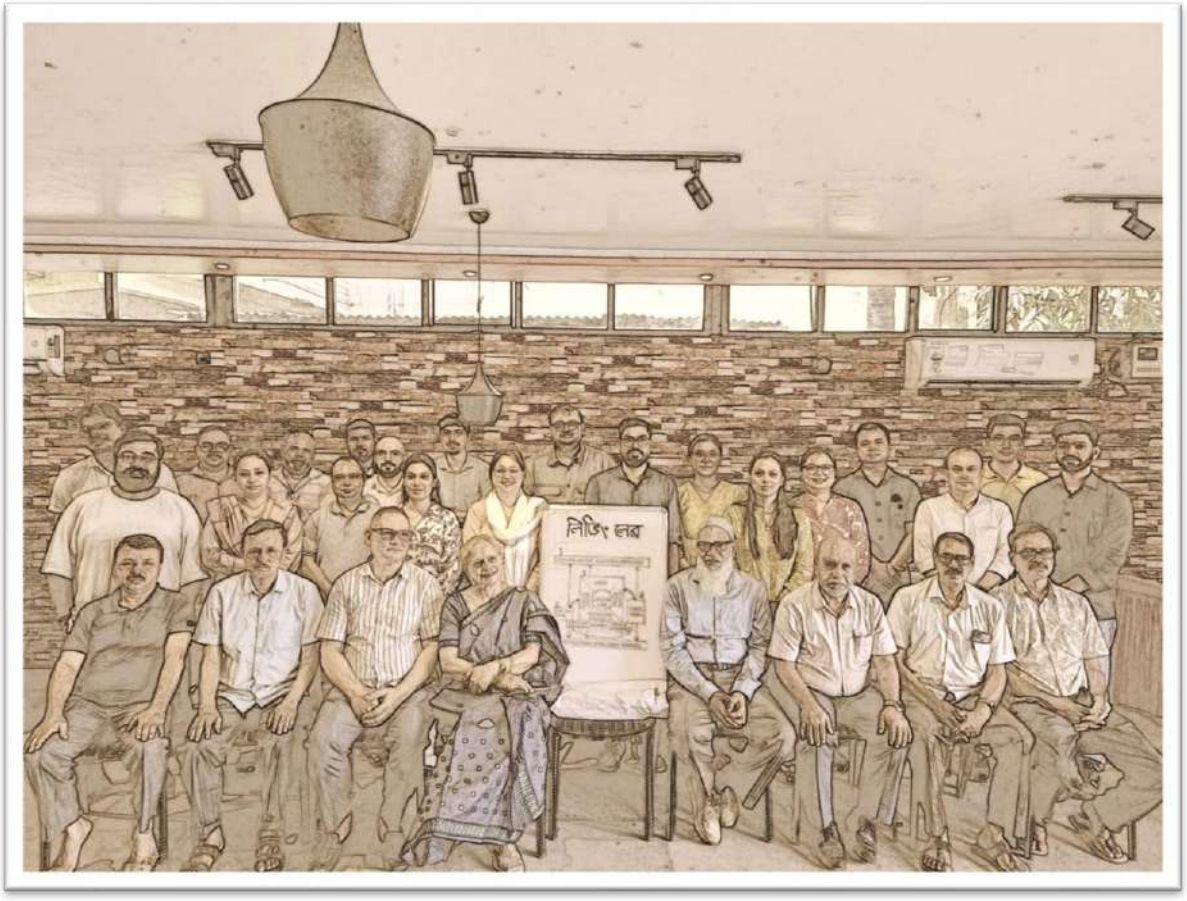
Process Document: Living Lab on Urban Floods and Early Warning System in Guwahati (Hatigaon)

Low-Cost Disaster & Emergency Services for CommuniTies At Risk (LODESTAR)

Date: 25th August, 2025

Venue: Belly's Day Out, Near Main Road, Sewali Path, Hatigaon, Guwahati.

Organised by: IIT Guwahati Lodestar Team



Objective: To create a collaborative **Living Lab** that brings together residents, government agencies, and researchers to co-develop solutions for urban flooding in Guwahati through a **low-cost, decentralized early warning system.**

Roles and Responsibilities:

- Project PI: Anamika Barua
- Project Co-PI: Debanga Raj Neog
- Team members: Priyam, Shankar, Gautam, Bipasha, Vineet, Minara, Himashree, Chayashri
- Facilitators: Anamika Barua and Debanga Raj Neog

Project members from Bengaluru and Anantapur Lodestar sites:

- Dr. Rajarshi Das Bhowmick, Assistant Professor, Interdisciplinary Centre for Water Research (ICWAR), IISc Bengaluru
- Mr. Yashpal Luniwal, PhD Scholar, IIT Tirupati
- Suvid M., Senior Analyst in the Adaptation and Risk Analysis group, CSTEP

List of Participants:

Name	Designation	Location
Biren Baishya	ASDMA (Assam State Disaster Management Authority), GIS Expert	Guwahati
Ajay Mazumdar	Field Officer, Azara Revenue Circle, District Disaster Management Authority (DDMA)	Guwahati
Anku Moni Gogoi	Field Officer, Chandrapur Revenue Circle, District Disaster Management Authority (DDMA)	Guwahati
Runu Borah	Retired ONGC employee	Bishnujyoti Path, Hatigaon
Rabia Khatun	Homemaker	Jogesh Das Path, Hatigaon

Mir Atowar Rahman	Retired from Indian Air Force (IAF)	Sijubari
Abdur Razzaque	Ex-ONGC	Sijubari
Dr. Rupam Bhaduri	Post-Doctoral Fellow	Bhetapara
T. Rahman	Retd. AEI, Department of Power, Government of Assam	Bishnujyoti Path, Hatigaon
Meher Khan	Ex Sub-Inspector of Police, Government of Assam	Notobomma
Shah Alam Bhuyan	Department of Exchange	Sijubari
Aynul Haque Choudhury	Business	Sijubari
Rashidul Islam	Studying	Jogesh Das path, Hatigaon
Moinul Haque Talukdar	Retired employee	Sijubari
Bipul Chandra Hazarika	Cab Driver	Hatigaon
Gobin Baruah	Cab Driver	Hatigaon
Shiraj Haque	Cab Driver	Hatigaon
Anindita Talukdar	Business	Hatigaon

List of Abbreviations:

i. ASDMA- Assam State Disaster Management Authority
ii. DDMA- District Disaster Management Authority
iii. GMC- Guwahati Municipal Corporation
iv. IMD- India Meteorological Department
v. IAF- Indian Air Force
vi. ONGC- Oil and Natural Gas Corporation

Step-by-Step Process of the Living Lab Event

Step 1: Arrival and Welcome

The Living Lab event was held on August 25, 2025, at Belly's Day Out, Hatigaon, Guwahati. The IIT Guwahati Lodestar team members arrived at the venue by 9:00 AM to start preparing for the event. All stakeholders, including residents and government officials, began to arrive gradually, and the event officially commenced at 11:00 AM with a warm welcome from the project team.

Step 2: Introduction of Participants

The event began with a round of brief introductions of all the attendees- including the project team, the facilitators, and representatives from various stakeholder organisations.

Step 3: Project Background and Purpose of the Living Lab

Following the introductions, Anamika Barua (Project Lead) and Debanga Raj Neog (Co-Project Lead) provided an overview of the project LODESTAR and the significance of Living Labs. The intent of an informal meeting set-up was put forth, placing centrality among the participants; hence, trying to destabilise any form of existing power asymmetry, aiming for a better collaborative approach.

They highlighted the urban flooding challenges in Guwahati, particularly emphasizing the lack of an effective early warning system (EWS). The attempt of the project at the integration of technology with its real-time users to increase efficiency, extending upon bridging the existing gaps in the communication of weather updates and alerts for further mitigation, was emphasised.

Step 4: Discussion on the Living Lab Approach

The discussion then transitioned into explaining the Living Lab methodology- an informal, open, interactive setup where the stakeholders could share their opinions and insights without any inhibitions pertaining to-

- What is working and what is not in the current flood response system?
- What is missing in the existing flood preparedness framework?
- What improvements can be made to develop an effective and sustainable EWS?

It was emphasized that, unlike conventional top-down approaches—where academicians develop models and later implement them—the Living Lab approach seeks to co-create solutions through a bottom-up approach involving the community and the government. The team stressed the importance of understanding:

- Community and government expectations regarding an early warning system.
- Differences in priorities between stakeholders.
- How to bridge these gaps to develop a realistic, cost-effective, and community-driven EWS that aligns with ground realities.

Step 5: Facilitation and scenario-based discussion on urban flooding

To facilitate an engaging session among the participants, the IITG team created three different scenarios related to the issue of urban flooding in Guwahati. Each scenario had guiding questions that were to be answered by the participants. The scenarios were thought through and planned out in a way that could take the discussion through the ground-zero issues of recurrent inundation in the city, further dwelling into the insights relative to EWS and its expected reliability among the public. The brief on the scenario-based approach was followed by the division of participants into three groups at 11:30 AM, through a token distribution system. Participants with the same number on their tokens formed their respective groups. Each table had a maximum of 5 participants and one member from the IITG project team, to assist, if required. It was made sure that every table had atleast one government official in it. Group 1 consisted of an ASDMA official, GMC contractor, active official in the Department of Exchange and a retired employee. Group 2 consisted of a homemaker, a restaurant owner, ex-ONGC officer, retired AEI from the Department of Power and a DDMA official. The third group had a post-doctoral fellow, ex-Sub-Inspector of Assam Police, retired IAF officer, ex-ONGC employee, along with a DDMA official.

After the group formation, the cards with different scenarios were distributed by the IITG team. Each of the scenarios, along with the guiding questions, were explained to them and how they were expected to engage in a discussion among themselves and note their responses on the sheets provided to them. The translated version of the scenarios in Assamese was written on the back of the cards to eliminate any potential language barrier. The intra-group deliberations went on till 12:15 PM. Active engagement was observed across all the tables, and collective responses were recorded on the response sheets. It was then followed by individual-group perspectives on the assigned scenarios, where a representative from each group put forth their collective stance.

Scenario 1:

On the evening of 29th August, it has started to rain. You wake up the next morning to find that there is no electricity and the roads are flooded following the heavy rains.

Guiding Questions:

1. What actions do you take immediately?
    a) How do you respond to the situation *(coping strategies)*
    b) Do you seek local support *(neighbors, colleagues, ward representatives)?*
    c) Do you reach out to the line departments?
2. Do you receive any warning for the rain or flooding?
    a) If yes, how?
    b) If no, then how would you like to receive the warnings? *(SMS, radio, TV, social media, sirens, community meetings, etc.)*

c) Do you think you can respond to the situation better if you receive an early warning?

3. What do you want to be warned for? *(weather forecasts, flooding, real-time inundation information, power cuts)*

Scenario 2:

You are outside your home and in the city - either commuting or running daily errands and receive an IMD weather alert saying that it is going to rain in parts of Kamrup Metro and adjoining districts (similar to the alerts that you currently receive).

Guiding Questions:

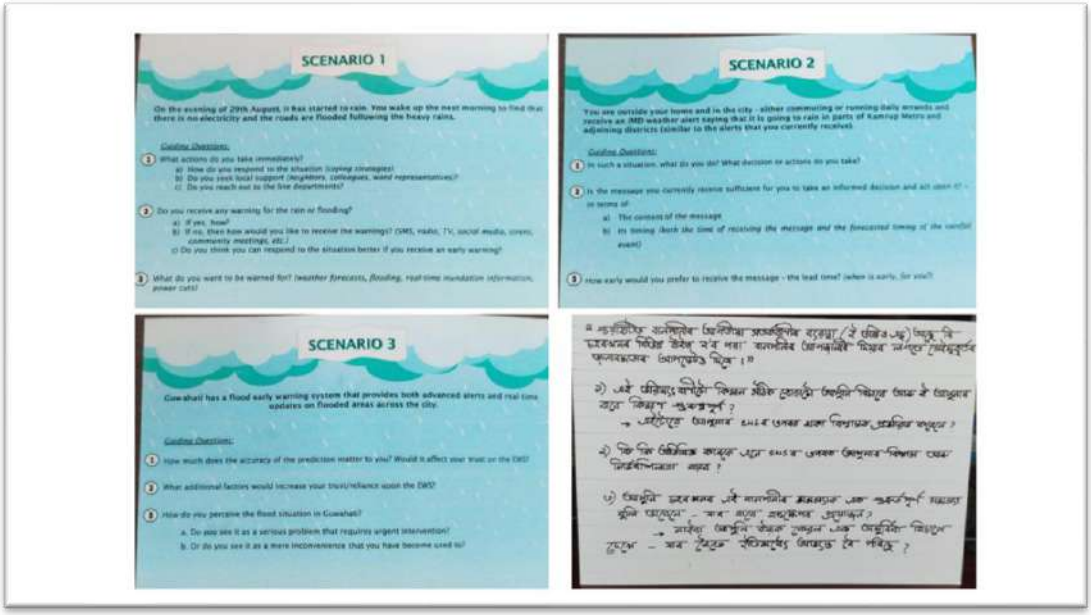
1. In such a situation, what do you do? What decision or actions do you take?
2. Is the message you currently receive sufficient for you to take an informed decision and act upon it? – in terms of-
    a) The content of the message
    b) its timing *(both the time of receiving the message and the forecasted timing of the rainfall event)*
3. How early would you prefer to receive the message – the lead time? *(when is early, for you?)*

Scenario 3:

Guwahati has a flood early warning system that provides both advanced alerts and real-time updates on flooded areas across the city.

Guiding Questions:

1. How much does the accuracy of the prediction matter to you? Would it affect your trust on the EWS?
2. What additional factors would increase your trust/reliance upon the EWS?
3. How do you perceive the flood situation in Guwahati?
    a) Do you see it as a serious problem that requires urgent intervention?
    b) Or do you see it as a mere inconvenience that you have become used to?



Group Insights and Responses:

Group 1- Scenario 1-

The members in this group aligned on the significance of proper information dissemination relative to weather forecasts as well as power cuts to enhance preparedness at the time of crisis. Pertaining to the immediate response at the time of crisis, people mostly relied on 'self-built' networks, inclusive of their immediate neighbourhood, relatives and friends. The belief in this close-knit network extended from support and mitigation to information dissemination as updates were shared among them relative to waterlogging at different pockets around the city.

The members mentioned about receiving the occasional IMD alerts, but they were conflicted on its accuracy. One of them was an ASDMA official who talked about the several categorisations of such alerts and the existent gap that persists between the IMD and the state forecasts, which leads to such confusion. This brings forth the significance of localised information regarding early warning to enhance accuracy and build trust among the people. The government official further mentioned *Cap Sachet*, an app attempting to provide more localised weather updates across India. There was a collective expectation for a more precise and accurate information channel on weather updates. Given the regularity of crisis, people having to get themselves accustomed to such situations and have built their own circles of

information as a source of support. However, they seek a uniform, localised Early Warning System that could help in better management and preparedness.

Group 2- Scenario 2:

This table saw a mixed response pertaining to their reliance on the IMD alerts. While a few participants did take the alerts seriously and arranged their routine likewise, one of them completely negated its use given its inaccuracy. The group did agree to the occasional inaccurate predictions, mentioning that the alerts were taken into consideration, only with some caution. Another key observation that was put forward highlighted the medium of dissemination currently used by the forecasting agencies. While SMS is the primary channel through which these alerts are delivered to the general public, they often get missed or ignored due to the overwhelming number of promotional messages that dilute the urgency of early warnings.

Referring to the question on the content of the message, the group highlighted that currently the warnings are quite simple to understand even when in English. They discussed that even if a certain age group or section of the population might face difficulty with English, yet almost the majority of them have immediate near members who can read or translate the content of the alerts. However, alerts in the local language – Assamese – were also preferred. Towards the end of the scenario-based intra-group discussion, the members at Table 2 reverted to the problem of drainage mismanagement in Guwahati and its significant role in aggravating the artificial flooding issue, particularly in the Hatigaon locality. The group blamed the GMC department and its assigned contractors for the unscientific construction of drains, overlooking the natural gradient (topography) of the area, resulting in the new emergent areas that suffer recurrent artificial flooding.

The group stressed the importance of timely, regular, and proper cleaning of the drains for tackling the flood problem in their area. They mentioned that merely cleaning the drains right before the monsoons and dumping the waste by the roadside results in the wash-off of the same waste down the drains during the subsequent rainfall. Hence, the problem is not solved, but rather it persists and repeats itself. Members of the group also stressed the need for increased public awareness on unclogged drains through rational garbage disposal practices. There was a collective willingness to form neighborhood watch groups that could coordinate with the line departments and oversee the process. They further added that a system could be put in place to

raise complaints against the offenders. The group suggested that coercive action by the government, such as fines etc. can also have the desired effect, making it a more collaborative effort at raising public awareness.

Group 3- Scenario 3:

The accuracy of received predictions was of utmost importance in this table. The current early warning messages were not very accurate, hence a more precise prediction is expected to build a larger trust on the EWS. However, the participants mentioned that the larger challenge was waterlogging. Given the current situation, people are aware that a downpour of 30 minutes would result in a water logging crisis in some corner of the city. They expected interventions that could solve the water logging issue in the longer run.

The suggestion as put forth by this table was the integration of EWS into an app instead of just a message, as there is a common tendency among people to overlook messages. The possibility of receiving information on the water level or the water flow height, along with updates on the water retention duration, could possibly enable better decision making and preparedness. The urgency of localised information was put forth. (Alert on a heavy thunderstorm in Kamrup Metro is read as vague information; information as specific as 'Heavy rain at Hatigaon' is anticipated). Although not everyone on the table agreed but there was a mention that the EWS could help in re-routing the traffic during situations of urban flooding. Participants saw the flood situation in Guwahati as a serious problem that required urgent interventions. In addition to being a daily life inconvenience, they put forth that the situation of urban flooding imposed a serious risk to life.

Step 6: Discussion and Key Findings

An open discussion was initiated at around 12:35 PM following the individual-group perspectives shared by the representatives of each group. Active participation from every member was observed, with analytical insights and suggestions being put forth. The discussion was later joined by three members of the Cab Drivers' Association who shared about their novel approach on networking through social media, sharing updates through pictures when the city faced heavy rainfall. Such networking helped them to divert their rides from the waterlogged areas and avoid the traffic at times.

The discussion saw uniform awareness of the existing crisis with a focus on collective concerted efforts to minimise the intensity, if not eliminate the urgency completely. The residents put forth their anticipation for more localised information regarding the weather alerts and updates. It can be assessed from the responses across the tables that there was a willingness to rely on such updates but due to the existing gaps relative to accuracy and real-time information, a concrete state of confidence was lacking. The government officials agreed on the need for more localised information, bringing into light the current nowcast, that is, 3 hours, which serves to be inefficient for any form of government interventions as well. The tone of "Guwahati as an unplanned city" dominated the entire discussion throughout the event. While the residents complained about the clogged drains that surpass their capacity after every downpour, the officials mentioned how the city lacks a proper drainage map itself. The issue was beyond improper drainage; the fact that Guwahati has no stormwater drains and the existing ones are for sewer purposes only, makes the city prone to recurrent episodes of waterlogging. The discussion saw a slight conflict of opinion as one of the participants, who was a GMC contractor, blamed the engineers and bureaucracy for the planning irregularities. Another participant, while agreeing to the existing mismanagement, also put equal liability on the contractors involved in the construction of the drains in the city. Hence, bridging the communication gap through real-time information dissemination came out as a message that resonated as the event concluded with networking, informal discussions, lunch, and thank-you gifts presented to participants as a token of appreciation. Below, we present an overview of the responses from the citizens and government.

Citizen perspectives:

- Need for more localised updates concerning waterlogging to enhance the accuracy.
- Regularities in the uptake of the drains; especially before the monsoons to minimise the water retention period due to mindless garbage dumping.
- Sustainable mode of communication between the residents and the government officials at the time of crisis.
- Integration of EWS with an app to eliminate any possibility of overlooking the messages.
- Increasing accessibility of emergency contacts during crisis through better marketing and outreach.

Government perspectives:

- Government officials address the gap that persists between the IMD alerts and state weather updates; equally stressing on the need for more localised/precise information.
- Accurate information, when received in time, enables authorities to deploy rescue teams efficiently to the affected localities.
- The desired nowcast of 72 hours through EWS is expected to ensure better preparedness and efficient mitigation.
- Taking up the issue of SMS alerts being overlooked, a novel approach of Flash Messages for early warning updates was mentioned to be in its formation stage.
- Officials aim to utilize available resources and manpower to reduce the duration of inundation and ensure effective management of water flow.

Step 7: Mapping Exercise

After the discussions, the mapping exercise begun at 12:58 PM, where participants took part in the identification of sensor locations using a flood inundation map of the streets of Hatigaon that face the crisis. The participants were divided into two groups, with one member from the IITG project team in each to assist and guide them in identifying critical locations where flood monitoring is needed based on past inundation experiences. Both groups engaged in discussions among themselves and independently marked the locations that encountered severity. Notably, both groups identified similar flood-prone areas, demonstrating a shared understanding of the city's most vulnerable zones. This alignment underscores the importance of collaborative efforts between citizens and government agencies to enhance flood response strategies and improve early warning systems.

Step 8: Conclusion & Takeaways

The expected reliance on the EWS could only be harnessed through more localised updates. Given the erratic rainfall that spans over the city, more precise information strengthens the preparedness of the citizens and further interventions to be implemented by the government. A sustainable communication channel between the residents and the administration could ensure a more systematic management of the existing irregularities.
