



**Government of India
Central Water Commission
Ministry of Jal Shakti
Department of Water Resources, River Development & Ganga Rejuvenation
National Hydrology Project (NHP)**

INTERNATIONAL COMPETITIVE BIDDING

**Request for Expression of Interest (REOI) for Consultancy Services
for
“EARLY FLOOD WARNING SYSTEM INCLUDING INUNDATION FORECAST IN GANGA
BASIN”
under
National Hydrology Project**

31st December, 2019

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**GOVERNMENT OF INDIA
NATIONAL HYDROLOGY PROJECT**

REQUEST FOR EXPRESSIONS OF INTEREST

**CONSULTANCY FOR EARLY FLOOD WARNING SYSTEM INCLUDING INUNDATION
FORECAST IN GANGA BASIN**

No.: NHP/2020/RDC-1/01

Date: 31.12.2019

Expressions of Interest (EOI)

The Government of India has applied for a loan from the World Bank under the National Hydrology Project (NHP) and intends to apply part of the loan proceeds to make payments under the contract for Early Flood Warning System including Inundation Forecast in Ganga Basin.

NHP is countrywide project, with 49 Implementing agencies (IAs) including eight central agencies, 39 state-UT level agencies and two river basin organizations (RBO). The National Hydrology Project (NHP) is proposed to be an eight-year project starting from November, 2016. One of the studies under NHP is Early Flood Warning System including Inundation Forecast in Ganga Basin. The broad objective is to develop an Early Flood Warning system including inundation forecast and its integration with WRIS/e-SWIS with customized GIS tool for real time dissemination of forecast, inundation forecast, and inundation maps library including development of dashboard for query-based generation of flood warning/flood inundation maps for all stakeholders.

The Project Development Objective of the National Hydrology Project is proposed **“to improve the extent, quality, and accessibility of water resources information and to strengthen the capacity of targeted water resources management institutions in India”**.

The study in the initial phase is presently for Ganga Basin. Subsequently under the project similar studies shall be conducted for other major basins. Study area lies in the following States and UT Implementing Agencies (IA), who are IAs in NHP (mentioned below) may use the resulting systems to capture, validate, store and disseminate Early Flood Warning in their States.

S. No.	River Basin	Catchment area (Sq.Km)	Participating States
1.	Ganga	1,063,100 km ² out of which 861,000 km ² are in India	Delhi Chhattisgarh Haryana Rajasthan Himachal Pradesh Madhya Pradesh Bihar Uttar Pradesh West Bengal Jharkhand Uttarakhand

OBJECTIVES OF THE CONSULTANCY:

The broad objective of the Consultancy is to develop an Early Flood Warning system including inundation forecast and its integration with WRIS/e-SWIS with customized GIS tool for real time dissemination of forecast, inundation forecast, and inundation maps library including development of dashboard for query-based generation of flood warning/flood inundation maps for all stakeholders.

The broad objectives of the study are as below:

1. Review and verify the currently used hydro-meteorological data. Correct, validate and process the required hydro-meteorological data of entire basin for the stations selected by CWC. Suggest alternative data if required.
2. Carry out river cross-section surveys for up to 500 selected locations in the river basin. The exact locations will be decided in close cooperation with CWC. Process satellite images and Digital Elevation Model (DEM) to integrate the results of cross sections surveys with the DEM provided by CWC so as to calibrate and verify the previously developed 1-D flood forecasting model, or to calibrate another 1-D model chosen by the Consultant.
3. Conduct frequency analyses of historic floods and suggest a methodology to assess design hydrographs with desired return flow periods (2, 5, 10, 25, 50, 100, 200 and 500 years) for selected strategic locations in the basin that are of importance for flood management. The frequency analysis will be done at all H.O stations with discharge measurement. The Consultant may be requested to assess the effects of regulation on some of the stations and their peak flows, and correct the peak flows for the effects of regulation prior to conducting frequency analyses.
4. Develop a 2D or 1D-2D coupled model as well as inundation forecasting for the basin area, for which DEM will be provided by the Client.

For the purpose of the current consultancy assignments, real time flood forecasting may be interpreted as issuing flood/inundation forecast for 1. Selected areas on real time basis 2. Other location based on the library of historical floods and / or model solutions that have the best match with the current rainfall and water level conditions, as well as the forecasted weather conditions.

- a. Real time inundation forecast using 1D-2D coupled model will be carried out in few pockets of areas of strategic importance in consultation with respective CWC field offices/State government (Run at least once or twice a day.)
 - b. Create an inundation map library for various return periods (2, 5, 10, 25, 50, 100, 200 and 500 years) of rainfall /flood events based on the results of simulation runs that relied on calibrated hydrodynamic model runs for different scenarios. Frequency analyses based Inundation map libraries are to be prepared for all HO sites with discharge measurements.
5. Automate the whole process such that it includes the development of a dashboard - an interface routine that will receive required input data for modelling from the India-WRIS/e-SWIS web site, download all rainfall forecasts, satellite data, and real-time monitoring data, run the model at predefined frequency in consultation with the CWC, and upload the model results to the India-WRIS web site integrating all relevant GIS features in consultation with the Client. Develop a mobile app for the dissemination of forecasted flood inundation areas including SMS alerts to relevant

stakeholders/users with the inclusion of GIS layers like railways, roads, etc. made available by the Client.

6. Provide training and capacity building.
7. Provide technical support, trouble shooting, maintenance and updating of models.

SCOPE OF THE CONSULTANCY:

The Broad scope of the study will consist but not limited to the following in brief as under. The final Terms of Reference and the scope of the study would be issued along with the Request for Proposals. The Scope of the Consultancy is broadly divided in two phases as follows:

Phase-I

- a. Verification of the Currently used and alternative hydro-met data including telemetry and satellite based rainfall products.
- b. Cross-section survey in the study area, Processing of Satellite Imageries and Digital Elevation Model (DEM)
- c. Hydrologic Analyses of historical data including Data Validation and Naturalization of Flows, Statistical Frequency Analyses
- d. Develop 1D-2D Coupled Model following review of existing Hydrologic and Hydraulic Models (existing model is setup in MIKE 11)
- e. Development of Dash Board, Early Flood Warning System, Integrate Hydrologic and Hydrodynamic Models with eSWIS Database/India-WRIS, Development and testing of mobile application and Dissemination Tools

Phase-II

- a. Operation, Maintenance, Technical Support, Troubleshooting and periodical updating of the model including updating of software; etc.
- b. Capacity building of State and Central Implementing Agencies, develop e-learning module for end to end flood forecasting system, workshop comprising 50 officials from Central/State Govt. officials on complete system including updating of the models.

DURATION:

Total schedule time for completion of the consultancy services for 'Early Flood Warning System Including Inundation Forecast in Ganga Basin' shall be 24 months followed by Operation & Maintenance and upgradation period of 5 years.

IMPLEMENTATION ARRANGEMENT

The Project Implementation plan of the Consultancy is broadly divided into two phases as mentioned in Scope of the Consultancy.

Director, RDC-1 Directorate, Central Water Commission is purchaser and Director, FCA-2 is the Project Manager for this project. The Central Water Commission in the role of a user, which will use the resulting systems to capture validate, store and disseminate Early Flood Warnings.

General:

- (i) Under National Hydrology Project (NHP), DoWR, RD&GR and its organization CWC will be responsible for flood forecasting activities of the river basins. The size and nature of the Ganga River and its tributaries is a challenge to model using 1D hydrodynamic modeling environment due to extensive braiding of the river channels, particularly in the lower reaches. While the need for 2D modeling along with Early Flood Warning System exists particularly for areas which are nearly flat and are flooded frequently. Also, there is a need to address the breach of flood protection dykes and assess how the existing gates on the dykes should be operated to reduce the likelihood of future dyke failures.
- (ii) Central Water Commission (CWC) shall be responsible for overall coordination and development of the 2D modeling along with Early Flood Warning System for the entire river basin mentioned above and henceforth called “Early Flood Warning System including Inundation Forecast in Ganga Basin” (EFWS-G) respectively. Stakeholder consultation and data needed for this purpose shall be the responsibility of the consultant involved in these packages.
- (iii) CWC shall be responsible for the development of the Integrated EFWS for the Ganga basin as mentioned above. They shall also be responsible for signing the contracts, contract management, payments etc. for their respective packages/sub packages.
- (iv) The Consultant shall setup teams as indicated subsequently for the above works.
- (v) The Consultant has to procure hardware with minimum specification for running 1D/2D or 1D-2D coupled model using a technically feasible high resolution DEM for real time inundation forecast. The hardware will be handed over to CWC after successful completion of the project.

The States and Central organizations shall support each other and the Consultants for the development of EFWS by way of sharing and exchange of data, supporting the stakeholders’ participation, training & capacity building etc.

Central Water Commission now invites eligible consultants to indicate their interest in providing the above required consultancy. Interested consultants must provide information demonstrating that they have the required qualifications and relevant experience to perform the Services (brochures, description of similar assignments, experience in similar conditions, availability of appropriate skills among staff, etc.).

Consultants may associate with other firms in the form of a joint venture or a sub-consultancy to enhance their qualifications. The EOI submitted by consultants in association should clearly indicate the nature of the association if it is a joint venture or a sub-consultancy. In case of Joint venture, the name of the lead firm should be clearly stated and the JV should not have more than three members including the lead. The consultants firm may submit the EOI as per Performa attached at Annexure-I to VII.

The short-listing criteria, are as follows:

- a) The Consultancy Firm /Research Institute must have been in business for at least the last ten years (Copy of the Certificate of Incorporation or Memorandum of Articles) in providing international consultancy services in the water sector, with particular emphasis and a track record of successfully delivering major analytical projects that directly interface with water resources policy or management.

- b) Organization set-up, structure and availability of key professionals (Senior Hydrologic Modeler, Junior Hydrologic Modeler, GIS/RS expert, Database specialist/web management specialist etc.) of required qualification with the firm i.e. Technical team and expertise available with the organization.
- c) The Consultancy firm / research institute must have carried out the work of EFWS studies for the basin(s) /sub-basin(s) for an area of at least 30,000 Sq. Km encompassing the key components of EFWS studies namely data collection, compilation and its validation, gap filling, review of 1D model, Development of 2D/1D-2D Coupled Model, Development of mobile application and Test Dissemination Tools.
- d) In case of Joint venture, the lead firm should have carried out atleast 2 out of the 3 key areas namely (a) data compilation and its validation, (b) 2D/1D-2D Coupled Modeling, (c) mobile application and Dissemination Tools including Decision Support System. Experience in 2D/1D-2D Coupled Modeling is mandatory. The other partner of JV can be financial firm.
- e) The Firm / research institute must have experience of working with governments/ state owned enterprises.
- f) The firm(s) / research institutes, including the JV partners and sub-consultants, should have at least 40% of the key professionals, including Team Leader as permanent employees.
- g) The Firm should have sound financial performance and resources i.e. the firm should have average Annual turnover (last five financial years 2018-19, 2017-18, 2016-17, 2015-16 and 2014-15) of more than USD 2.50 million. In case of JV, the lead member shall have more than USD 2.00 million of average annual turnover (last five financial years) and other members shall have minimum USD 0.50 million.
- h) In case of Research Institute meeting the eligibility requirements intending to apply solely or as JV with other research institutes for these studies, the average annual turnover clause at (g) above would not be applicable. However, in case of JV with any private entities, the annual average turnover clause (g) above will be applicable to private partner only either as lead partner or otherwise.
- i) For the purpose of Research Institute such as IIT, NCAR, BOM, CSIRO and UCAR or equivalent will be considered.

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 dated January 2011 ("Consultant Guidelines"), revised Jul 2014, setting forth the World Bank's policy on conflict of interest.

A consultant will be selected in accordance with the Least Cost Selection (LCS) method set out in the Consultant Guidelines. Interested Consultants may obtain further information from the Contact Person (mentioned below) between 10 AM and 5 PM on all working days.

Director (RDC-1) & Project Director (NHP)
 Ground Floor, Wing-5, West Block-II,
 R.K.Puram, New Delhi-110 066
 Tel & Fax: +91-11-26181267
 E-mail: rdcdte-cwc@nic.in

The bidders are required to follow the following instructions as detailed below:

1. Instruction to bidders

- i). e-EoI will be available on the NHP's website at URL <http://nhp.mowr.gov.in>. The prospective bidders are required to register on e-procurement website i.e. <https://eprocure.gov.in/eprocure/app> at no cost and prior to the submission of proposals. The bidders are also required to have a Digital Signature (DSC) from one of the Government of India authorized Certifying Authorities in order to submit a proposal on line at the web address indicated above (<https://eprocure.gov.in/eprocure/app>), The list of the authorized Certifying Authorities can be found on <http://www.cca.gov.in/cca/>.
- ii). The prospective bidders are required to submit the EoI online at NIC e-procurement website i.e. <https://eprocure.gov.in/eprocure/app> from **02.01.2020 (09.00AM) to 31.01.2020 (03.00 PM)**.
- iii). Intending Bidders are advised to visit again NIC e-procurement web site URL <https://eprocure.gov.in/eprocure/app>, <http://cwc.gov.in> and NHP website <http://nhp.mowr.gov.in> at least 1 days prior to closing date of submission of tender for any corrigendum / amendment.

Expression of Interest Form for Consulting Engineering Firm or Joint Venture
(To be filled up by each of the constituent in case of a Joint Venture)

1.

Consultant	Date of Establishment	Country	Type of organization			
			<i>Individual</i>	<i>Partnership</i>	<i>Corporation</i>	<i>Other</i>
<i>Name</i>						

2. *Corporate/registered Office / Business Address / Telephone Nos. / Cable Address/ E-mail address of consultant and its branch offices for Consultant (including members in case of JV)*
3. *Consultant's firm name and year of establishment (including that of members in case of JV)*
4. *Narrative description of Consultant firms if any (Use other sheet, if necessary)*
5. *Name of, not more than two (2) principals who may be contacted with title, telephone number/ fax number, E-mail address.*

Financial Statement of the Five Financial Years

Sr. No.	Particulars		2018-2019	2017-2018	2016-2017	2015-2016	2014-2015
1.	Annual turnover from Consulting	Lead member					
		other					
		other					
2	Net Profit.	Lead member					
		other					
		other					

Notes:

- i. Values should be duly certified by statutory body like Chartered Accountant or Independent Auditors who are competent to do so as recognized by the Government of India.
- ii. The amount shall be stated in Indian Rupees (INR).
- iii. For the purpose of short listing, conversion to Indian Rupees shall be based average of the buying and selling rates of Reserve Bank of India as on the Proposal submission date.
- iv. In case the exchange rate for any currency is not available as per the provision of this section, then Ministry of Jal Shakti, Department of Water Resources, RD & GR reserves the right to use the rate available from an alternative source at its sole discretion.

Organizational Strength

1. Staff strength of the Organization/s

S No.	Area of Expertise*	Total No. of Staff	No. with Doctoral Degree	No. with Post-graduate Degree	No. with Graduate Degree	No. of Permanent Employees	No. of years with the firm
i.	Senior Hydrologist						
ii.	Meteorologist						
iii.	Senior Hydrological Modeler						
iv.	Intermediate Hydrological Modeler						
v.	GIS/RS Specialist						
vi.	Database Specialist/Web management specialist/programmer						

Annexure-IV

Logistics and Software Availability

- a) Office space in sq. m. and ownership status
- b) List of Hydro-Metrological along with Modelling Software available

Name of Software	Whether Web Enabled?	Number of Concurrent Users	Cost of Purchase In Rs.	Year of Purchase	Utility and Functions of the Software

Details of Experience

Sr. No	Projects Name / Year	Type of services rendered including' (A, B, C, D, E)	Cost of the assignment of category 'A' Rs. in Cr.	Cost of the assignment of category 'B' Rs. in Cr.	Cost of the assignment of category 'C' Rs. in Cr.	Cost of the assignment of category 'D' Rs. in Cr.	Cost of the assignment of category 'E' Rs. in Cr.	Client (With complete address, contact person, telephone No. Fax No and E mail address)	Fee in INR (Applicant's share in case of JV/ Consortium)	Completion certificate from client (Reference page no)	Duration in months	Funding Agency	Sole / JV/ Consortium (if JV-state Lead /Partner with share)
1	2	3	4	5	6	7	8	9	10	11	12	13	14
1													
2													

- A. Hydrological analysis and modelling, validation and filtering of hydro-meteorological data sets including telemetry and satellite based rainfall products
- B. Hydrologic and Hydraulic Modeling including review of 1D model, Development of 2D or 1D- 2D coupled model
- C. Development of Dash Board, EFWS and Mobile application
- D. Capacity building and trainings in the field of hydro-metrological analysis, sediment analysis etc.
- E. Cross-section survey in the study area, Processing of Satellite Imageries and Digital Elevation Model (DEM)

Note: Only those assignments shall be considered for which consultant has provided services as lead member in case that work is done by a JV/ Consortium. Each assignment shall be supported by following details:

Name of Overall assignment :

Location of Overall assignment :

Owner's Name and Address :

Completion (Actual/Estimated vis-à-vis Stipulated):

Description of assignment:

Description of Services provided by the firm:

Authorized Signatory:

Name of the client:

Employer's References

Undertaking

I certify that the information in the above Expression of Interest forms is true to the best of my knowledge. I also understand that any misleading or wrong information will disqualified this application straightaway.

President/Managing Director

or

Authorized Signatory of Applicant
