

**Request for Expression of Interest (Eoi)**  
**INDIA**  
**UNDER WORLD BANK AIDED NCRMP-II**  
**OF**  
**NATIONAL DISASTER MANAGEMENT AUTHORITY (NDMA)**  
**CREDIT No. IDA-5693-IN**

**Hiring of Consultant for Developing Hydro-meteorological Resilient Action Plans (HmRAP) in Selected Urban Areas in the Country**

**Reference No.IN-NDMA-70460-CS-QCBS**

**Date: 24 January, 2019**

The Government of India has received financing from the World Bank toward the cost of the National Cyclone Risk Mitigation Project-II and intends to apply part of the proceeds for consultancy services on the subject mentioned above.

2. One of the agreed components under NCRMP-II is about Hydro-meteorological Resilient Action Plans (HmRAP) as a futuristic step and funds have been demarcated for this purpose. Accordingly, PMU, NDMA has now decided to hire a Consultant firm for developing HmRAP in select urban areas. The HmRAP would be a key document in guiding decision-makers to improve their city's resilience and reduce risks to hydromet related hazards, with a critical focus on incorporating hydromet information into planning and service delivery. The HmRAP would identify specific issues and priorities tailored to the context of the specific urban area and propose key actions to be implemented at short, medium and long term for strengthening the hydromet information base and improving the resilience of urban services delivery. The plans would also become the basis for developing investment frameworks for climate resilient cities.

3. Hydromet hazards such as flooding, thunderstorms, poor air quality and others have significant impact on urban areas in India, causing both low level chronic damages, for example during the monsoons, and also resulting in major havoc due to extreme events. They have received insufficient attention but NDMA and cities are increasingly aware of the risks and need to plan specific efforts to deal with such hazards, fueled by the frequency of such events.

4. Urban flooding is significantly different from rural flooding as urbanization leads to developed catchments which increases the flood peaks from 1.8 to 8 times and flood volumes by upto 6 times. Consequently, flooding occurs very quickly due to faster flow times, sometimes in a matter of minutes.

5. Urban areas are centres of economic activities with vital infrastructure which needs to be protected 24x7 and they may not have only local but global implications. They are

also densely populated and people living in vulnerable areas suffer loss of life, damage to property and disruptions in transport and power, thus, bringing life to a grinding halt. Even the secondary effects of possible epidemics and exposure to infections takes further toll in terms of loss of livelihood and human suffering.

6.The **objective of the consultancy** is to develop resilient action plans in order to strengthen the capacity of National/ State and ULB entities to effectively plan for and respond to significant hydromet hazards/extreme events and climate change affecting urban areas.

7.This also includes to support participating ULBs in preparing resilience actions plans that will assess hydro-meteorological exposure, risks and vulnerability of urban assets and communities, identify current and proposed adaptive and mitigative actions, and develop action plans that include recommendations for strengthening capacity and investment outline for investing in resilient solutions. A key focus of the consultancy would be to assess the availability of weather, water and climate information available at the city level, assess gaps and the potential for developing urban oriented hydromet services using existing information, and develop a plan to strengthen the capacity for improving such service delivery to critical weather dependent sectors and users.

8.The consultancy will target six selected second tier cities and will include a strong technical analysis and consultative process as a basis for the development of the proposed action plans.

9.The scope of work and tasks of the Consultant for each city will be as follows:-

- (a) Conduct an **overview** of the urbanization patterns, economic sectors' growth, hydromet hazards and risks, preliminary damage assessments from weather related events to characterize its vulnerability, existing institutional capacity and identification of key urban services delivery and user agencies and communities.
- (b) Develop a **detailed methodology, work plan and baseline of information** on the basis of the overview and desk reviews of available research/other information.
- (c) Initiate a **technical and consultative process for prioritization of hydromet hazard/categorization** of cities by hazard. This initial scoping consultation will allow tailoring of the assessment and recommendations for each selected city based on the specifics of that particular urban area and the hydromet hazards that threaten its resilience.
- (d) Conduct a **detailed assessment of the hydromet hazard and risk identification/scoping for potential impact** across urban infrastructure and key services, available hydromet data and information, climate forecasts and capacity assessment for urban hydromet services and resilient actions.

- (e) Conduct **vulnerability and risk assessment** at urban level and for critical weather dependent sectors, develop hazard and vulnerability maps as well as impact scenarios based on hydromet risks.
- (f) **Review and assess ongoing activities** undertaken by the local, state and National entities related to urban planning and resilience; and conduct a review of urban development strategies/area plans, policies and regulations.
- (g) Conduct a **detailed institutional assessment** to assess available capacity and gaps at city agencies (municipalities), hydromet agencies, early warning systems and relevant entities for undertaking resilient planning.
- (h) Make **structural and non-structural recommendations** based on the analytical base of this activity and conduct a consultative process to define the priority actions and develop an investment framework by city to reduce vulnerability and enhance resilience.
- (i) Develop a **summary report and detail report** that draws from individual city HmRAP to develop a strategic framework for city resilience to hydro-met events and climate change, identify city and sector specific investments for resilience actions and action plan for implementation.

10. PMU, NDMA will help in getting data from other Government Departments, if required. However, the Consultant will have to interact with all stakeholders.

11. The Terms of Reference (ToR) is available at [www.ncrmp.gov.in](http://www.ncrmp.gov.in), NDMA website [www.ndma.gov.in](http://www.ndma.gov.in) and <https://eprocure.gov.in/epublish/app> for further details.

12. The Project Monitoring Unit (PMU), NDMA now invites EoI from eligible consulting firms for providing the services. Interested Consultants should provide information demonstrating they have the required qualifications and relevant experience to perform the Services (in form of brochures, description of similar assignments, past experience in similar services, availability of appropriate skills among staff etc.). The shortlisting criteria are:-

i. The organization shall furnish details of relevant Hydro-meteorological/ Urban Flooding Management assignments undertaken during the last five years (2013-18). Certified copies of orders received and completion certificates for these projects must be submitted.

ii. The organization shall furnish information regarding the year wise annual turnover for the last five years (i.e. FY 2013-2018). A certificate to this effect from a Chartered Accountant, in original, must be submitted.

iii. The Consulting firms should demonstrate that they have enough capacity (including Personnel) in handling similar assignment by providing organizational structure and details of technical resource.

13. Expressions of interest (EOI) should contain all relevant information but not limited to:

- Introductory letter on letter head (with complete contact details – name of contact person, mailing address, telephone, fax, email etc.) explaining how the firm is best to deliver the task.
- Organization profile and branches/offices within the country.
- Two years annual report (Yr 2015 and Yr 2016) and past 3 years (2015-18) audited financial statements with minimum average turnover of INR 04 Crore or equivalent.
- Short note on the similar projects implemented by the Consultancy Firm pertaining to the shortlisting criteria.
- The EOI should contain sufficient supporting document to substantiate the claim of the Consultant towards their qualifications as per the shortlisting criteria.

The attention of interested Consultants is drawn to paragraph 1.9 of the World Bank's Guidelines: Selection and Employment of Consultants [under IBRD Loans and IDA Credits & Grants] by World Bank Borrowers January 2011 ("Consultant Guidelines"), setting forth the World Bank's policy on conflict of interest.

14. Consultants may associate with other firms in the form of a joint venture or a sub-consultant to enhance their qualifications. Such association must be clearly stated as either Sub-consultant or Joint Venture.

15. The Eois will be evaluated and shortlisted for Request for Proposal (RfP) stage.

A consulting firm will be selected in accordance with Quality Cost Based System (QCBS) method set out in the World Bank Consultants guidelines. Further information can be obtained at the address below during office hours between 1000hrs to 1700hrs.

16. Expression of Interest must be delivered by e-mail and a hard copy as well to the address given below on or before **28 February, 2019 by 1700hrs.**

Project Manager,  
National Cyclone Risk Mitigation Project (NCRMP),  
National Disaster Management Authority (NDMA),  
NDMA Bhawan, A-I, Safdarjung Enclave,  
New Delhi-110029

Tele: 011-26701749, Fax: 011-26714321

E-mail : [pm.ncrmp@gov.in](mailto:pm.ncrmp@gov.in)

17. For further details Terms of Reference (ToR) may be referred as follows:-

## **Terms of Reference**

### **Consultancy Services for Developing Hydro-meteorological Resilient Action Plans (HmRAP) in Selected Urban Areas in India**

#### **Introduction & Background**

1. During 2011, Govt. of India, Ministry of Home Affairs, launched a National Cyclone Risk Mitigation Project – I (NCRMP-I) in Andhra Pradesh and Odisha with an objective to protect the vulnerable coastal communities from frequent cyclones and minimize loss of lives and assets through multiple mitigating measures. Subsequently, during 2015, NCRMP-II was launched in six other coastal States viz. Goa, Gujarat, Maharashtra, Karnataka, Kerala and West Bengal.
2. One of the agreed components under NCRMP-II is about Hydro-meteorological Resilient Action Plans (HmRAP) as a futuristic step and funds have been demarcated for this purpose. Accordingly, PMU, NDMA has now decided to hire a Consultant firm for developing HmRAP in select urban areas. The HmRAP would be a key document in guiding decision-makers to improve their city's resilience and reduce risks to hydromet related hazards, with a critical focus on incorporating hydromet information into planning and service delivery. The HmRAP would identify specific issues and priorities tailored to the context of the specific urban area and propose key actions to be implemented at short, medium and long term for strengthening the hydromet information base and improving the resilience of urban services delivery. The plans would also become the basis for developing investment frameworks for climate resilient cities.
3. Hydromet hazards such as flooding, thunderstorms, poor air quality and others have significant impact on urban areas in India, causing both low level chronic damages, for example during the monsoons, and also resulting in major havoc due to extreme events. They have received insufficient attention but NDMA and cities are increasingly aware of the risks and need to plan specific efforts to deal with such hazards, fueled by the frequency of such events.
4. Urban flooding is significantly different from rural flooding as urbanization leads to developed catchments which increases the flood peaks from 1.8 to 8 times and flood volumes by upto 6 times. Consequently, flooding occurs very quickly due to faster flow times, sometimes in a matter of minutes.
5. Urban areas are centres of economic activities with vital infrastructure which needs to be protected 24x7 and they may not have only local but global implications. They are also densely populated and people living in vulnerable areas suffer loss of life, damage to property and disruptions in transport and power, thus, bringing life to a grinding halt. Even the secondary effects of possible epidemics and exposure to infections takes further toll in terms of loss of livelihood and human suffering.
6. It is being observed that there has been an increasing trend of urban flood disasters in India over the past in several areas whereby major cities have been severely affected. Most notable among them are Hyderabad in 2000, Ahmedabad in 2001, Delhi in 2002, 2003 & 2010, Chennai in 2004, 2015 & 2017, Bangalore in 2014 & 2017, Mumbai in 2005, Surat in 2006, Kolkata in 2007, Jamshedpur in 2008, Guwahati in 2010 and Srinagar in 2014.
7. The main reasons for urban flooding in India are heavy rainfall during monsoons, storm surges in coastal cities, sudden release or failure to release water from dams/reservoirs,

urban heat island effect, global climate change affecting weather patterns causing episodes of high intensity rainfall events occurring in a shorter period of time and rise in sea level due to global warming. Of late, the rainfall in certain cities has been much above the average. The municipal and storm drainage systems are decades old and cannot take the load of extra water flow. These often do not work also because of improper disposal of solid waste- domestic and industrial and dumping of construction debris into drains combined with poor maintenance. Encroachments on the natural drains and river flood plains, catchments, illegal sand mining etc. are also major problems in the cities and towns.

8. Rapid unplanned growth, urban areas in many cases retain high socioeconomic vulnerability, such as urban poverty, informal settlements, lack of municipal services, land tenure issues, etc., which are exacerbated by the exposure to climate-related shocks and stresses. The inter-phase between uncertainties associated with climate change, urbanization and increasing vulnerability has given rise to growing interest to address urban resilience to extreme weather events and climate change.
9. Accelerating urbanization across the country demand urgent formulation and implementation of rational and local adaptation/mitigation strategies backed by climate risk baseline study, future growth and climate scenarios, sector impact assessment and implementation of actions through an agreed risk reduction/adaptation framework which includes identification and evaluation of opportunities (entry points) and benefits for formulating new climate resilient practices in the context of urban planning and management.
10. Cities and local authorities have the potential to influence both the causes and consequences of climate change. Cities are a major contributor to GHG emissions, the obligation therefore falls on cities to provide leadership and direction and implement practical initiatives for the communities and citizens they represent. Based on the growth story and the agro-climatic zones, cities need to develop local strategies (to address extreme weather events and climate change impacts) towards a sustainable and resilient future.

### **Objectives of the Consultancy**

11. The overall goal of the Hydromet Resilience Action Plan (or HmRAP) will be to strengthen the capacity of National/ State and ULB entities to effectively plan for and respond to significant hydromet hazards/extreme events and climate change affecting urban areas.
12. The objectives of the consultancy is to support participating ULBs in preparing resilience actions plans that will assess hydro-meteorological exposure, risks and vulnerability of urban assets and communities, identify current and proposed adaptive and mitigative actions, and develop action plans that include recommendations for strengthening capacity and investment outline for investing in resilient solutions. A key focus of the consultancy would be to assess the availability of weather, water and climate information available at the city level, assess gaps and the potential for developing urban oriented hydromet services using existing information, and develop a plan to strengthen the capacity for improving such service delivery to critical weather dependent sectors and users.

13. The consultancy will target six cities in the initial phase and will include a strong technical analysis and consultative process as a basis for the development of the proposed action plans.

### **Scope of Work and Tasks**

14. The assignment, which will result in a HmRAP for each selected urban area, will include the following activities and tasks. For each city, the consultants will:
  - a. Conduct an **overview** of the urbanization patterns, economic sectors' growth, hydromet hazards and risks, preliminary damage assessments from weather related events to characterize its vulnerability, existing institutional capacity and identification of key urban services delivery and user agencies and communities. This would also comprise of a desk review of research and other materials relevant to the key themes related to urban resilience and hydromet services.
  - b. Develop a **detailed methodology, work plan and baseline of information** on the basis of the overview and desk reviews of available research/other information. This will be included in an inception report along with plan for consultations during the consultancy across a spectrum of stakeholders.
  - c. Initiate a **technical and consultative process for prioritization of hydromet hazard/categorization** of cities by hazard. This initial scoping consultation will allow tailoring of the assessment and recommendations for each selected city based on the specifics of that particular urban area and the hydromet hazards that threaten its resilience. The overall TOR will be broader but an initial consultative scoping exercise would allow for scoping that can adapt the overall assessment to the specific city context.
  - d. Conduct a **detailed assessment of the hydromet hazard and risk identification/scoping for potential impact** across urban infrastructure and key services, available hydromet data and information, climate forecasts and capacity assessment for urban hydromet services and resilient actions. This will include a detailed assessment of historical data on chronic and extreme events, description of main climate hazards and their impacts currently experienced in urban areas (e.g. heavy rainfall and flooding, thunderstorms/cyclones, drought, heat waves, SLR, UHI effect, landslides, interruption to urban services and impact on urban infrastructure, cascade impact on infrastructure services, mortality/displacement /destruction of property and infrastructure, etc.) including damage assessments, etc. This will include a comprehensive assessment of available hydromet and climate data (historical and projections) for the city level. Data and information on hydro-meteorological parameters that allow for a systematic assessment of weather, water and climate related hazards and risks for population and assets exposed will be assessed, including collection of data on disaster history and trends. This can be achieved through a number of sources, including close collaboration with IMD and hydrological agencies, downscaling from global and regional centers, etc. The assessment would define potential future evolution of climate variability and climate change related natural hazard risk (both sudden-onset and slow-onset) and possible intensification and intensification trends including extreme rainfall, flooding, drought, heat wave

conditions/urban heat islands over the next 25 to 50 years. Collection of existing climate forecasts and scenario building at the national and state levels would have to be downscaled/adapted to the specific urban area to get the best projections of potential local impacts based on different climate and disaster scenarios. A key part of this exercise would be to examine the potential for developing improved hydromet products and services targeting urban users based on existing data and identifying gaps where further investments would make the most impact in terms of improving the quality of such products.

- e. Conduct **vulnerability and risk assessment** at urban level and for critical weather dependent sectors, develop hazard and vulnerability maps as well as impact scenarios based on hydromet risks. This will include identifying critical infrastructure and assets, identifying most vulnerable areas, communities and assets, formulating approach/methodology to create DEM/DTM of the study area through open source, GIS, survey methods (DGPS/LIDAR, etc), developing impact modeling, etc. Both, vulnerability and risk assessment will be based on current socio-economic context in which hazards are translated into impacts on urban environment, i.e. which populations/areas are vulnerable to various hazards, exposure of sectors (public and private) /urban systems to various climate hazards, and key drivers of vulnerability (e.g., social, economic, policy, regulatory, urban planning and management) and hazard scenarios, as well as future trends. It will both describe the current situation and simulate future impacts based on scenarios of future growth paths in weather dependent economic sectors, built environment, population segments, etc. under different climate projections. The assessment of future trends will be derived from master plans, sectoral growth plans and from specific interviews with officials and experts. More specifically, this activity will include the
  - inventory and mapping of socioeconomic and infrastructure assets (current and future);
  - assessment of building codes to ensure they reflect risk profiles;
  - vulnerability mapping of exposed locations and populations in selected urban areas (current and future);
  - identification of target areas such as most at risk at present or projected, fastest growing neighborhoods, most vulnerable areas/communities/slums and in-depth analysis conducted.
- f. **Review and assess ongoing activities** undertaken by the local, state and National entities related to urban planning and resilience; and conduct a review of urban development strategies/area plans, policies and regulations - local but also at national and state levels related to DRM, urban planning, and any specific sectoral plans (e.g., transport, water, energy). This would include a description of current levels of adaptive capacity in the relevant population groups, urban systems, sectors and institutions; existing options available for response to manage and reduce existing risks, and constraints that prevent action to reduce risk. Assess the availability of weather, water and climate information available at the city level, assess gaps and the potential for developing urban oriented hydromet services using existing information, and develop a plan to strengthen the capacity for improving such service delivery to critical weather dependent



sectors and users (assess entry points for generating and using urban hydromet products and services that can enhance the quality of planning or the resilience of ongoing investments through data informed decision making).

- g. Conduct a **detailed institutional assessment** to assess available capacity and gaps at city agencies (municipalities), hydromet agencies, early warning systems and relevant entities for undertaking resilient planning, incorporating weather and climate information into planning and actions and for facilitating delivery of hydromet urban services to key users and sectoral entities (particularly related to sectors such as DRM, water supply and drainage, urban planning, urban transport, energy etc.). This will include:
- stakeholder and institutional mapping (with identification of mandates for action) and capacity assessment of various organizations (public and private) involved in hydromet and early warning services, disaster response and recovery
  - inventory and mapping of actions/measures adopted on adaptation and DRM preparedness at the city level, including sector specific activities and expected results;
  - review of urban development patterns/master plan review and gaps analysis;
  - gaps assessment to evaluate the need for augmenting existing measures or defining additional ones (at technical, institutional, policy/ regulatory, and financial levels) – in light of previous vulnerability and risk assessment.
- h. Make **structural and non-structural recommendations** based on the analytical base of this activity and conduct a consultative process to define the priority actions and develop an investment framework by city to reduce vulnerability and enhance resilience. This would include identification of entry points for climate resilient practices and urban planning, as well as actionable recommendations to strengthen the urban infrastructure and services related to disaster risk management, public health, urban transport, water supply, drainage, sewage and sanitation, urban housing and building codes, energy, peri-urban agriculture, land use, etc. This would also include possible adaptation measures, including prevention, preparedness, mitigation of impacts, response, awareness and sensitization as well as the identification of investments needs for infrastructure to support sustainable urban services, including developing reliable early warning systems that are widely accessible, and for improving the hydromet knowledge base in the cities (such as expanded/upgraded observation networks, capacity for improved forecasting and early warning services communication). It would further explore designs for decision support systems by urban users and sectors for incorporating hydromet data into their planning and propose ways of evaluating alternative measures based on criteria such as economic valuation or stakeholder prioritization.
- i. Develop a **summary report and detail report** that draws from individual city HmRAP to develop a strategic framework for city resilience to hydro-met events and climate change, identify city and sector specific investments for resilience actions and action plan for implementation (including capacity building of key institutions and communities/citizens, urban hydromet services delivery, promotion of adaptive and mitigative actions to enhance resilience). Individual

city HmRAPs will have a matrix of recommended actions, proposed investments and an implementation strategy. The latter will describe the responsibilities of key stakeholder partners (ULB, state and national agencies) and include a capacity building plan that would be essential in the implementation of the HmRAP.

### Geographical Coverage

15. The Action Plans will be made for six cities prone to heavy rain fall, one city each in the following States:-

- I) Panjim (Goa)
- II) Kochi (Kerala)
- III) Porbandar (Gujarat)
- IV) Mangaluru (Karnataka)
- V) Thane or any similar city (Maharashtra)
- VI) Asansol or any similar city (West Bengal)

### Type of Contract & Period of Assignment

16. It will be a lump-sum contract for 18 months. Payments will be linked with acceptance of deliverables. The time period of acceptance will be 60 days from the date of submission of the deliverable.

### Expected Outputs and Deliverables

17. The primary output from this exercise is the City level HmRAPs for selected cities and an overall framework document. To complete these deliverables, interim outputs are also required, which are noted in the table below:-

Deliverables	Tentative Delivery Timelines
Inception report including a detailed work plan and methodological note	01 month from the date of signing the contract
Stakeholder consultations process	03 months from the date of signing the contract
Creation of DEM/DTM of the study area (Six designated cities) through open source and survey methods (DGPS/LIDAR, etc)	08 months from the date of signing the contract
Interim report on current and projected hydromet and climate data and impact scenarios for the selected cities and the potential for hydromet urban services; Map Viewer development for all analysis results	10 months from the date of signing the contract
Interim report on Vulnerability and Risk Assessment at urban level and per sector in selected cities, including hazard, vulnerability and impact forecast maps; Map viewer development for all analysis results	12 months from the date of signing the contract
Interim report on the Institutional Review and Assessment capacity of relevant agencies, ongoing urban resilience activities, coordination mechanisms, data sharing and service delivery, including recommendations for institutional and capacity strengthening	14 months from the date of signing the contract
Draft HmRAPs including an 'action and investment matrix' for selected cities (includes sector specific interventions and	16 months from the date of signing the contract

actions for strengthening capacity for delivering improved and tailored hydromet urban services)	
Final HmRAPs including an 'action and investment matrix' for selected cities; Framework document for city resilience	18 months from the date of signing the contract

18. The development of these outputs will be closely linked to a consultative process that brings together NDMA, key State level Urban Department/Agencies, and the ULBs. This will involve a number of consultative workshops and meetings grouped broadly into three categories:

- Broad consultations – Overall stakeholder workshops including private sector, NGOs and community outreach, academia, etc.
- Expert meetings – individual and group
- Agency consultations

19. A key part of the consultative process in addition to the solicitation of information and prioritization will be to assess the quality of existing information and propose additional actions as needed. The consultative process will also help assess and strengthen the coordination mechanisms needed for HmRAP implementation.

#### **Language and Documentation**

20. Language to be used for the study will be English. However the documents, maps, etc. relevant to the cities will also be translated in the regional language.

#### **Quality Assurance**

21. The Consultant will be responsible for quality assurance for all documents, maps, images, etc. to be submitted to the client (NDMA) / the city authorities.

#### **Ownership and Confidentiality of Data and Work Products**

22. The ownership of the raw data collected by the Consultant during the course of the study and the deliverables including documents, maps, images, processed data, etc. will rest with the client. The Consultant will keep the data and work products confidential and will share them only with the express permission of the client.

#### **Project Management and Implementation Arrangements**

23. The Consultant will be reporting to the Project Management Unit (PMU), NCRMP, NDMA fortnightly, monthly and quarterly.

#### **Review and Monitoring of Consultant's Work**

24. Consultant will be submitting deliverables to PMU, NCRMP, NDMA as per the time schedule. PMU will get the deliverable reviewed by a Review Committee and confirm the acceptance/non-acceptance to the Consultant. Invoice will be initiated by the Consultant only after the acceptance of the deliverable.

#### **Role of Client**

25. Relevant/available data from the Govt. Agencies/Depts. will be provided to the Consultant on request. For this purpose, the Consultant will have to co-ordinate with the concerned Govt. agency/ Deptt. for obtaining data in the required format. NDMA will be facilitating procurement of data from Govt. sources.

## Manpower requirements and list of suggestive Key Personnel and Specialists

### 26. Eligibility Criteria of Key Personnel/Specialists:

Sl. No.	Position	Number
1	<b>Team Leader</b> (Masters in Water resource/ Hydrology/ Environmental Engineering, Environmental Management or equivalent; with atleast 20 years experience in integrated water management, including externally funded flood risk management projects)	01
2	<b>City Coordinator</b> (Masters in Water resource/ Hydrology/ Environmental Engineering/ Environmental Management or equivalent; with at least 15 years experience including flood risk management projects)	06
3	<b>Flood Management Specialist</b> (Masters in Hydrology/ Environmental Engineering/ Urban Planning; with atleast 10 years experience in urban flood risk assessment & planning, GIS, Remote Sensing, and Hydraulic & Hydrological modeling)	02
4	<b>Vulnerability Expert</b> (Masters in Hydrology/ Water Resources/ Disaster Risk Management with at least 10 years of experience in flood risk & vulnerability assessment, capacity development activities in flood risk & vulnerability assessment)	02
5	<b>Social Vulnerability Expert</b> (Masters in Social Sciences with at least 10 years experience in social development sector desirably in DRR)	02
6	<b>GIS Specialist</b> (Masters in Remote Sensing & GIS/Geography with at least 07 years of experience in the field of remote sensing and GIS)	01
	<b>Total</b>	<b>14</b>

**Note:** In addition, the Consultant has freedom to engage Survey Team/ Specialists as per need at its own cost.

### 27. Training (Transfer of Knowledge)

The Consultant will conduct one workshop in each city in order to impart training on City-specific Resilient Action Plan Manual to the personnel of Local Urban Bodies/State Government /Community representatives.

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