

Terms of Reference (ToRs)

Flood Hazard Assessment Consultant

1. Project Background

Pakistan is vulnerable to a large number of natural as well as man-made disasters. The country has experienced a wide range of such events including earthquakes, floods, droughts, tsunamis, landslides, GLOF, avalanches and among such, which resulted in heavy loss of precious human lives and economy. These risks are further aggravated by rapid urbanization, climate change, increasing industrialization, encroachment of flood plains, lack of safer land use planning etc. Moreover, the country is one of the most flood-prone regions in South Asia. Some major historical floods which hit the country occurred in 1950, 1973, 1978, 1988, 1992, 1998, 2005, 2007, 2010, 2011, 2012, 2013, 2014 and 2015. In particular, the floods in 2010 and 2011 caused heavy damages and losses amounting to US\$10 billion and US\$3.7 billion, respectively.

National Disaster Management Authority (NDMA) has formulated Project Management Unit (PMU) for execution and monitoring of Multi Hazard and Vulnerability Risk Assessment (MHVRA) exercises in the country. The aim of PMU is to regulate MHVRA exercises nationwide. Further, to maintain unanimity all across the board, the development of National MHVRA Methodologies/Guidelines and designing of National MHVRA database will facilitate replication of the same sets standard and methodology for all stakeholders to be followed in order to develop a clear National Risk Picture. In this regard, with support of WFP, PMU-NDMA is undertaking MHVRA study in five districts of Central and Southern Punjab.

MHVRA exercise will provide solid foundation for outlining DRR interventions, mainstreaming DRR and safer land use planning. The exercise includes gathering and analyzing of hazard information and development of future scenarios based on frequency, magnitude and spatial extent of likely events.

2. Objective of the Assignment

One of the main objectives of the assignment is to carry out flood hazard assessment in the study area with vulnerable sites identification, integration of hazard modeling results in flood management plans, revision of infrastructure planning, and embedding of mitigation measures in the study. Such exercises will assist in identification of the exposed elements and quantification of vulnerability based on which disaster management experts can make informed decisions.

a. Geographic Extent

Detailed Flood Hazard Assessment will be carried out in five selected districts (Jhang, Multan, Bahawalpur, Khushab and Rahim Yar Khan) of Central and Southern Punjab (study extent is up to UC level).

b. Assignment Duration

44 man working days stretched over a period of Two months from the date of signing contract

3. Scope of Work and Outputs

- a. Carry out detailed flood hazard assessment through hydraulic modeling techniques using peak discharge data, Land Covers roughness, velocity, lag time, and depth of flood water.
- b. Use of 1D & 2D modeling to develop four scenarios inundation maps, based on Return Period of 10, 25, 50, 100 for the study area
- c. Collection of historical statistical data (river discharge) and past events to analyze high and low flood discharges, seepage flow, velocity, and vulnerable locations and embankments.
 - 1) All input datasets for probabilistic flood modeling, including quality check of collected data-set, will be collected by consultants. In this regard, NDMA will assist consultant for data collection.
 - 2) Hydraulic input, discharge data for temporal frequency analysis and Return Period (RP) calculation will be collected by consultants
 - 3) Base datasets, DEM/DTM showing terrine, stream network, stream cross sections, L section hydro sheds, geology, land cover and soil data will be collected by consultants.
- d. Organize two days hands on training workshop for MHVRA project staff and relevant agencies in order to orient them about Flood Hazard Assessment applications, maps, models and datasets as well as methodology.
- e. Handover all associated datasets to NDMA, on agreed formats and standards as prescribed in MHVRA guidelines.

4. Deliverables

- a. Based on the MHVRA guidelines, consultant is required to submit the inception report based on desk review including methodology, process and detail work plan for flood hazard assessment.

- b. All hydraulic datasets/outputs/ models, raw files, calibrated data, survey data and spatial data will be submitted along with final report in prescribed standard format.
- c. Various flood maps for a range of designs, flood flows, inundation, hazard depth, and velocity of flood will be submitted along with identification of safe zones/spots for evacuation and relief camps against likely flooding.
- d. Prior to the acceptance of final report all comments and feedbacks from NDMA-PMU team will be incorporated in the study.
- e. Consultant will attend meetings as per the requirement of project, in addition a biweekly performance review meeting will be held at NDMA.
- f. Consultant is bound to provide activity progress on daily man days based on Podio software/Google Progress sheet.

5. Required Skills

- a. M.S/ M.Phil. Degree in hydrology, GIS, Geography, Water Management and other related discipline with minimum 6 years relevant professional experience in the field of hazard assessment, including study design, execution and management of hazard assessments at regional, national and local level.
- b. Should have experience of conducting at least two similar exercises in past with proven track record.
- c. Should Strong knowledge of catastrophe/disaster hazard modeling, particularly for flood modeling.

6. Non-Disclosure Agreement:

- a. Data, reports and other associated information's collected under the assignment for which consultant was hired, and any data/information's which is shared with consultant for analysis by NDMA, will remain a property of NDMA and consultants will be bound to sign Non-Disclosure Agreement.

Terms of Reference (ToRs)

Earthquake Hazard Assessment Consultant

1. Project Background

Pakistan is vulnerable to a large number of natural as well as man-made disasters. The country has experienced a wide range of such events including earthquakes, floods, droughts, tsunamis, landslides, GLOF, avalanches and among such, which resulted in a heavy loss of precious human lives and economy. These risks are further aggravated by rapid urbanization, climate change, increasing industrialization, encroachment of flood plains, lack of safer land use planning etc. The seismicity of the country is generally characterized by major earthquakes with northern and south-western regions being the most vulnerable zones. The 2005 Kashmir earthquake is the prominent example which caused more than 73000 human fatalities and loss amounting US\$5 billion. The recent Afghanistan earthquake 26 Oct 2015 caused heavy toll of deaths in Pakistan (280 reported fatalities) and damages to infrastructure in Khyber Pakhtunkhwa and Gilgit Baltistan.

National Disaster Management Authority (NDMA) has formulated Project Management Unit (PMU) for execution and monitoring of Multi Hazard and Vulnerability Risk Assessment (MHVRA) exercises in the country. The aim of PMU is to regulate MHVRA exercises nationwide. Further, to maintain unanimity all across the board, the development of National MHVRA Methodologies/Guidelines and designing of National MHVRA database will facilitate replication of the same sets standard and methodology for all stakeholders to be followed in order to develop a clear National Risk Picture. In this regard, with support of WFP, PMU-NDMA is undertaking MHVRA study in five districts of Central and Southern Punjab.

MHVRA exercise will provide solid foundation for outlining DRR interventions, mainstreaming DRR and safer land use planning. The exercise includes gathering and analyzing of hazard information and development of future scenarios based on frequency, magnitude and spatial extent of likely events.

2. Objective of the Assignment

The objective of probabilistic earthquake hazard assessment is to generate and elaborate earthquake hazard microzonation and future zone scenario generation with return periods of 50, 100, 250, 475 years, and to quantify the potential damages and losses due to future earthquakes and their probabilities of occurrence in a given period.

a. Geographic Extent

Detailed earthquake micro level Hazard Assessment will be carried out in five selected districts (Jhang, Multan, Bahawalpur, Khushab and Rahim Yar Khan) of Central and Southern Punjab (study extend up to UC level).

b. Assignment Duration

44 man working days stretched over a period of Two months form the date of signing contract.

3. Scope of Work and Outputs

- a. Develop comprehensive hazard and event intensity maps for various return periods (50, 100, 250, 475) based on EQ hazard appropriate tools as prescribed in MHVRA guidelines, along with ArcGIS and visual outputs.
- b. Collect ancillary earthquake hazard GIS data from various stakeholders. Data includes surface soil information, geological data, geo-tech investigation data (borehole data) and topographical maps for microzonation.
- c. Collect Geo referenced fault database with associated attributes based on existing information including seismicity level, depth, traces, representative slip behavior and recurrence information.
- d. Collect spatial and non-spatial data related to fault lines, seismic stations, weak motion, strong motion (if available), and epicenter catalogue.
- e. Submit micro level earthquake hazard and PGA based microzonation maps. Zonation will be in accordance with the building codes of Pakistan.
- f. Complete an updated earthquake catalogue (earthquake epicenter x,y, event date, and magnitude) which should include
 - 1) Frequency and magnitude (G-R) relationship, and active deformation.
 - 2) Various models including information related to seismicity, Bedrock motion, local site effects (amplification & liquefaction) and motion damage effects.
- g. Organize two days hands on training workshop for MHVRA project staff and relevant agencies to introduce earthquake hazard assessment applications, maps, models, and datasets as well as methodology.
- h. Hand over all associated data sets to PMU-NDMA on formats as prescribed in MHVRA guidelines.

4. Deliverables

- a. Based on the MHVRA guidelines, consultant will be required to submit inception report based on desk review including methodology, process, and detail work plan for earthquake hazard assessment.
- b. All spatial and non-spatial data for surface soil, geology and any other parameter considered for analysis, data for model outputs, raw files and topographical maps should be submitted along with final report.
- c. Prior to the acceptance of final report all comments and feedbacks from NDMA-PMU team will be incorporated in the study.
- d. Consultant will attend meetings as per the requirement of project, in addition a biweekly performance review meeting will be held at NDMA.
- e. Consultant is bound to provide activity progress on daily man days based on Podio software/Google Progress sheet.

5. Required Skills

- a. M.S/ M.Phil or equivalent Degree in geology, seismology, geophysics, civil engineering and geography with special research work on EQ hazard or related field and disciplines.
- b. Minimum 6 years relevant professional experience in the field of EQ hazard assessment, including study design, execution of hazard and vulnerability assessment process at regional, national and local level.
- c. Should have enough knowledge of GIS, remote sensing and earthquake simulations & modeling tools.
- d. Should have experience of conducting at least two similar exercises in past with proven track record.
- e. Should have strong knowledge of catastrophe / disaster hazard modeling, particularly for seismic modeling.

6. Non-Disclosure Agreement:

Data, reports and other associated information's collected under the assignment for which consultant was hired, and any data/information's which is shared with consultant for analysis by NDMA, will remain a property of NDMA and consultants will be bound to sign Non-Disclosure Agreement.

Term of Reference (ToRs)

Drought Hazard Assessment Consultant

1. Project Background

Pakistan is vulnerable to a large number of natural as well as man-made disasters. The country has experienced a wide range of such events including earthquakes, floods, droughts, tsunamis, landslides, GLOF, avalanches and among such, which resulted in a heavy loss of precious human lives and economy. These risks are further aggravated by rapid urbanization, climate change, increasing industrialization, encroachment of flood plains, lack of safer land use planning etc. These risks are further exacerbated by rapid urbanization, climate change, increasing industrialization, development in risk-prone areas, etc. Drought has become an intermittent problem of the country. In past drought is reported to have brought extensive damages to Baluchistan, Sindh and Southern Punjab where average rainfall is as low as 200-250 mm. Severe drought periods in years 2000 and 2002 affected livelihoods, resulted in human deaths, pushed tens of thousands people to migrate, and killed large numbers of cattle. Pakistan Meteorological Department (PMD) has prepared a comprehensive drought map for the country. The frequent occurrence of draught in Pakistan brought negative consequences on food security, livestock production, environment and national resources. About 60 percent of the country is classified as arid receiving less than 200mm rainfall.

National Disaster Management Authority (NDMA) has formulated Project Management Unit (PMU) for execution and monitoring of Multi Hazard and Vulnerability Risk Assessment (MHVRA) exercises in the country. The aim of PMU is to regulate MHVRA exercises nationwide. Further, to maintain unanimity all across the board, the development of National MHVRA Methodologies/Guidelines and designing of National MHVRA database will facilitate replication of the same sets standard and methodology for all stakeholders to be followed in order to develop a clear National Risk Picture. In this regard, with support of WFP, PMU-NDMA is undertaking MHVRA study in five districts of Central and Southern Punjab.

MHVRA exercise will provide solid foundation for outlining DRR interventions, mainstreaming DRR and safer land use planning. The exercise includes gathering and analyzing of hazard information and development of future scenarios based on frequency, magnitude and spatial extent of likely events.

2. Objective of the Assignment

This study should identify the beginning, severity degree and the end of drought events on return period basis through use of metrological, agricultural, and hydrological parameters and models (SPI, PDSI) with both surface and sub surface available water resources.

a. Geographic Extent

Detailed drought hazard assessment will be carried out in five selected districts (Jhang, Multan, Bahawalpur, Khushab and Rahim Yar Khan) of Central and Southern Punjab (study extend up to UC level).

b. Assignment Duration

44 man working days stretched over a period of Two months form the date of signing contract.

3. Scope of Work and Outputs

- a. Review the historical data of drought occurrence, impacts and severity on water related sectors of metrology, agriculture, and hydrology.
- b. Analyze the probable impact of Drought on environmental socioeconomic and climate patterns. Environmental analysis should include damages to water quality, degradation of landscape, bio diversity loss, soil erosion and damages to agriculture, plants and livestock.
- c. Develop frameworks, methodologies and results using Drought Severity Index (DSI), Palmer Drought Severity Index (PDSI) and Surface Water Supply Index (SWSI) analysis of drought Impact. Keetch byran index (KBI) Soil moisture anatomy, NDVI (Normalized Difference Vegetation Index) TCI (temperature condition index) vegetation condition index, vegetation health index, ground water based on data availability.
- d. Identify the adaptation options and management strategies to cope with likely climate change impacts on drought hazards.
- e. Overview of the district and specific region in the drought context, identifying losses from the previous droughts and potential human and material impact of the drought on the economy.
- f. Examining the impact of drought on agriculture, health, food security, and nutritional status.
- g. Consultant will organize two days hands on training workshop for MHVRA project staff and relevant agencies to introduce draught hazard assessment applications, maps, models, and datasets as well as methodology.

- h. Consultant should hand over all associated data sets to PMU-NDMA on prescribed format given in MHVRA guidelines.

4. Deliverables

- a. Based on the MHVRA guidelines consultant will be required to submit inception report based on desk review including methodology, process, and detail work plan for drought hazard assessment.
- b. All model inputs, GIS files, model outcomes, calibration data, survey data and spatial data should be submitted along with final report
- c. Prior to the acceptance of final report all comments and feedbacks from NDMA-PMU team will be incorporated in the study.
- d. Consultant will attend meetings as per the requirement of project, in addition a biweekly performance review meeting will be held at NDMA.
- e. Consultant is bound to provide activity progress on daily man days based on Podio software/Google Progress sheet.

5. Required Skills

- a. M.S/ M.Phil degree in soil sciences, environmental social sciences, environmental social science, water resource management, and land use planning or relevant discipline.
- b. Minimum 6 years relevant professional experience in the areas of drought management, drought, analysis and mapping, drought monitoring and forecasting, land use planning & management, water resources management, hydrological and climate change.
- c. Should have experience of conducting at least two similar exercises in past with proven track record.
- d. Should have strong knowledge of catastrophe/ disaster hazard modeling.

6. Non-Disclosure Agreement:

Data, reports and other associated information's collected under the assignment for which consultant was hired, and any data/information's which is shared with consultant for analysis by NDMA, will remain a property of NDMA and consultants will be bound to sign Non-Disclosure Agreement.

Term of Reference (ToRs)

Exposure & Vulnerability Assessment Consultant (Structure Engineer)

1. Project Background

Pakistan is vulnerable to a large number of natural as well as man-made disasters. The country has experienced a wide range of such events including earthquakes, floods, droughts, tsunamis, landslides, GLOF, avalanches and among such, which resulted in a heavy loss of precious human lives and economy. These risks are further aggravated by rapid urbanization, climate change, increasing industrialization, encroachment of flood plains, lack of safer land use planning etc.

National Disaster Management Authority (NDMA) has formulated Project Management Unit (PMU) for execution and monitoring of Multi Hazard and Vulnerability Risk Assessment (MHVRA) exercises in the country. The aim of PMU is to regulate MHVRA exercises nationwide. Further, to maintain unanimity all across the board, the development of National MHVRA Methodologies/Guidelines and designing of National MHVRA database will facilitate replication of the same sets standard and methodology for all stakeholders to be followed in order to develop a clear National Risk Picture. In this regard, with support of WFP, PMU-NDMA is undertaking MHVRA study in five districts of Central and Southern Punjab.

MHVRA exercise will provide solid foundation for outlining DRR interventions, mainstreaming DRR and safer land use planning. The exercise includes gathering and analyzing of hazard information and development of future scenarios based on frequency, magnitude and spatial extent of likely events.

2. Objective of the Assignment

To develop a comprehensive exposure/vulnerable database using existing datasets; especially Government endorsed data for population, basic government infrastructures (health facilities, roads, water supply schemes, offices, post offices, rescue offices, etc.), community infrastructures (schools, mosques, etc.) strategic assets (oil fields, power plant, railway lines, airports, foods, warehouses), etc. Further, to develop a GIS based exposure and vulnerability database of population disaggregation on socio economic, gender, children and disability.

a. Geographic Extent

Detailed exposure and Vulnerability assessment will be carried out in five selected districts (Jhang, Multan, Bahawalpur, Khushab and Rahim Yar Khan) of Central and Southern Punjab (study extend up to UC level).

b. Assignment Duration

44 man working days stretched over a period of Two months form the date of signing contract.

3. Scope of Work and Outputs

- a. Carry out detailed vulnerability assessment (physical infrastructure) through means of field service, GIS/RS technologies and government endorsed statistical data.
- b. Identification of exposed population (Age, sex and disability wise) and physical assets with respect to prevailing hazards of the study area.
- a. Develop probabilistic damage and probabilistic impact scenarios with consultation of relevant stakeholders and field validation.
- b. Consultant will enlist/identify different types/levels of exposure.
- c. Devise different tools and sampling techniques for vulnerability analysis and calculations for each exposed element with respect to available local hazards.
- d. Apply Participatory Rural Appraisal (PRA) tools, FGD, Hazard timeline, Transit walk, Problem Tree, Seasonal calendar and vulnerability map for exposure & vulnerability assessment.
- e. Organize two days hands on training workshop for MHVRA project staff and relevant agencies to introduce exposure and vulnerability assessment techniques.
- i. Hand over all associated data sets to PMU-NDMA on prescribed format given in MHVRA guidelines.

4. Deliverables

- a. Based on the MHVRA guidelines consultant will be required to submit inception report based on desk review including methodology, process and detailed work plan for exposure & vulnerability assessment.
- b. All geospatial data, primary and secondary data, survey data and spatial data must be submitted along with final report.
- c. Prior to the acceptance of final report all comments and feedbacks from NDMA-PMU team will be incorporated in the study.
- d. Consultant will attend meetings as per the requirement of project, in addition a biweekly performance review meeting will be held at NDMA.

- e. Consultant is bound to provide activity progress on daily man days based on Podio software/Google Progress sheet.

5. Required Skills

- a. M.S/ M.Phil degree in Civil Engineering, Structural Engineering, Disaster Risk Management, GIS & RS, Geography, Social Science or relevant discipline with specialized experience on building and population exp/vul assessment.
- b. Minimum 6 years relevant professional experience in the field of Structural and Disaster Risk Reduction (DRR), GIS and risk assessment including design, execution and management of multi hazard vulnerability assessments at regional, national and local level.
- c. Should have strong familiarity with participatory community assessment methodologies and scientific data collection and analysis tools.
- d. Should have experience of conducting at least two similar exercises in past with proven track record.
- e. Should have strong knowledge of catastrophe / disaster hazard modeling, particularly for seismic modeling.

6. Non-Disclosure Agreement:

Data, reports and other associated information's collected under the assignment for which consultant was hired, and any data/information's which is shared with consultant for analysis by NDMA, will remain a property of NDMA and consultants will be bound to sign Non-Disclosure Agreement.

Term of Reference (ToRs)

Exposure and Vulnerability Assessment Expert (Food Security and Agriculture)

1. Project Background

Pakistan is vulnerable to a large number of natural as well as man-made disasters. The country has experienced a wide range of such events including earthquakes, floods, droughts, tsunamis, landslides, GLOF, avalanches and among such, which resulted in a heavy loss of precocious human lives and economy. These risks are further aggravated by rapid urbanization, climate change, increasing industrialization, encroachment of flood plains, lack of safer land use planning etc.

National Disaster Management Authority (NDMA) has formulated Project Management Unit (PMU) for execution and monitoring of Multi Hazard and Vulnerability Risk Assessment (MHVRA) exercises in the country. The aim of PMU is to regulate MHVRA exercises nationwide. Further, to maintain unanimity all across the board, the development of National MHVRA Methodologies/Guidelines and designing of National MHVRA database will facilitate replication of the same sets standard and methodology for all stakeholders to be followed in order to develop a clear National Risk Picture. In this regard, with support of WFP, PMU-NDMA is undertaking MHVRA study in five districts of Central and Southern Punjab.

MHVRA exercise will provide solid foundation for outlining DRR interventions, mainstreaming DRR and safer land use planning. The exercise includes gathering and analyzing of hazard information and development of future scenarios based on frequency, magnitude and spatial extent of likely events.

a. Geographic Extent

Detailed food security/crops exposure/vulnerability assessment will be carried out in five selected districts (Jhang, Multan, Bahawalpur, Khushab and Rahim Yar Khan) of Central and Southern Punjab (study extend up to UC level).

b. Assignment Duration

44 man working days stretched over a period of Two months form the date of signing contract.

2. Objective of the Assignment

Exposure & Vulnerability Assessment consultant (Agriculture & Food Security Expert) will be responsible to undertake this study for classification and quantification of elements exposed, and their vulnerability assessment on social, human, physical and economic parameters with respect to agriculture. Consultant will be responsible for quantitative/qualitative analysis on Food Security, population i.e directly or indirectly dependent on agriculture, livestock and agriculture based livelihood and industrial sector.

3. Scope of Work and Outputs

- a. Provide technical guidance in the broader areas of food security and agriculture exposure/vulnerabilities identification.
- b. Quantify the exposure and vulnerability of the crops and food security status.
- c. Assist the Exposure and Vulnerability consultant and coordinate with Cost Benefit Analysis consultant, drought consultants and flood hazard assessment consultant in various activities.
- d. Analysis and characterization of each hazards on exposed crops with respect to magnitude, frequency and effects of hazards on certain aspect of agricultural elements.
- e. Analyze and investigate the impact of climate change on food security and crop yield.
- f. Literature review of existing information on food security, previous surveys, nutrition's surveillance report, crop assessment, agriculture sample surveys and other reports.
- g. Develop a methodology of quantitative/ qualitative data collection tools and analysis.
- h. Develop survey tools and database, ArcGIS shape files and producing maps for poverty, malnutrition, food insecurity etc.
- i. Organize two days hands on training workshop for MHVRA project staff and relevant agencies to introduce food security and crops exposure/vulnerability and risk assessment applications, maps, models, and datasets as well as methodology.
- j. Hand over all associated data sets to PMU-NDMA on prescribed format given in MHVRA standard guideline.

4. Deliverables

- a. Based on the MHVRA guidelines consultant will be required to submit inception report based on desk review including methodology, process and detail work plan for food security and agriculture assessment. All geospatial data, primary and secondary data, survey data and spatial data must be submitted along with final report.
- b. Prior to the acceptance of final report all comments and feedbacks from NDMA-PMU team will be incorporated in the study.
- c. Consultant will attend meetings as per the requirement of project, in addition a biweekly performance review meeting will be held at NDMA.
- d. Consultant is bound to provide activity progress on daily man days based on Podio software/Google Progress sheet.

5. Required Skills

- a. M.S/M.Phil degree in agriculture, food security, rural development, GIS & RS, Geography, Social Science or any relevant discipline with specialized experience on exp/vul assessment.
- b. Minimum 6 years relevant professional experience in the field of rural development, (agronomy, agrozoology, agriculture, economic, water resources and natural resource management).
- c. Comprehensive understanding of rural development theory and practice, experience in strategic planning and implementation of programs linking rural employment, poverty reduction, and food security.
- d. Should have knowledge of latest development in the livelihoods sector, and in-depth knowledge of agriculture and livestock as a subsector.
- e. Should have experience of conducting at least two similar exercises in past with proven track record.

6. Non-Disclosure Agreement:

Data, reports and other associated information's collected under the assignment for which consultant was hired, and any data/information's which is shared with consultant for analysis by NDMA, will remain a property of NDMA and consultants will be bound to sign Non-Disclosure Agreement.

Term of Reference (ToRs)

Risk Assessment Consultant

1. Project Background

Pakistan is vulnerable to a large number of natural as well as man-made disasters. The country has experienced a wide range of such events including earthquakes, floods, droughts, tsunamis, landslides, GLOF, avalanches and among such, which resulted in a heavy loss of precocious human lives and economy. These risks are further aggravated by rapid urbanization, climate change, increasing industrialization, encroachment of flood plains, lack of safer land use planning etc.

National Disaster Management Authority (NDMA) has formulated Project Management Unit (PMU) for execution and monitoring of Multi Hazard and Vulnerability Risk Assessment (MHVRA) exercises in the country. The aim of PMU is to regulate MHVRA exercises nationwide. Further, to maintain unanimity all across the board, the development of National MHVRA Methodologies/Guidelines and designing of National MHVRA database will facilitate replication of the same sets standard and methodology for all stakeholders to be followed in order to develop a clear National Risk Picture. In this regard, with support of WFP, PMU-NDMA is undertaking MHVRA study in five districts of Central and Southern Punjab.

MHVRA exercise will provide solid foundation for outlining DRR interventions, mainstreaming DRR and safer land use planning. The exercise includes gathering and analyzing of hazard information and development of future scenarios based on frequency, magnitude and spatial extent of likely events.

2. Objective of the Assignment

To create a comprehensive and scenario based risk assessment of target area by employing various risk assessment techniques which leads to design DRR interventions, mainstreaming R and safe land use plans.

a. Geographic Extent

Detailed risk assessment will be carried out in five selected districts (Jhang, Multan, Bahawalpur, Khushab and Rahim Yar Khan) of Central and Southern Punjab (study extend up to UC level).

b. Assignment Duration

44 man working days stretched over a period of Two months from the date of signing contract.

3. Scope of Work and Outputs

- a. Develop risk assessment framework, methodology, tools, qualitative and quantitative results based on primary & secondary data.
- b. Identify credible and viable models to quantify risks for likely impacts of earthquake, flood, and drought hazards.
- c. Analyze disaster risk and its impact on community and national economy.
- d. Generate composite risk scenarios based on reoccurrence period of multi hazards, and also quantify the level of risk, and propose DRR interventions on the basis of findings and results. Defining DRR mainstreaming strategies for safe land use practices. Need assessment for CBDRM, emergency response training, school safety trainings and early warning systems.
- e. Identify most suitable mediums for awareness and media campaigns in the given study area for future campaigns.
- f. Perform Risk indexing at UC level
- g. Organize two days hands on training workshop for MHVRA project staff and relevant agencies to introduce risk assessment stages, steps, maps, and datasets as well methodology.
- h. Hand over over all associated data sets to PMU-NDMA on prescribed format given in MHVRA guideline.

4. Deliverables

- a. Based on the MHVRA guidelines consultant will be required to submit inception report based on desk review including methodology, process, and detailed work plan for risk assessment.
- b. All geospatial data, primary and secondary data, survey data and spatial data must be submitted along with final report.
- c. Prior to the acceptance of final report all comments and feedbacks from NDMA-PMU team will be incorporated in the study.
- d. Consultant will attend meetings as per the requirement of project, in addition a biweekly performance review meeting will be held at NDMA.
- e. Consultant is bound to provide activity progress on daily man days based on Podio software/Google Progress sheet.

5. Required Skills

- a. M.S/M.Phil degree in Disaster Risk Management, GIS/RS, Planning, Geography, Geology, Social Science or relevant discipline with specialization in risk assessment.
- b. Minimum 6 years relevant professional experience in the field of Disaster Risk Reduction (DRR) and risk assessment including design, execution and management of multi hazard and vulnerability assessments at regional, national and local level.
- c. Should have strong familiarity with participatory risk assessment methodologies and scientific data collection and analysis tools.
- d. Should have specialized knowledge of Arc GIS tools for composite risk assessment
- e. Should have experience of conducting at least two similar exercises in past with proven track record.
- f. Should have strong knowledge of catastrophe / disaster hazard modeling, particularly for seismic modeling.

6. Non-Disclosure Agreement:

Data, reports and other associated information's collected under the assignment for which consultant was hired, and any data/information's which is shared with consultant for analysis by NDMA, will remain a property of NDMA and consultants will be bound to sign Non-Disclosure Agreement.

Term of Reference (ToRs)

Cost Benefit Analysis (CBA) Consultant

1. Project Background

Pakistan is vulnerable to a large number of natural as well as man-made disasters. The country has experienced a wide range of such events including earthquakes, floods, droughts, tsunamis, landslides, GLOF, avalanches and among such, which resulted in a heavy loss of precious human lives and economy. These risks are further aggravated by rapid urbanization, climate change, increasing industrialization, encroachment of flood plains, lack of safer land use planning etc.

National Disaster Management Authority (NDMA) has formulated Project Management Unit (PMU) for execution and monitoring of Multi Hazard and Vulnerability Risk Assessment (MHVRA) exercises in the country. The aim of PMU is to regulate MHVRA exercises nationwide. Further, to maintain unanimity all across the board, the development of National MHVRA Methodologies/Guidelines and designing of National MHVRA database will facilitate replication of the same sets standard and methodology for all stakeholders to be followed in order to develop a clear National Risk Picture. In this regard, with support of WFP, PMU-NDMA is undertaking MHVRA study in five districts of Central and Southern Punjab.

MHVRA exercise will provide solid foundation for outlining DRR interventions, mainstreaming DRR and safer land use planning. The exercise includes gathering and analyzing of hazard information and development of future scenarios based on frequency, magnitude and spatial extent of likely events.

2. Objective of the Assignment

The objective of study is to conduct cost effective analysis of proposed DRR interventions, mainstreaming DRR and make recommendation on how to minimize risks. The assignment should include quantification of financial impacts with respect to likely damages incurred during disasters which could have otherwise being averted with better mitigation and preparedness planning.

a. Geographic Extent

Detailed cost benefit analysis will be carried out in five selected districts (Jhang, Multan, Bahawalpur, Khushab and Rahim Yar Khan) of Central and Southern Punjab (study extend up to UC level).

b. Assignment Duration

44 man working days stretched over a period of Two months from the date of signing contract.

3. Scope of Work and Outputs

- a. Carry out risk indexing based on risk analysis for defining potential UC wise risks severity index, their root cause and current practices.
- b. Analyze the existing and proposed interventions related to hazards mitigations/interventions in the hazards prone localities of the study area.
- c. Perform cost effectiveness analysis on the basis of interventions proposed, cost benefit analysis on existing and ongoing DRR interventions.
- d. Make an assessment of the potential cost after consultation with the stakeholders, in order to interface the DRR activities into local planning, taking in account the perception and aspiration of the target communities.
- e. Evaluate local capacity of the communities to implement, operate and maintain the DRR related interventions.
- f. Organize two days hands on training workshop for MHVRA project staff and relevant agencies to introduce CBA and CE applications for future planning, maps, models, and datasets as well as methodology.
- g. Hand over all associated data sets to PMU-NDMA on prescribed format given in MHVRA standard guidelines.

4. Deliverables

- a) Based on the MHVRA guidelines consultant will be required to submit inception report based on desk review including methodology, process, and detail work plan for cost benefit analysis.
- b) All geospatial data, primary and secondary data, survey data and spatial data must be submitted along with final report.
- c) Prior to the acceptance of final report all comments and feedbacks from NDMA-PMU team will be incorporated in the study.
- d) Consultant will attend meetings as per the requirement of project, in addition a biweekly performance review meeting will be held at NDMA.
- e) Consultant is bound to provide activity progress on daily man days based on Podio software/Google Progress sheet.

5. Required Skills

- a. M.S/M.Phil in Economics, Statistics, Civil Engineering or relevant discipline.
- b. Minimum 6 years relevant professional experience in the field of economic analysis, implementation of Disaster Risk Reduction (DRR) and risk assessment including design, execution and management of multi hazard and vulnerability assessments at regional, national and local level.
- c. Relevant theoretical and practical experience in financial & economic analysis, in particular cost benefit analysis and cost effectiveness analysis of DRR interventions.
- d. Should have experience of conducting at least two similar exercises in past with proven track record.
- e. Should have strong knowledge of catastrophe / disaster elevation

6. Non-Disclosure Agreement:

Data, reports and other associated information's collected under the assignment for which consultant was hired, and any data/information's which is shared with consultant for analysis by NDMA, will remain a property of NDMA and consultants will be bound to sign Non-Disclosure Agreement.

Term of Reference (ToRs)

Urban Hazard Assessment Consultant

1. Project Background

Pakistan is vulnerable to a large number of natural as well as man-made disasters. The country has experienced a wide range of such events including earthquakes, floods, droughts, tsunamis, landslides, GLOF, avalanches and among such, which resulted in a heavy loss of precious human lives and economy. These risks are further aggravated by rapid urbanization, climate change, increasing industrialization, encroachment of flood plains, lack of safer land use planning etc.

National Disaster Management Authority (NDMA) has formulated Project Management Unit (PMU) for execution and monitoring of Multi Hazard and Vulnerability Risk Assessment (MHVRA) exercises in the country. The aim of PMU is to regulate MHVRA exercises nationwide. Further, to maintain unanimity all across the board, the development of National MHVRA Methodologies/Guidelines and designing of National MHVRA database will facilitate replication of the same sets standard and methodology for all stakeholders to be followed in order to develop a clear National Risk Picture. In this regard, with support of WFP, PMU-NDMA is undertaking MHVRA study in five districts of Central and Southern Punjab.

MHVRA exercise will provide solid foundation for outlining DRR interventions, mainstreaming DRR and safer land use planning. The exercise includes gathering and analyzing of hazard information and development of future scenarios based on frequency, magnitude and spatial extent of likely events.

2. Objective of the Assignment

The main objective of the assignment is to examine hazard situations in the region with special reference to urban areas, proper land use planning, monitoring of critical infrastructure and vulnerable localities (living in flood plains, slopes, slums. The secondary aim of the study is to evaluate the existing and future urban sprawls in term of hazard zonation.

a. Geographic Extent

Detailed urban planning assessment will be carried out in five selected districts (Jhang, Multan, Bahawalpur, Khushab and Rahim Yar Khan) of Central and Southern Punjab (study extend up to UC level)

b. Assignment Duration

44 man working days stretched over a period of two months from the date of signing contract.

3. Scope of the Assignment

- a. Review of all structural designs and necessary structural drawings and specifications, including components related to construction/rehabilitation for the critical infrastructure.
- b. Identify possible interventions with respect to role of local municipalities to minimize impacts of urban floods (local flood, drainage)
- c. Evaluate and carry out detailed investigation of the existing information available (geotechnical, topographical and structural etc), wherever necessary.
- d. Analyze compliance of applicable building codes as per building code of Pakistan (sample basis), with specific focus on compliance on seismic resistant requirements for essential infrastructure.
- e. Prepare urban hazard maps to assist the MHVRA team in visualization of densely populated and vulnerable urban areas exposed to various hazards, in order to steer urban development in the project areas.
- f. Identify core infrastructure needs in line with spatial development scenarios, transport links, power, and drainage, to address the current and future needs of the project area population.
- g. Carry out analysis (minimum 15 years) in growth rate of urban center in terms of their spatial expansion using remote sensing and GIS technologies.
- h. Organize two days hands on training workshop for MHVRA project staff and relevant agencies to introduce urban hazard assessment applications, maps, models, and datasets as well as methodology.
- i. Hand over all associated data sets to PMU-NDMA, on agreed formats and standards.

4. Deliverables

- a. Based on the MHVRA guidelines consultant will be required to submit inception report based on desk review including methodology, process and detail work plan for urban hazard assessment.

- b. Submit catalogue of urban hazards in the study area.
- c. Prior to the acceptance of final report all comments and feedbacks from NDMA-PMU team will be incorporated in the study.
- d. Consultant will attend meetings as per the requirement of project, in addition a biweekly performance review meeting will be held at NDMA.
- e. Consultant is bound to provide activity progress on daily man days based on Podio software/Google Progress sheet.

5. Required Skills

- a. M.S/ M.Phil degree in Urban/Regional Planning, civil engineering, GIS/RS, and land use planning or equivalent in related field and disciplines
- b. Minimum 6 years relevant professional experience in urban planning, Landuse planning, hazard assessment, planning implementation, and monitoring of urban and regional programs at national/local level.
- c. Should have ability to analyze the results to support decision making process.
- d. Should have enough knowledge of land use planning, GIS, remote science and town planning and etc.
- e. Should have experience of conducting at least two similar exercises in past with proven track record.
- f. Should have strong knowledge of catastrophe/disaster hazard modeling, particularly for seismic modeling.

6. Non-Disclosure Agreement:

Data, reports and other associated information's collected under the assignment for which consultant was hired, and any data/information's which is shared with consultant for analysis by NDMA, will remain a property of NDMA and consultants will be bound to sign Non-Disclosure Agreement.