Sindh Resilience Project (SRP)

Terms of Reference

River Morphological Study, Flood Hazard Mapping and Establishment of Decision Support System for Sindh Province

Introduction:

Pakistan's irrigation system is the largest contiguous irrigation system in the world. Agriculture comprises more than 1/5th (20.9%) of Pakistan's GDP, about 2/3th of employment and an equal amount of exports. The country's socio-economic welfare depends on this water system in spite of the meager rainfall of about 150-180 millimeters. The province of Sindh is at the Southern end of Pakistan, the third largest in terms of area (140935 square kilometers) and the second largest in terms of population (40 million); and is at the tail of Pakistan's irrigated agriculture system. Sindh has 14 publicly owned irrigation systems, which receive water from three barrages across the River Indus. These systems, with an aggregate length of 18,000 km of canals, serve an area of about 5.38 million hectares. There are 13 existing surface drainage systems in Sindh, which serve a total area of over 3.5 million hectares and have an aggregate length of about 4,800 km.

The Sindh Irrigation Department (SID), Government of Sindh intends to undertake several activities for institutional strengthening of the department under the 'Sindh Resilience Project' soft component funded by The World Bank. The envisioned studies under soft component are to handle flood situations efficiently, meaningful preparedness before each flood season, reliable flood hazard and vulnerability assessments, and manage uninterrupted extreme drought conditions through the development of tools to improve understanding of risks and eventually support rapid response through the flood disaster.

Currently, flood hazard management in Sindh province is being carried out with limited information along with localized knowledge and experience of previous floods. The adequacy of real-time data is now accessible due to the advent of technology which can be efficiently used in overall flood management and real-time decision making. Thus, efficient flood control and river management can be achieved by conducting detailed development of flood models, river morphology models, (using both satellite images and numerical models) integrated with real-time discharge and water level data of the Indus river in Sindh province, for this purpose, Decision Support System (DSS) will be established.

In modern-day water resources management, DSS has two main functions: (1) Functions related to the planning of the water resources development and (2) functions related to real-time operation and management. The aim of a real-time operational DSS in Sindh Province is the development of a comprehensive system, incorporating a state-of-the-art data acquisition and advanced communication system, for real-time operational management of the water resources in an integrated manner.

Decision Support System (DSS) allows decision-makers to combine real-time information including hydrological data/ spatial distribution of flood from satellite imageries, personal judgment with computer output, over a user-machine interface, to produce meaningful information for the decision-making process. This system will reinforce present flood hazard management practices (which are currently focusing on flood management mainly during active flooding only) by integrating real-time hydrological data, spatial information, latest terrain representation, infrastructure capacities and thresholds, possible flood paths after breaching at a certain location, pre-assessed damages, and experience of previous flood handling. Due to the integration of GIS-based layers of various facilities, utilities, infrastructure, inundation layers and modeling tools, proposed DSS will also contribute in pre-flood preparedness and post-flood recovery and adopting efficient flood damage reduction strategies.

Objectives:

The objective is to study and document geometry, bed form and profile characteristics of the Indus basin of Sindh together with their hydrologic and hydraulic characteristics, and floodplain characteristics, and to identify areas/stretches where the stream flow is likely to have adverse physical, social and economic impact from changing river morphology, particularly during high discharge caused by occasional events such as flood from heavy rainfall, and sudden discharge from upstream reservoirs.

Another objective of this project is to rapidly implement a collaborative geospatial platform; integrate real-time and baseline data into the platform; and deploy applications on the platform to handle flood situations efficiently, meaningful preparedness before each flood season and reliable flood damage assessments and decision makers involved in disaster management in the province of Sindh.

Scope of Work:

The consulting firm shall be responsible for undertaking following tasks;

Task 1: River Morphology Study

1. **Field Survey of River Hydraulic and Development of Digital Elevation Models**

One of the elementary and utmost significant inputs of any hydraulic model is the geometry data of the river and old river courses in order to determine the river morphology. To achieve the accurate modeling of the river, cross-sectional elevation data, and the bathymetric survey is mandatorily required along the river. For detail investigation of flow paths & inundation extents/ depths/ velocities using hydrodynamic models, topographic and bathymetric details are the vital inputs. The detailed topographic survey and bathymetric survey data can be fused together to develop hybrid digital elevation model (DEM) at a finer resolution. This hybrid DEM will capture bathymetric details of the riverbed, morphological details river, and active floodplain.

Digital Elevation Model (DEM) represents elevation and topographic details of the area, which are critical for computing flow characteristics and storage volume of surface flooding. The accuracy of a hydrodynamic model depends on the spatial resolution of the DEM. DEM of 30m x 30m resolution are available free of cost from different online sources such as ASTER and SRTM but this resolution is not suitable for flood simulations and inundation analysis, specifically along the embankments, cities, hydraulic and public infrastructures (roads, railways) and small settlements. Each DEM has predefined vertical and horizontal accuracy which should also be considered while selecting DEM for hydrodynamic modeling. Moreover, residual flood modeling, dam and embankment breach modeling, and flow regulation modeling on mega hydraulic structures (like barrages and dams), not only require finer resolution of DEM but also requires accurate modeling of these structures in term of their architectural and functional design.

Data acquisition of using new DEM preferably with a resolution of 25m x 25m will be acquired for acquiring accurate flood modeling results. Normally, a DEM of resolution of 25m x 25m is suitable for acceptable results but this should be decided after the preliminary terrain analysis and assessment of accessible topographic information and required results. Although for the whole Sindh, 25m x 25m will work, however, for some of the selected target areas i.e. urban areas, high-resolution DEM on 12.5m x 12.5m will be acquired to get more accurate results. Final hybrid DEM will be attained by integration of the river cross-sectional survey data, layout and elevation data of embankments, bathymetric data, and the high-resolution satellite-based elevation data. Main activities for this task will include the following;

1) Establish horizontal and vertical survey control points (of concrete), connected with Survey of Pakistan datum, along the river and its tributaries.

2) Taking flood 2010 as a benchmark, at least 2 to 4KM buffer zone will be selected for cross-sectional survey along the downstream. The survey shall also include recording geometry of hydraulic structures (including water crossings geometric details). The cross-sections shall be observed from left to right embankment. Where embankments on either side are not available, the cross section shall either be extended to floodplain extent or 2Km further than the bank of the river (whichever gives best results for hydraulic modeling).

3) Initial terrain analysis and review of available topographic information. Propose extent and specifications of required DEM based on initial review and possible extent of water during floods.

4) Acquiring of 25m x 25m DEM (from recent archives) along downstream for the whole Sindh, based on above proposals with the flexibility of having more fine resolution possibly with 12.5m x 12.5m DEM for some of target sample sites including near urban areas depend upon costing and availability.

5) Transformation of a cross-sectional survey into raster DEM and fusion with DEM to represent true ground surface after elimination of water.

6) Develop high-resolution DEM (0.5m x 0.5m) to be used for breach modeling using drones, around designated breaching sections along the river.

7) Develop contour maps at 0.5m contour interval around the major hydraulic structures covering river reach a length of 1-km upstream and 1-km downstream of the structure.

Task 2: Flood Hazard Mapping

Flood hazard mapping will include determining the extent and intensity of floods for various return periods for assessing the active flood-prone areas over the project area. Use of remote sensing and crowd-sourcing techniques will be encouraged in addition to flood modeling to identify hot spots for flood hazards and to calibrate and validate the model results. For calibration of the hydrodynamic model, seasonal Manning's roughness for the study area will be carried out which can be obtained by landcover and land use classification using remote sensing techniques. The purpose of the task is to develop a flood model for flood forecast in Lower Indus basin using satellite remote sensing data and hydro-meteorological parameters for the study area.

1. **Review and Analysis of Hydrologic and Satellite Remote Sensing Data and Development of Hydrological and Models**

1) Spatio – Temporal analysis of flood extent in the Sindh region using satellite remote sensing data.

2) A review of flood frequency in the study area by analyzing remote sensing data and statistical flood frequency analysis.

3) A review of existing hydrologic data, processing of rough data and integration into DSS system.

4) Development, calibration, and validation of hydrological rainfall-runoff models.

5) Generation of design hydrographs of various return periods (Q20, Q50, Q100 and Q500 as a minimum) using the most recent data on precipitation and high waters (i.e. including 2010 super floods).

6) Incorporation of the hydrological model (or its outputs) into the hydraulic model(s) to support the development of flood forecasting and early warning systems, development of flood hazard management intervention measures (i.e. scenario modeling and options appraisal) and the detailed design of structural and non-structural measures.

2. **Building a Hydraulic Model**

The aim is to build a single linked 1D-2D hydraulic model of the Indus River and its floodplains (which may have varying levels of detail in different areas). The model should comprise a 1D representation of the river and its tributaries and a 2D representation of the floodplain for the most part and detailed representation of all hydraulically significant structures. The model should also have a capacity to perform stable calculations of subcritical flow and transition from subcritical to supercritical flow.

1) Review existing hydraulic models/techniques (not limited to any specific model) being used in Pakistan; in view of reliability and accuracy of flood modeling. In light of review and SID's requirements, identify required improvement(s) in flood forecasting models/techniques focusing Indus River.

2) Develop new 1-D hydraulic models of the river and its tributaries, using latest geometric data, to estimate various hydraulic parameters, corresponding to a various range of flood magnitudes and existing infrastructure capacities. Relevant details and data used in existing models may also be used as a reference.

3) Estimate flood levels and freeboard assessments along embankments on both sides of the river and its tributaries corresponding to a different return period of flood magnitudes with embankment geometries.

4) Identifying breach vulnerable locations along embankments against overtopping/ freeboard encroachment corresponding to a various range of flood magnitudes.

5) Residual flood modeling of each breach vulnerable section and estimating the extent of the disaster. Residual flood modeling can be used to rationally prioritizing embankment strengthening and identify the deliberate / designated/engineered breach locations.

6) Estimate existing safe flood passage capacity of different Hydraulic structures barrages and bridges along river reaches.

7) Review existing floodplain maps and update them with recent topographic and infrastructure details also generate flood risk maps.

8) Following hydraulic model calibration, validation and sensitivity testing, run the Q20, Q50, Q100 and Q500 hydrographs through the hydraulic model to generate the corresponding flood maps.

9) Integrate results of hydraulic modeling in web-based interface for decision makers.

3. Development of Models for Breaching Sections

Flood protection embankments are generally constructed either to protect irrigation infrastructure or to safeguard certain towns, villages, adjoining agricultural lands and public or private facilities.

1) Review and recommend a software package for 1D/2D breach analysis.

2) Develop robust 1D/2D models for designated breaching sections and prepare flood Atlas with flood depths, flood velocity, flood hazard (depth x velocity), flood depth-duration, flood recession, and flood extents. With the intentions that SID team will continue breach modeling after completion of the project at 25 km or finer interval.

3) Identify vulnerable breach locations along Indus river in Sindh using 1D model with latest topographic and infrastructural details.

4) Develop 1D/2D models for vulnerable breaching sections (identified through the 1D model) and update existing flood Atlas with flood depths and extents.

5) Development of integrated modeling system which integrates 1D river model and 2D flood plain model.
6) Identify flow paths, inundation depths, velocities, and drainage time at designated breaching location corresponding to a various range of discharges and breaching scenarios.

7) Develop/update existing flood atlas, showing the drainage pattern of the flood in case of embankment breaching anywhere along the river for the different magnitude of the flood.

8) Optimize/revise operational strategy of designated breaching sections at each location corresponding to a range of flood scenarios and identify critical scenarios.

9) Develop inundation maps duly highlighting risk and vulnerable areas at each designated breaching location and update existing flood-fighting plans using simulation results. Integrate simulation results with damage assessment.

10) Propose various options for drainage of flood after breaching and practical recommendations for safe passage and re-joining the river with stakeholder consultations.

11) Estimate depth/velocity damage functions using flood inundation simulation results (extent, depth, velocity, drainage time etc.), through modeling activity.

12) On job training of SID professionals on the acquisition of data, processing, model development, interpretation of results and troubleshooting

13) Integrate results of breaching section models in web-based interface for decision makers.

Task 3: Establishment of Decision Support System

The technology of Web-based GIS gives planners/decision-making authority an ability to react faster with proactive response plans and the tools to execute them. It also helps to share information with the public with web maps, so local planners/engineers can visualize how their developments will affect the land and vice versa. Keeping these aspects, a web-based GIS application has been envisaged. Main activities for this task are as follows;

1) A stand-alone, easy-to-use, reliable, web-based application for the computation of flood characteristics and population affected, in near real-time comprehensive of the automatic procedure for the collection of the necessary data. This application is expected to automate all

steps required under Task 2 of this assignment, determine the return period of the observed event and present outputs in a user-friendly interface for non-technical users.

2) Evaluation and updating of existing GIS Layers for available data with Sindh Irrigation Department not limited to roads, populations, settlements & villages, hospitals, schools, etc.

3) Establish spatially enabled data capturing, development, data analyzing and visualizing system for planners/decision makers.

4) Integrate the results of all tasks with the web-based interface using open source technology stack and new server owned by the SID.

5) Using post flood free domain inundation extents, analyze and develop tools (a geospatial analysis tool etc.,) for post-flood damage assessments as a part of web GIS application.

6) Automate the procedure of extracting post flood inundation extents from MODIS, Landsat and Sentinel data, using overlay analysis, assess infrastructure damages and integrate all spatial results with web-based GIS application with the ability to download and upload data or layers in KMZ format. The report should be developed consisting of graphs, diagrams, and maps.

7) Development of an instruction/user manual of the application for SID technical staff and non-technical users.

8) Development of Governance structure of DSS complete with staffing plan and detailed job description. There is a possibility of seconding the Client staff in order to ensure a seamless transition of DSS from Consultant to Client. This would be in addition to training imparted by Consultants to relevant Sindh Irrigation Department officials

Data Formats and Requirements:

With respect to this data, the inception phase of the project should establish the definition of data management guidelines inducing all file formats and metadata standards. The minimum requirements to be followed for all geospatial (GIS) data are:

Metadata: Detailed documentation needs to be provided for each data set. This metadata must include a description, source, contact, date, accuracy, restrictions. A description of attributes needs to be provided for vector and tabular datasets. Spatial data must include details of projection. There are available ISO standards commonly used by World Bank projects to guide the development of metadata.

Vector data: Geospatial vector data must be converted into a standard OGC format or well-known format. This list includes, but is not limited to, shape file, KML, GML, WKT. Additional formats may be used with approval. Where possible, styling information should be provided in SLD format. All files must include projection parameters.

Raster data: Geospatial raster data must be converted into a standard OGC or well-known format. This list includes, but is not limited to, GeoTIFF, JPEG, JPEG2000, ERDAS img, ArcInfo ASCII or Binary grid, MrSid. Additional formats may be used with approval. Where possible, styling information should be provided in SLD format. All files must include projection parameters.

Tabular data: Tabular data must be converted into a readily accessible or well-known format. This list includes, but is not limited to, CSV, tab-delimited text file, or spreadsheet. Additional formats may be used with approval.

Media/method of transfer: All datasets must be transferred to permanent media such as a CD/DVD disk. Very large data sets, too large for CDs and DVDs, may be provided on a hard drive or solid-state drive, as agreed by the SID

Warranty: The consulting firm will provide warranty support for an agreed duration which will include bug fixing and enhancements if any. The consultant will also define post-implementation maintenance process for the DSS application and provide onsite/offsite support as per the defined service level agreement.

Timetable for Deliverables:

Deliverables	Submission Schedule	Details
Inception Report	Two (2) months after Commencement of the Services.	A detailed description of methodologies and timelines to achieve all tasks of TOR.
Stakeholders Consultative Workshop	Within two (2) weeks after the submission of Inception Report for client/stakeholders.	Presentation for all stake holders to build the understanding of all the tasks and methodologies to carry out each task.
First Interim Report **Task 1: River Morphological Study** • Field Survey of River Hydraulic and Development of Digital Elevation Models	By end of six (6) months after Commencement of the Services.	The submissions shall include both reports (hard format) and soft data (raw data, processed data, models, GIS tasks and soft copies of all reports).
Stake Holders workshop	Within two (2) weeks after the submission of First Interim Report for client/stakeholders.	Presentation to build an understanding of the task. Also, to enable client/stakeholders to submit observations/modifications to the consultant.
Second Interim Report **Task 2: Flood Hazard Mapping** • Review and Analysis of Hydrologic Data and Development of Hydrological Models • Building a Hydraulic Model • Development of Models for Breaching Sections	By end of one twelve (12) months after Commencement of the services.	The submissions shall include both reports (hard format) and soft data (raw data, processed data, models, GIS tasks and soft copies of all reports).

Stake Holders workshop	Within two (2) weeks after the submission of Second Interim Report for client/stakeholders.	Presentation to build an understanding of the task. Also, to enable client/stakeholders to submit observations/modifications to the consultant.
Third Interim Report **Task 3: Establishment of Decision Support System** • Implementing the Modeling Tool into an Operational Web-based application • GIS Mapping and Web Integration	By end of sixteen (16) month after Commencement of the Services.	The submissions shall include both reports (hard format) and soft data (raw data, processed data, models, GIS tasks and soft copies of all reports).
Stake Holders workshop	Within two (2) weeks after the submission of Third Interim Report for client/stakeholders.	Presentation to build an understanding of the task. Also, to enable client/stakeholders understand the DSS interface submit observations/modifications to the consultant.
Draft Final Report	By end of seventeen (17) month after Commencement of the Services.	Submission of all tasks items after completion, along with packages of different raw and processed data. The submissions shall include the following: • All raw data acquired during the project. (DEMs, flows, metrological, topographic data etc.) • All processed data. (fused DEMs with cross sections, contour maps, etc.,) • All cross-sectional data in CSV format, DWG format, and PDF format. • Contour maps of the 0.5m interval. Embankment data in GIS format, along with the geometry of culverts, bridges etc. • Integrated distributed hydrological model of all rivers. Integrated hydraulic models of all rivers including breach models.

		• Flood levels, freeboard assessments, vulnerable locations, safe flood passage capacities, floodplain maps, inundation maps corresponding to various range of floods and risks at each breaching sections, both in GIS and hard format. • Optimized/ Revised operational strategy of designated breaching sections and upgraded flood-fighting plans. • Upgraded flood atlas, both in GIS and hard format. • Various options for drainage of flood after breaching and recommendations for safe passage and rejoining the river with stakeholder consultation. • Estimate depth/velocity damage functions using flood inundation simulation results (extent, depth, velocity, drainage time etc.), through modeling activity. • Detail manual of the complete system, including instructions for the acquisition of data, the operation of various modules, simulation, interpretation of results and troubleshooting. • Details of reviews (existing hydrological models, hydraulic models, existing DEMs). • Details of Methodology adopted for completion of each task and sub-task. • License keys of software, under the part of this project. • All background coding, processing, calibration factors and other supporting process/data. • All results integrated into the web-based interface in the existing server of client

		department. • Details of stakeholder consultation, stakeholder concerns, and subsequent strategy. • Automate the procedure of extracting post flood inundation extents from free domain satellite imageries, using overlay analysis, assess infrastructure damages and integrate all spatial results with web GIS application. • Development of web GIS utility to automatically extract real-time free domain satellite data and assess water extents to quantify damages. • Develop a DSS public interface for information sharing with the public. All submissions should incorporate observations made by client and stakeholders.
Final Report	Within three (3) weeks after acceptance of the draft final report.	The final report shall contain all items as mentioned above, after incorporation of final observations.

Expertise and Team Composition:

Name of position	Principal responsibility	Essential minimum qualifications	Experience required
Team Leader, Senior Flood Management Expert	Project Management, lead roles, and responsibilities shall include but not limited to the followings: i) providing a technical lead role in activities involving flood modeling, flood mapping, flood management strategies, flood forecasting, review & design of the real-time hydromet network. ii) providing expertise in development of hydrological & hydraulic models (1D, 2D and possibly 3D and development of DSS, risk modelling, etc. iv) writing and reviewing technical reports; v) planning and supervising and providing training, vi) Miscellaneous tasks as and when required; vii) presentations and participation in relevant seminars, conferences, and other activities	Post graduate degree in Civil Engineering, preferably a doctorate in Water Resources Engineering or relevant field.	Minimum 20 years of experience, with direct involvement in flood modeling, real-time data collection, and development of flood forecasting and warning systems, the design of flood management systems including structural and non-structural interventions, knowledge on state-of-the-art modeling systems and GIS; Excellent verbal and written communication skills with proficiency in English.
River Morphologist-and modeling expert	Conduct morphological studies; Prediction of river probable immediate scouring and bank erosion with and without river training works; Identification of area which will need protection; Advising on river surveys; Development of sediment transport and morphological models (1D, 2D).	BSc/B.E in Civil Engineering and Masters in Water Resources Engineering or relevant field.	Minimum 10 years post BSc./B.E experience in developing 1D and 2D river morphological models, Excellent skills in providing training to counterpart staff Knowledge and practice of using industry standard modeling software for sediment transport and morphology are essential.

			Excellent verbal and written communication skills in English.
Hydrologist	Development of hydrological data collection, analysis, and quality checking.	Minimum BSc/B.E in Civil Engineering	Minimum 10 years post BSc./B.E experience in carrying hydrological analysis and modeling; Knowledge and practice of industry-standard modeling software and/or public domain software; Knowledge of GIS tools essential.
Flood / Hydraulic Modeler	Development of hydraulic models (1D/2D), miscellaneous tasks as and when required.	Minimum BSc/B.E Civil Engineering or equivalent	Minimum 10 years post BSc/B.E experience in developing hydraulic (1D or 2D) models; Working experience in hydrodynamic modeling tools used in flood inundation; Knowledge and practice of industry-standard modeling software and/or public domain software; Knowledge of GIS tools essential.
Risk Modelling Expert	Model and analyze flood risks and develop risk maps for building and infrastructures	Minimum BSc/B.E in Engineering and related field and with experience in disaster risk assessment or in a related subject.	Minimum 10 years post BSc/B.E experience in the fields of hazard, vulnerability, and assessment; At least 5 of which should be with a developing country or emerging nation, preferably in South Asia region.
GIS Expert	Develop or maintain geospatial information databases, Provide mapping, analysis, and modeling support in areas of flood modeling, sediment and morphological modelling, climate change etc.	Minimum BSc/B.E in Engineering, Science, Remote Sensing & GIS and related field	Minimum 10 years post BSc/B.E experience in RS/GIS applications for resource mapping, preparation, and integration of GIS datasets; Experience in the hydrologic application, 3D analysis and customization and experience in flood inundation mapping for GIS/RS specialist (at least three similar projects)
Remote Sensing	Process and analyze satellite	Minimum BSc/B.E in	Minimum 10 years post BSc/B.E experience in

Expert	imageries, Merge scanned images or build photo mosaics of large areas, using image processing software; Integrate remotely sensed data with other geospatial data, evaluate remote sensing data requirements to determine the types of equipment or computer software necessary to meet project requirements, such as specific image types or output resolutions.	Engineering in Engineering, Science, Remote Sensing & GIS and related field	analyzing satellite data and images with application in flood management, disaster risk management studies. In-depth knowledge of image analysis software
Application Development Expert	Tasks and responsibilities shall include but not be limited to the followings: i) execute full software development life cycle develop flowcharts, layouts, and documentation to identify requirements and solutions; ii) Write well-designed, testable code; iii) Integrate software components into a fully functional software system; iv) Develop software verification plans and quality assurance procedures; v) Document and maintain software functionality; vi) Troubleshoot, debug and upgrade existing systems; vii) Deploy programs and evaluate user feedback; viii) Comply with project plans and industry standards; ix) Ensure software is updated with latest features.	Minimum BSc/B.E in Computer Science, Information Technology, Remote Sensing/GIS and related field	Minimum 10 years post BSc/B.E experience in analyzing information, general programming skills, software design, software debugging, software documentation, software testing, problem-solving, teamwork, software development fundamentals, software development process, software requirements and software maintenance;
DSS/Database expert	Evaluate alternatives and identify the general requirements for the DSS processing software and	Minimum BSc/B.E in Computer Science, Information Technology,	Minimum 10 years post BSc/B.E in development and implementation of DSS and knowledge of the enabling hardware.

	hardware. Develop outline proposals for the data management, user interface and report formats.	and related field	
GIS Officer	Maintain geospatial information databases, Provide mapping, analysis, and modeling support in areas of flood modeling, sediment, and morphological modeling, climate change etc.	BSc/B.E in Computer Science, Information Technology, Remote Sensing/GIS and related field	At least 4 years-experience in RS/GIS applications for resource mapping, preparation, and integration of GIS datasets;
Project Coordinator	Overall supervision of project and ensure the quality of modeling, quality of report and compliance with client's requirements.	BSc/B.E in Civil Engineering and Masters in Water Resources Engineering/ Computer Science, Remote Sensing/GIS and relevant	Minimum 15 years post BSc/B.E experience in Project Management or in relevant field.
Capacity Building Specialist	Provides technical support to project in the areas of work planning, needs assessment, training plan development, and training evaluation reports.	Post graduate degree in Management relevant field	Minimum 15 years experience in capacity building for different development consultancy projects.

Facilities from the Client:

The Client through the Head PMT will facilitate the Consultants to obtain all reports, maps, data, or any other information, available with SID which is needed by the Consultants to carry out the Tasks. The Client will also provide the Consultants with all permissions, approvals or other things needed by the Consultants to obtain (if available) maps, aerial photographs, remote sensing data, and images, or to import into Pakistan equipment and supplies needed to enable the consultants to carry out the Tasks. The Client will assist the Consultants and each of its personnel with work permits and such other documents as shall be necessary to enable them to perform their services; and also assist in issuance of entry and exit visas, residence permits, and other necessary documents for the expatriate employees of the Consultants and their eligible dependents, required for their stay in Pakistan. Any duties, fees or other port charges on staff or equipment shall not be reimbursable by Client (SID). Facility to stay in Rest Houses will be provided to the Consultants as per availability on payment of the prescribed charges.

Selection Process:

Procurement will be completed following the Selection Based on Quality and Cost Based Selection (QCBS) method in accordance with paragraph 3.7 & 3.8 of World Bank's Guidelines: Selection and Employment of Consultants [under IBRD Loans and IDA Credits & Grants] by World Bank Borrowers, January 2011 (revised July 2014).