

Terms of Reference

for

“Watershed assessment and River Flood Warning System for Tirunelveli city”

Title:	“Watershed assessment and Urban Flood Warning System for Tirunelveli city”
Project:	CapaCITIES – Phase II
Location:	Tirunelveli, Tamil Nadu, India
Type of Contract:	Independent consultant or Firm
Deadline for acceptance of proposals:	5 September 2022
Date of announcement of successful bidder:	5 September 2022
Indicative Starting Date:	8 September 2022
Envisaged Duration of Contract:	6 months

1. Introduction

1.1 Background

ICLEI – Local Governments for Sustainability is a global network of more than 2500 local and regional governments committed to sustainable urban development. Active in 125+ countries, we influence sustainability policy and drive local action for low emission, nature-based, equitable, resilient and circular development. Our members and team of experts work together through peer exchange, partnerships, and capacity building to create systemic change for urban sustainability. ICLEI South Asia, the South Asian arm of ICLEI - Local Governments for Sustainability, aims to build and serve a regional network of local governments to achieve tangible improvements in regional and global sustainability through local initiatives. ICLEI - South Asia is a strong and vibrant local government association with a membership base of over 70 cities in the region.

Capacity Building for Low Carbon and Climate Resilient City Development project (CapaCITIES) Phase II project, funded by the Swiss Agency for Development and Cooperation, aims to strengthen the capacities of Indian cities to plan and implement climate resilience actions, considering both climate change adaptation and mitigation measures in an integrated manner in key urban service sectors. ICLEI South Asia as a consortium partner of the CapaCITIES Implementing Agency, which comprises of South Pole Group and econcept AG, is implementing the project across the selected cities and states.

After the successful implementation of the first phase of the project in Coimbatore, Rajkot, Siliguri and Udaipur cities, the CapaCITIES project in its second phase focuses on enhancing the capacity of 4 more cities namely, Ahmedabad, Vadodara, Tirunelveli, Tirunelveli, in implementing climate resilience actions. The project also engages with the state government of Gujarat and Tamil Nadu to mainstream climate action in urban development through adoption of integrated climate-resilient planning, design of innovative finance mechanisms and development of climate-resilient infrastructure. The project will bring together Indo-Swiss expertise in the sectors of water, waste, and transport to demonstrate scalable solutions of urban climate action in India, with a global relevance.

The primary objectives of the project are:

- City and state governments integrate climate change aspects (adaptation and mitigation) into urban planning and implementation.
- Enhanced capacities of city and state governments to access finance for scaled up urban climate action.
- Enhanced knowledge on accelerating city climate action at the national and global level.

Tirunelveli city was chosen as a CapaCITIES Phase II project city in early 2020 and ICLEI South Asia, representing the CapaCITIES Implementing Agency (IA) Consortium, had signed a Memorandum of Understanding (MoU) with the Tirunelveli City Municipal Corporation (TCMC) in March 2021. Under this project, the city is provided technical assistance to prepare Climate Resilient City Action Plan and to identify and implement pilot demonstration projects.

1.2 Assignment Overview – CapaCITIES in Tirunelveli

In Tirunelveli, the average annual rainfall is 752 mm. During monsoons and heavy rainfall, the runoff accumulates and stagnates in low lying areas very quickly due to lack of proper stormwater drainage network. Real estate developments and encroachment in water shed areas of canals and lakes in the city and limited pervious surfaces has led to flooding during heavy rainfall and resultant problems.

The stormwater runoff from roads, private/government vacant places etc., flows into the nearby sewer manholes and drainage channels and mixes with sewage water. Also, the stormwater runoff is often contaminated due to open drainage network that caters to both sewage from households and storm

water during rainfall, especially in the older parts of the city. Thus, the runoff is contaminated, increases the load on Sewage Treatment Plants by mixing with sewerage network and leads to ground water contamination. The city also often faces flooding risks due to overflowing Tamirabharanai river when there is heavy rainfall upstream of the river, excess release of flood water from reservoirs etc.

Thus, the study proposes to (1) Create an advance flood forecasting system for Tirunelveli city by deploying a combination of Radar sensors/ ultrasonic IoT sensors/ automatic weather stations to measure the water level in the upstream of Tamirabharanai river to give adequate warning of not less than 4 hours for the city administration to issue an alert (2) identify potential infrastructure/nature-based solutions within the city of Tirunelveli to augment the existing storm water management system, with an aim to prevent urban flooding and rejuvenate the existing lakes in Tirunelveli.

ICLEI South Asia seeks expert consultancy services (individual or organization) to assist the Tirunelveli Municipal Corporation by conducting feasibility assessment for installing early warning system on flood/water logging through IoT measures, to conduct macro and micro-level water shed assessments, and assess vulnerable hotspots and priority areas for identifying and implementing solutions for flood mitigation and adaptation in Tirunelveli city due to river flooding of Thamirabarani river and urban flooding.

2. Description of Services

2.1 Scope of Work

The tasks for the consultant(s) under this assignment in the city of Tirunelveli are:

Component A: Feasibility assessment for installing early warning system on flood/water logging through IoT measures

The component A is sub divided into 3 parts.

Component A1: Feasibility assessment for installing early warning system for flood/water logging through IoT measures and identifying sites for the installation of these sensors.

The main purpose of this activity is to create web-based and mobile communication system where the city administration is made aware of possible river flooding due to upstream discharge within sufficient time so that citizens/stakeholders can be alerted via a web-based interface based on the rise in water levels in the upstream area.

Steps required to be undertaken while completing component A1 of this assignment are as follows:

1. Conduct project inception meeting with project stakeholders, and initial site visits to gather initial information and data required for
 - a. Developing a hydrological and geological baseline for the city
 - b. Mapping and assessment of water sources within the city, including groundwater levels and quality, and rainfall trends etc.
 - c. Developing baseline information of water harvesting structures that are already implemented in the city
 - d. Assessing and analyzing existing stormwater drain system and identifying infrastructure and geographical coverage gaps

2. Conduct macro-level assessment of watershed areas within city limits to including the upper reaches of the river and understand its characteristics, with focus on Thamirabarani River and its canals flowing through the city. Prepare digital watershed maps.
3. Identify vulnerable hotspots in the city based on the assessments, potential impacts from city's existing stormwater drains, sanitary sewer lines and septic systems, and historical data on water stagnation and floods within the city
4. Review of various options available for early warning systems for water logging/flooding through IoT measures and its infrastructure requirements specifically focused on flooding in highly vulnerable points identified in point 3 above.
5. Identify sites for placement of IoT sensors in the Thamirabarani river or tributaries of the river upstream of the Tirunelveli city
6. Comparison and feasibility assessment of various solutions for the selected sites based on various aspects including technical, financial, environmental, and social.
7. Recommendations to select technology/tool/instrument (such as flood sensors, automatic rain gauge stations etc.) for early warning system at potential water logging/flooding areas

Component A2: Overall support for preparing working documents/ designs/tender document/ selection of service provider, supervision during implementation and monitoring

Steps required to be undertaken while completing component B2 are as follows:

1. Preparation of BOQ/working documents/drawings/tender documents for engaging the procurement of IoT sensor

Component A3: Assist in the Tendering & Implementation of component A2.

1. Assistance in selection of work contractor for the deployment of the IoT sensors
2. Facilitate and ensure the integration of the IoT sensor output into the Integrated Command and Control Center (ICCC)
3. Training for the Tirunelveli Corporation officials for monitoring and evaluation/anticipation/prediction of water logging/flooding through installed systems to reduce reaction time and minimize impact on urban livelihood

Component B: Engineering and Nature Based Solutions for flood mitigation and adaptation in Tirunelveli city due to river flooding of Thamirabarani river and urban flooding.

1. Explore alternative/incremental technical solutions like retaining walls, non-return gates, water holding ponds and pumping stations, diversion channels etc. to address the flow volume during peak monsoon season while exploring the possibility of nature-based solutions before alternative methods.
2. Develop a city-wide watershed management plan, with focus on stormwater control measures, groundwater recharge and mitigation of flood risks in vulnerable parts of the city including but not limited to upstream interventions in the river.
3. Support the project team in selection of said contractor/firm for implementation and in overseeing the pilot implementation.
4. The consultant(s) shall thoroughly study all the existing and proposed projects of the PWD/WRD department and also other line agencies that will have water balance impact on the city. The consultant(s) shall all review all the existing recommendations proposed by previous committees for flood mitigation.

2.2 Deliverables and Schedule

The following table provides the deliverables and timelines for the scope of this assignment as specified for the two cities:

S No	Milestone	Activity/Deliverable	Timeline (T is contract signoff)
1	M1	Project inception meeting and initial site visits	T+ 2 weeks
2	M2	Submission of Feasibility assessment for installing early warning system on flood/water logging through IoT measures as outlined in A1	T + 6 weeks
3	M3	Submission of BOQ/working documents/drawings/tender documents for engaging work contractor as outlined in A2	T+8
4	M4	Submission of completed watershed management plan consisting of Engineering and Nature Based Solutions for flood mitigation and adaptation in Tirunelveli city due to river flooding of Thamirabarani river and urban flooding	T+20
5	M5	Assistance in the implementation of the early flood warning system as outlined in A3	T+36

The timeline for Component A2 will depend on the anchoring of the project by Tirunelveli Municipal Corporation, and therefore might be subject to changes, which will be duly communicated by the project team as and when required and may extended up to 1 year from the date of award of this contract.

2.3 Payment Schedule

The fee is payable upon satisfactory completion and acceptance of the deliverables by ICLEI South Asia. The breakdown of deliverables and percentage of payment is as follows for the contract that will be entered into for the scope of work as described in this ToR.

The payment schedule against the various milestones will be:

Milestone	Payment (% of the total contract value)
On signing of workorder	10%
M1	10%
M2 & M3	30%
M4	30%
M5	20%

2.4 Methodology

The consultant(s) will report to ICLEI South Asia and will work closely with ICLEI personnel, and representatives from Tirunelveli Municipal Corporation involved in the project. Project relevant communication with the consultant(s) will be done through ICLEI South Asia. The consultant(s) will attend a project inception meeting organized by ICLEI South Asia with the concerned city officials and project partners in Tirunelveli city to gather information, inputs and required data from the stakeholders and to resolve queries, if any, from either party. All documentation from the consultant(s) will be finalized only after incorporating all queries/ concerns raised by ICLEI South Asia and relevant departments of Tirunelveli Municipal Corporation.

The methodology proposed by the consultant(s) for the scope of work given in this assignment should focus on the deployment of an early warning system and assessment of necessary augmentation of storm water management system through deployment of infrastructure/nature-based solutions.

This will be achieved through focused discussions with officials and representatives from Tirunelveli Municipal Corporation, coordination with stakeholders, document review, hydrological and geological data collection & analysis, macro & micro-level watershed assessments and planning, technical design of water harvesting structures, economic analysis, meetings, report writing, careful supervision and successful implementation of the pilot projects.

ICLEI South Asia will not provide any equipment or technical support in executing the assignment. It is expected that the consultant(s) will sufficiently resource himself/herself in carrying out the tasks specified in this ToR (where it shall be included in the Financial Proposal).

3 Bidders Eligibility Criteria and List of Required Documents

3.1 Bidder Eligibility Criteria

Both independent consultants and firms are welcome to apply. The consultants should ideally have the following expertise and experience:

3.1.1 Professional Experience

- **Master's degree in a relevant discipline. PhD or additional advanced training will be a plus. Relevant disciplines include water resources/watershed, Civil/Environmental engineering, or other related quantitative disciplines.**
- **The consultant/team lead shall have demonstrated experience of minimum 15 years in the field of water resources/ watershed/ flood management for municipal services**
- The applicant must possess at least 5 similar assignments in past and able to show written proofs of the same. Experience in the field of watershed mapping, water resource management, disaster management, modeling of water systems especially storm water management, design and implementation of water conservation and flood management measures will be considered.
- The consultant shall demonstrate ability to effectively work and manage similar projects of consultancy
- The consultant shall demonstrate strong understanding of the field related to this project and municipal services
- The consultant shall have excellent communication skills in English (Tamil is also a preferred language while interacting with municipal officials and key stakeholders)
- The consultant shall have good interpersonal skills and knowledge of the field including

government schemes and missions

- The consultant shall have ability to collaborate with other team members across boundaries and contribute productively to the team's work and output, demonstrating respect for different points of view. Able to use strong interpersonal and teamwork skills to cultivate effective, productive relationships and partnerships across organizational boundaries.

3.1.2 Financial requirements

- The bidder (if a firm) should possess a valid GST registration.
- The bidder must be registered with the Income tax department and should produce Latest Income Tax clearance certificate/income tax return details.

3.1.3 Education Requirement

The consultant/team lead (if a firm) should have a minimum of **graduate/postgraduate degree in Hydrology, Irrigation & drainage engineering, Soil & Water Conservation, or equivalent qualification** from a government of India approved and recognized university.

3.1.4 Language Requirement

Proficient in English. Proficiency in Tamil will be a clear advantage.

3.2 Documents to be Submitted by Participating Bidders

Interested individuals/firms must submit the following documents/information to demonstrate their qualifications:

3.2.1 Technical Bid

The Technical bid should provide the following information/ documents:

- Consultancy/ company profile (both independent consultants and firms are encouraged to apply)
- Bidder's experience on assignments of similar nature, the outline should indicate, inter alia, the profiles and names of the staff provided (if in case of a firm), duration of the assignment, contract amount, and firm's involvement.
- The bidder must possess written evidence in the form of Letter of intent/Work order/ project completion certificate issued by the client (any city/ state/ national/ international agency) for related consultancy.
- On-going consulting assignments can be submitted with detail of progress supported by suitable documents (E.g., copy of invoice or payment received till date or through certificate from the respective client).
- Detailed Approach and Methodology for undertaking the current Assignment.
- Project Schedule with activity and duration to accomplish the task within the scheduled project duration along with detailed work plan.
- Against the list of proposed staff, details of tasks assigned to each staff as per his / her experience shall influence the evaluation
- All relevant CVs shall be provided in full detail. If the CV of a proposed staff is found incorrect, the award of the consultancy to the bidder may also be liable to cancellation in light of such an event.
- Each page of the CV must be signed in original by the authorized representative together with original or electronic signature of the key team member at the proposal stage. However, at the time of contract signing, original signatures of both authorized representative and the Key Personnel shall be required.
- The consultant shall assess required key and support personnel, both technical and

administrative, to undertake the assignment. Additional support and administrative staff shall be provided as needed for the timely completion of the Assignment within the total estimated cost. Consultant should provide time estimates of Key Personnel as well as support staff in the staffing schedule. It is stressed that the time for the assignment indicated in the TOR should be strictly adhered.

- The Proposals/ bid documents must be duly signed by the authorized representative/ signatory on each page and stamped as detailed below. This shall not contain any alternative items or suggestions, comments, or conditions:
 - i. By the partner holding the Power of Attorney in case of a partnership firm / limited liability partnership (A certified copy of the Power of Attorney shall accompany the proposal)
 - ii. By the proprietor in case of a proprietary firm; by a duly authorized person holding the Power of Attorney or by a Board Resolution in case of a Limited Company or a corporation (A certified copy of the Power of Attorney/Board Resolution shall accompany the proposal)
 - iii. By the authorized representative of the Member in Charge in case of Joint Venture / consortium (a certified copy of Board Resolution/Power of Attorney indicating the representative shall accompany the Proposal).

Note: Bidders shall also indicate how they will execute the project within the stipulated timelines as the assignment needs to be executed on an urgent basis and are welcome to include any previous experience on the same.

3.2.2 Financial Bid

The Financial bid should provide the following information/ documents:

- Financial bid for the tasks mentioned in the scope of work described in this ToR document. The total cost should include all the expenses for required to complete all the tasks mentioned in this ToR. Financial bids should be inclusive of all taxes, travel, and per-diem costs etc.
- A financial proposal clearly stating manpower/expert time, travel, equipment, survey, and laboratory costs as may be required, adequately addressing the manpower stated available for the project, as given in the technical proposal. A breakup of the budget items indicated above and by tasks listed in the ToR is required.
- The Financial bid shall be inclusive of all the costs including taxes associated with the assignment. It is clarified that, for the purposes of evaluation, the financial bid should be prepared in INR.
- The total amount indicated in the financial bid shall be without any condition attached or subject to any assumption and shall be final and binding. In case any assumption or condition is indicated in the financial bid, it shall be considered non-responsive and liable to be rejected.
- In case of any discrepancy between the amount quoted in figures and words, the amount quoted in words will be considered for evaluation purposes.
- A copy of valid Pan Number and particulars of registration with GST
- Last 3 Financial Year's balance sheet (or as applicable), audited by certified Chartered Accountant.

Please note:

- The bidder shall be acquainted with the work and working conditions at site and locality. No claim shall be entertained on this issue after the bid has been submitted.
- All or any accessories/consumables/items required for satisfactory commissioning of the

study/work shall be deemed to be included in the contract and shall be provided by the bidder without extra charges

- All Technical and Financial bids should be in English. Bidders are encouraged to visit the weblink with the ToR before submission of bid.

Failure to comply with or provide the above listed items in the Technical Proposal may result in disqualification. The bidder shall produce, original documents for cross verification as and when requested by ICLEI South Asia. Bidders shall ensure that the technical and price bid documents shall have a sign of the authorized representative/signatory, on the first and last pages at a minimum.

3.2.3 Bid Submission

- The Terms of Reference (ToR) shall be downloaded free of cost from the ICLEI South Asia website.
- The bid document shall be submitted by bidders through email to the below mentioned email IDs on or before **30th August 2022**:
soumya.chaturvedula@iclei.org
Soumya Chaturvedula, Deputy Director, ICLEI South Asia
senthil.arumugam@iclei.org
Senthil Kumar Arumugam, Project Officer (Energy & Climate), ICLEI South Asia
- The bidder shall also submit 2 sets of hard copies of the bid documents to the address as mentioned below:
**Soumya Chaturvedula, Deputy Director, ICLEI South Asia Secretariat,
C-3, Lower Ground Floor, Green Park Extension, New Delhi - 110016, India.
Tel: +91 – 11 – 4974 7200 Fax: +91 - 11 - 4974 7201**
- The hard copy of bid document shall reach to the above-mentioned address not later than 3 days from the last date of submission of bid document, provided the bid has been submitted through email before the due date of submission
- The bid shall be in two parts, viz. Part A: Technical Bid and Part B: Financial Bid submitted in a sealed envelope and shall be scribed as:
**“CapaCITIES Phase II - Watershed assessment and design of storm water infiltration/
groundwater recharge systems for Tirunelveli city”**
- The bid shall be valid for a period of 60 days from the date of submission of bid document.
- A bidder shall submit the bid documents that satisfies every condition laid down in this notice, failing which, the bid will be liable to be rejected by ICLEI South Asia.
- In case the bidder wishes to sub-contract part of his deliverables, the final responsibility of delivery and performance solely lies with the bidder.

4 Contract Terms

4.1 Specific conditions of contract

Contractor to study conditions:

- The bidder shall be deemed to have carefully examined the work and site conditions. In this regard, he/she will be given necessary information to the best of knowledge of ICLEI South

Asia in consultation with but without any guarantee to it.

- If he/she shall have any doubt as to the meaning of any portions of these general contract terms, or the scope of the work, or any other matter concerning the contract, he/she shall in good time, before submitting his tender, set forth the particulars thereof and submit them to the point of contact, as given in this TOR, by email in order that such doubts may be clarified authoritatively before tendering. ICLEI South Asia will respond to queries until August 23, 2022. Once a tender is submitted, the matter will be decided according to the tender conditions in the absence of such authentic pre-clarification.

4.2 General conditions of contract

- The contractor/ consultant shall address all aspects of the proposed outputs and deliverables mentioned in this TOR.
- The comments and suggestions provided by the bidder on the TOR are not binding and shall not affect the financial proposal.
- It should be noted that the project is being implemented in the jurisdiction areas of Tirunelveli Municipal Corporation and hence instructions to bidders will be given by ICLEI South Asia in consultation with Tirunelveli Municipal Corporation officials. ICLEI South Asia will be overall in-charge for all the works that would be executed under the present scope of work.
- The bidder shall also obtain necessary permission from concerned government departments related to the work/data collection if deemed necessary and in coordination with Tirunelveli Municipal Corporation, and ICLEI South Asia.

4.3 Tender Evaluation & Bid Assessment

- The bids received will be scrutinized & evaluated by ICLEI South Asia in consultation with senior city officials from Tirunelveli Municipal Corporation involved in the execution of project. The decision shall be informed to the winning bidder.
- The bids of those bidders whose technical bids are found to be responsive shall be informed and shall be invited for seeking any further clarification/s either individually or a meeting would be called, if desired. In both the cases the bidders shall be informed accordingly, and bidders are expected to be present at given date and time.

4.4 Award of contract

- Detailed Work Order will be issued to the winning bidder within 5 days of announcing the winning bidder.
- The winning bidder is to forward the signed and sealed work order to ICLEI at the earliest or not more than 3 (three) days of issue of work order.
- In case the winning bidder fails to indicate his intent to undertake the said work within the stipulated time of 3 (three) days and observe the formalities as above, the Letter of Intent will be cancelled, and the next bidder will be finalized by ICLEI South Asia in Consultation with senior city officials.

4.5 Compensation for delay

- Time is the essence of the contract and as such all works shall be completed within the time stipulated in the contract/ work order
- If the bidder, without reasonable cause or valid reasons, commits default in commencing the work within the aforesaid time limit, ICLEI South Asia shall without prejudice to any other right or remedy, be at liberty, by giving 15 days' notice in writing to the contractor to commence the work, to forfeit the balance payment depending on the status of work, and to cancel the

Work Order.

4.6 Extension of date of completion

On occurrences of any events causing delay as stated hereunder, the bidder shall intimate immediately in writing to ICLEI South Asia-

Force Majeure:

- ✓ Natural phenomena, including but not limited to abnormally bad weather, unprecedented flood and draught, earthquakes & epidemics.
- ✓ Political upheaval, strikes, lockouts, acts of any Government (domestic/foreign) including but not limited to war, properties, and quarantine embargoes.

Please note that this clause will only account if event occurs during data collection/ site visit/ city visit period.

4.7 Materials/Appliance at site

- Neither ICLEI South Asia nor Tirunelveli Municipal Corporation will undertake any responsibility for supply of any materials/ equipment/ Appliance/ tool for site analysis to the bidder.
- All materials/ equipment/ tools brought to site by the bidder shall be the responsibility of the bidder. Tirunelveli Municipal Corporation, and ICLEI South Asia shall extend help as and when approached by the bidder to keep any materials/ equipment/ Appliance/ tool, however not liable for any loss, theft, or damage due to fire or other cause, the responsibility for which shall lie entirely on the bidder.

4.8 Final Inspection of Work

- Representatives from Tirunelveli Municipal Corporation, and ICLEI South Asia team shall jointly make final inspection of all work included in the contract/work order, or any portion thereof as soon as practicable after notification by the bidder that the work is completed and ready for acceptance.
- At the time of such inspection, Tirunelveli Municipal Corporation shall inform ICLEI South Asia which in turn will inform the bidder in writing as to the concerns to be remedied before final acceptance can be made.

4.9 Ownership of Materials, IP and Confidentiality

All material will acknowledge ICLEI South Asia, by featuring its logo, together with the logos of the CapaCITIES Phase II initiative and other project partners (Swiss Agency for Development & Cooperation, South Pole, econcept AG, and the logo of the Initiative at the beginning and at the end of the documents.

The Consultant understands that as part of the Consultancy, they might be asked to create, modify, or contribute to the creation of architectural designs, drawings, documentation, and other copyrightable works. The Consultant agrees that all designs, drawings, assignment outputs, including design formats for infrastructure, forms, text, photographs and videos, computer programs, work-up files, documentation, and other copyrightable materials that have been prepared as part of this contract shall be "works made for hire" and that ICLEI South Asia, Tirunelveli Municipal Corporation shall own all the copyright rights in such works.

The IP rights of materials created by the consultant for the purpose of this contract shall belong to that ICLEI South Asia & Tirunelveli Municipal Corporation and shall be perpetual, irrevocable & worldwide.