.g., reports/videos) relevant to climate data/analytics in the region

B. Assess the Decision Support Framework

- Consult relevant stakeholders for all the key areas targeted (agriculture, transport, water, disaster management and finance sectors in Nepal) to determine the institutional context for the decision, the key decisions to be supported, the currently available information used in decision making, the current processes for decision making, and the capacity-building needs relating to the DSSs
- For each decision, support the development of a data value chain to outline the data and analytics ecosystem that is required to support that decision
- For each decision, develop iterative prototypes of climate and data/information -informed decision-making screens, visualizations, interfaces, or other DSS elements. Test these prototypes with real decision makers and improve iteratively based on real user feedback.
- Assess the existing decision support systems that are targeted to be strengthened and explore data and analytics from the RDAS as well as additional data/analytics/visualization services that can be utilized for this strengthening
- Conduct thorough technical assessment in terms of usability, design, programming language, analytics, etc. of existing systems and portals to be enhanced including, but not limited to, NAMIS, DHM Hydro-met portal, BIPAD and MOF MIS

C. Design and develop the DSSs/portals

- Based on the outcomes of stocktaking, assessments and feedback from real end-user decision makers, design the DSSs/portal framework including but not limited to the system architecture, schema, software and data services platform, functionality, information flow, graphical user interface, navigation, security level/s, hosting (including for additional data/documents not currently online), linkage with RDAS and NMHSs data, products and services; the following table outlines the possible services, data modules, analytics, user interface, reporting and dissemination components for expansion or enhancement.

Category	RDAS[1]	Agriculture	Transport	Water	Finance Portal	Disaster Management
Services/ Function	RDAS . Climate trends and scenarios . Climate impact assessment DHM . Forecast products/ services	. Agromet advisory . Pest and disease identification and guidance	. Climate-resilient plan, design & construction of roads . Operation & maintenance of transport network . Traffic monitoring	. Weather monitoring & forecasting . Seasonal forecasting . Water level monitoring . Flood monitoring and forecasting in	. Climate budget allocation . Tracking expenditure . Monitoring sustainability . Assessing investment results	. Disaster preparedness and emergency response

[1] Consulting firm will not develop the RDAS but will provide inputs and support to RDAS design and linkage with the national DSSs.

Category	RDAS[1]	Agriculture	Transport	Water	Finance Portal	Disaster Management
				select river basin/s		
Data modules	RDAS • Global climate models • Regional climate models • Satellite data DHM • Historical climate data • Medium- to long-range forecasts	• Weather forecasts from DHM • Climate projections from RDAS • Advisory matrices and contingency tables (decision trees) • Crop calendars • Crop growth stage requirements • Pest and disease profiles and guidance • Fertilizer information • MOALD offices, facilities, markets (for inputs and produce) • Crop prices (as available)	• Weather forecasts from DHM • Climate projections from RDAS • Multi-hazard risk maps and assessments • Disaster database • Road incident/ accident records • Design standards, models & classifications • Comprehensive asset database (roads, bridges, highways, hospitals, police stations, etc.) • Video surveillance network	• Weather observations • Climate database • Water level data • Flood hazard data • Exposure data and vulnerability curves	• Climate projections from RDAS • Database of climate-related plan, program and project budgets • Planned vs. actual expenditures • Plan, program and project indicators	• Climate projections from RDAS • Weather forecasts from DHM • Flood forecasts from DHM • Seasonal forecasts from DHM • Multi-hazard/ risk maps and assessments • Disaster loss and damage database • Exposure information and vulnerability curves
Engines/ Analytics	• Models for generating climate projections • Climate impact assessment models	• Crop engine • Pest analytics • Disease engine	• Road design standards & analytics • Infrastructure O&M engine • Traffic surveillance engine	• Weather forecast models • Climate models • Flood forecast models • Flood risk and Impact assessment models • Forecast verification engine	• Analytics on budget & expenditures • Plan, program & project targets & models	• Meteorological, hydrological & climate models • Impact forecast models & analytics • Response advisory engine
Visualization	• Dashboards, menus, charts (e.g., time-series, bar, pie, hierarchy, flow charts), scatter diagrams, maps, etc					
Reporting & Dissemination	• Mobile app and web portal	• Agro-met advisories • Guidance on fertilizer application and pest management • Mobile app	• Mobile app and web portal	• Mobile app and web portal	• Web portal	• Mobile app and web portal
Host institution/s	• RIMES & DHM	• MOALD	• DOR & DOLI	• DHM	• MOF	• NDRRMA

- Identify, collect and organize relevant datasets from various ministries, agencies and institutions including, but not limited to, data from in-situ monitoring, earth observation, crowdsourcing, modeling, etc.
- Develop the data management modules integrating relevant weather/climate information and sectoral data including but not limited to the following:
    - Historical climate data (e.g., gridded datasets of temperature, precipitation, river/lake/reservoir levels, flows, etc.)

    - Forecasts (nowcasts to seasonal scale), locations of monitoring stations (e.g., climate, water levels, flows, water quality, water diversions, etc.) and associated metadata and data from DHM
    - Climate change projections (CMIP5; CMIP6 as/when available) on temperature, precipitation, and any modeled implications on streamflow, evapotranspiration, glaciers, snow, etc.
    - Relevant physical characteristics like land cover, topography/DEM, administrative boundaries
    - Sector-specific data such as cropland cover map, irrigated areas, soil map, crop-specific information for agriculture sector; grazing map, cattle/poultry-specific data for livestock subsector; basins, watersheds, major aquifers, drainage for water resource sector; road and bridge infrastructure network for transport sector; climate screening tools, criteria and indicators for planning and finance sectors
- Establish the DSS/portal engines (e.g., crop, pest and disease management modules for agriculture sector; flood monitoring and forecasting module for water sector; road risk profile module for transport sector; and fiscal risk assessment module for finance sector) and develop the data analytics platform supporting these engines using modern data science to ensure enhanced data processing/analysis, visualization, access (for example, by other online systems using standard protocols like OGC standards, well-documented APIs), and use in machine learning/AI algorithms
- Iteratively design and user-test each DSS/portal's graphical user interface and accessibility including but not limited to interactive dashboards, maps and graphs, swipe tools, animations, language options, etc. making sure that users can interactively and intuitively access, analyze and visualize data and/or information using appropriate libraries. Follow a progressive model of user-informed design, engaging key stakeholders with early design concepts and iteratively improving and refining based on feedback for real user needs.
- Create the report and/or advisory generation module in consultation with sectoral stakeholders and RIMES for real-time monitoring and dynamic generation of sector-specific (internal) reports and/or actionable (public) advisories to end-users like farmers or flood-prone communities
- Develop the DSSs/portals' dissemination system in the Common Alerting Protocol (CAP) format using multiple channels including API, email, SMS and mobile app (for select DSSs/portals)
- Coordinate with RIMES and the Consulting Firm for Quality Assurance in the audit of DSSs/portals including assisting with system quality and functionality testing, bug fixing and finetuning as well as system staging
- Coordinate with RIMES on the hosting of the DSSs/portals in cloud, and assist with deployment/turnover to beneficiary ministries/agencies
- Develop a comprehensive plan for continued maintenance, update and enhancement of the DSSs/portals including but not limited to governance and institutional mechanisms, funding, quality management, technical and data support, and capacity-building

D. Interface with RDAS

- Provide technical inputs and/or recommendations to RDAS (services, metadata) development
- Work with RDAS Consulting Firm to ensure linking of data (and analytics) between RDAS and the DSSs/portals developed/enhanced
- Facilitate increased access/use of RDAS via use of the DSSs/portals among stakeholder ministries and agencies

E. Facilitate capacity development of stakeholders

- Organize outreach events such as virtual knowledge sharing series, and hackathons in coordination with RIMES' IT Experts and RDAS/DSS Lead, and building on training/learning plans informed by training/learning needs assessments to be undertaken prior to learning events
- Establish and maintain a virtual helpdesk support for each DSS/portal (e.g. on documentation, data rescue and processing, GIS, DSS interface, data visualization, use of touchscreen/touch tables), to facilitate data services in the public domain
- Develop a range of knowledge products including screen capture how-to videos; short training videos featuring the data, analytics, and functionality of the DSSs/portals; interactive e-books/story maps with embedded interactive services, wikis, etc.
- Prepare the technical manuals as well as user guides to be used in technical and sector-specific trainings

F. Report on work progress

- Discuss the monthly progress and action plan for subsequent month with the RDAS/DSS Lead and IT Expert
- Submit quarterly report on the progress of DSS/portal development/enhancement including implementation challenges, good practices, lessons learned, and recommendations
- Participate in relevant consultations and progress meetings with stakeholder ministries/agencies

5. Approach

The Consulting Firm is expected to utilize the following approach while undertaking these tasks:

- Ensure collaborative design and development process throughout the consultancy period including working closely with the Country Coordinator, Sectoral Experts/Data Analysts, IT Expert, and RIMES CARE Project staff to ensure integration of user needs, requirements and recommendations in the design, full development/enhancement, capacity enhancement and deployment of systems
- Receive inputs from regular consultations with project beneficiaries and stakeholders on the DSS/portal architecture, modules, functionalities and analytics, graphical user interface, visualization, reporting and dissemination modules (where applicable), etc. including but not limited to the following ministries/agencies:
    - Department of Hydrology and Meteorology for enhancing the DHM portal and linking this with user departments
    - Ministry of Agriculture and Livestock Development (MALD) and allied agencies in enhancing the Nepal Agriculture Management Information System (NAMIS)
    - Ministry of Physical Infrastructure and Transport and allied departments in developing a DSS/portal that supports risk assessments of rural/local roads
    - Ministry of Finance in enhancing/developing the public finance management information system
    - Disaster Risk Reduction and Management Authority for enhancing the bipad portal
- Prototyping and Agile Development**:** Develop prototypes of DSS dashboards within the first 6 months of the contract to help stakeholders visualize the type of platform intended; Use modern agile design sprints (incl. with virtual participation) to collate regular inputs for this evolving prototyping and developing alternative data visualization and interactive analytics options

6. System Development Requirements

- Overall considerations
  - Flexible and scalable (including open source datasets/databases, etc.) framework for system development
  - GIT/SVN repository of all source codes, database scripts, test scripts, etc.
- Application quality assurance
  - Well-commented source code (application development) for all system enhancement work
  - Test plans and test cases (including Unit Test Plan, System/Integration Test Plan, User Acceptance Test Plan, Security Test Plan, Load Test Plan, Regression Test Plan)
  - Unit testing, load testing, integration testing
  - Testing documentation (including details of defects/bugs/errors and their resolution)
  - Development and implementation of security policy (including aspects of cybersecurity and privacy)
  - Database scripts, setup and release notes for each new release
- Platform and technology
  - Use of open source development language framework based on Java, PHP, Ruby, etc, and Model View Controller (MVC) based web frameworks for sufficient security and manageability; the consulting firm may propose an alternative development language, providing the details as well as reasons for such
  - Use of open source database such as MySQL, PostgreSQL, NoSQL etc.
  - Use of open source spatial data visualization platform e.g. Leaflet with responsive design that works on common digital devices (smartphones, tablets, computers)
  - Use of free/open-source analytics and visualization platforms/tools
  - Cloud-based hosting (e.g., Google, Amazon AWS, Microsoft Azure, etc)
- Design the graphical user interface and accessibility (i.e., dashboard, interactive maps and overlays, interactive graphs, swipe tools, animations, modern data visualization using open-source platforms and open visualization libraries such as https://d3js.org/, including English and Nepali language options with free translation APIs) making sure that users can interactively and intuitively access, analyze and visualize data and/or information using appropriate libraries.
- Develop the DSS export (including deep URLs, embed codes, etc.) and dissemination system using multiple channels (and languages) including API, email, SMS and mobile app (android and iOS versions), social media
- Data access policy
  - The DSSs shall primarily integrate free and open source data available at sub-national and national level. Other data, either procured or accessed from countries or other sources, which may be considered sensitive, shall be placed under data protection policy in the system, and secured and restricted access shall be provided to different user groups.

7. Responsibilities of RIMES

RIMES shall support this assignment by facilitating access to data and stakeholders, monitoring progress and providing technical guidance and feedback.

8. Reporting Requirements and Payment Schedule

The consulting firm will report to RIMES' Project Implementation Unit (PIU) and work under the direct supervision of the RDAS/DSS Lead and Project Director who will monitor and review progress and quality of work every quarter. The firm should have an office in Nepal. In-country, the firm will report to the Country Coordinator and IT Expert.

The assignment will be delivered in 33 months at the most. The final schedule of payment will be agreed with the firm, based on the final workplan and schedule of deliverables. A preliminary schedule of payments will be as per the following.

Item	Deliverables	Percentage of total price	
1	Development approach, methodology, and work plan for the DSSs/portals to be developed/enhanced	5%	On contract effectiveness
2	Report on stocktaking and assessment outcomes, including detailed decision support framework and data parameters for the DSSs/portals	20%	Within 6 months from contract effectiveness
3	DSS design and development: data management modules for the DSSs/portals	25%	Within 12 months from contract effectiveness
4	DSS design and development: DSS engine, data visualization and interface modules, report generation and dissemination (e.g., web-based system, mobile app, etc.) modules and interface with the RDAS	30%	Within 24 months from contract effectiveness
5	Capacity development of stakeholders (including user guide and technical manual, training, hackathons)	10%	Within 30 months from contract effectiveness
6	System transfer and deployment (including final documentation, helpdesk services), and final report featuring a comprehensive plan for DSSs/portal sustainability	10%	Within 33 months from contract effectiveness

RIMES' PIU shall provide necessary guidance and coordination. All outputs shall be submitted to RIMES' PIU for review and approval. These include but are not limited to i) software requirement specification document, ii) software design document, iii) functional and audited software with source code, database and scripts, iv) administrator manuals including detailed metadata document, v) set-up and release notes for each new release, vi) test cases and reports, and all other relevant documents and software.

Progress reports shall be in English language. However, all DSSs/portals, training guides, manuals and related capacity-building materials must be developed in English and Nepali. These outputs will become the property of RIMES on behalf of beneficiary ministries/agencies until the end of the project; the consulting firm shall not use, replicate, and reproduce these outputs in any manner without RIMES and/or the ministries/agencies' consent.

9. Contract Duration

The entire work is expected to be completed within 33 months.

10. Qualifications and Criteria for Selection

The tasks will be implemented by a consulting firm with proven track record (35%), technical expertise (35%), and human resources and operational capacity (30%) to undertake assignments described in this TOR. Experience in developing DSSs/portals in such sectors as agriculture, transport, or finance in Nepal will be an advantage.

The consulting firm shall provide (but not limited to) the following staff and expertise. Short-listed firms are expected to propose a team composition with number of person-days involvement for each, when submitting technical proposals.

1) Team Leader, ideally a system developer and project management professional, with the following minimum qualifications:
    a) Master's degree or higher in computer science, data science, statistics or related fields
    b) Over 15 years of professional experience in software/database development and management
    c) Over 10 years of experience leading development teams in requirement analysis, design, development, and quality assurance of software solutions
    d) Excellent problem-solving, organizational, and presentation skills
    e) Strong written and oral English and Nepali communication skills

2) Technical Lead and Quality Assurance Specialist, with the following minimum qualifications:
    a) Master's degree in computer science, information/communication technologies, data science, statistics or related fields
    b) Over 10 years of professional experience in data analytics, web applications, database development and management with minimum 5 years of experience in reviewing and analyzing system design, development and implementation
    c) Knowledge of security and quality assurance methods, standards and tools for web applications and databases
    d) Proficient in various open source programming languages (e.g., Python, R, JavaScript, CSS, PHP, HTML5, Java), data management systems (e.g., PostgreSQL, MySQL, NoSQL), current and emerging technologies, modern applications
    e) Excellent problem-solving and analysis skills with attention to detail and quality
    f) Strong communication skills

3) Senior Web Application Developer, with the following minimum qualifications:
    a) Bachelor's degree or higher in computer science, information communication technologies, or related fields
    b) Over 5 years of experience in software/database development and management, and analysis tools
    c) Strong knowledge of Web Map services, Open Layers, Google Earth Engine
    d) Strong technical knowledge of systems networking, databases, and web development
    e) Proficient in various open source programming languages (e.g., Python, R, JavaScript, CSS, PHP, HTML5, Java) and data management systems (e.g., PostgreSQL, MySQL, NoSQL)

4) Senior Data Scientist, with the following minimum qualifications:
    a) Bachelor's degree or higher in computer science, data science, mathematics, statistics, or related fields
    b) Over 5 years of experience in software/database development and management, and analysis tools
    c) Extensive knowledge of processing structured and unstructured data, with strong analytical skills and ability to understand, classify data and analyze patterns

d) Strong technical knowledge of database architecture, and machine learning algorithms
e) Knowledge about data mining and weather data formats
f) Strong knowledge of R, Python and MATLAB, JavaScript and other statistical tools

5) Senior Visualization Expert, with the following minimum qualifications:
    a) Bachelor's degree or higher in computer science, information technology, data science, or related fields
    b) Over 5 years of experience in software/database development and management, and analysis tools
    c) Extensive knowledge of data processing and optimization techniques and data format conversion
    d) Knowledge of structured and scientific data management and visualization, data mapping and storytelling
    e) Strong knowledge of Data as a Service, REST API services and web services as well as data formats like GeoJson, ESRI shape files, Scientific data NETCDF, GRIB (gridded Binary), HDF
    f) Strong knowledge of statistics, and Knowledge of HTML, CSS, key libraries, and scripting tools like R, Python and JavaScript, D3, Tableau etc
    g) Demonstrable design knowledge, such as layout, typography, color, interaction design

6) Mobile App Developer, with the following minimum qualifications:
    a) Bachelor's degree in computer science, information communication technologies, information technology, or related fields
    b) Over 5 years of experience in software/database development and management
    c) Demonstrable portfolio of released applications on the App store or the Android market
    d) Extensive knowledge of open-source programming language
    e) Knowledge of OOP design principles and third-party libraries and APIs

7) GIS and Remote Sensing Specialist, with the following minimum qualifications:
    a) Bachelor's or higher degree in remote sensing/GIS, geo-informatics, computer science or related fields
    b) Over 5 years of experience using GIS Server geo processing services, including developing programming scripts
    c) Working experience of web-based map viewers and mapping tools

8) Software Engineers (i.e., support staff including Database Experts, Data Scientists, Web Application Developers, Visualization Experts, Mobile App Developers), with the following minimum qualifications:
    a) Bachelor's degree in computer science, data science, statistics or related fields
    b) Over 5 years of experience in software/database development and management
    c) Good knowledge of modern computer hardware, software, connectivity, and online services
    d) Strong GIS skills and solid understanding of machine learning and artificial Intelligence

9) Experts in agriculture, water, transport, disaster management and finance, whom the firm engages on as-need basis

a) Master's degree or equivalent qualification
b) At least five (5) years of experience in climate services for the selected sector in Nepal
c) Knowledge of data and decision support systems
d) Demonstrated experience working with government ministries/agencies
e) Proficiency in spoken and written English and Nepali languages