WARNINGS
BRIEFING NOTE

Community and impact-based warnings

The Site-Specific Early Warning System Framework

Key Points

- Warnings must empower communities to reduce hazard impacts.
- A community-based approach allows systems to be flexible and adaptable to the needs and requirements of the most vulnerable sectors.

State of the Art

Early warning systems (EWS) are crucial for effective disaster risk reduction (DRR) strategies. National meteorological and hydrological services (NMHSs) have made substantial advancements in their capacity and precision to forecast weather-induced events. However, lives continue to be lost and extensive damage is still observed. Evidently, timely warnings alone do not guarantee that recipients will understand the message and that appropriate anticipatory actions will be performed to reduce the local impact. In this context, impact-based EWS (IB-EWS) have been promoted [1] to help close this communication gap. That is, systems able to communicate 'what the weather will do', focusing on the expected damages and the clear guidelines on what citizens and authorities can do to reduce their risk.

Core Needs

The design and implementation of IB-EWSs can be a complex objective, especially for vulnerable communities that usually have limited resources. If communities are expected to implement IB-EWS, they need guidance to exploit their local risk knowledge to develop a system within their capabilities. For this purpose, as a step forward in the line of IB-EWSs, the Site-Specific EWS (SS-EWS) framework [2] has been developed at the Centre for Applied Research in Hydrometeorology of the Polytechnic University of Catalonia (CRAHI). The framework guides communities and local experts on using hydrometeorological, local vulnerability, impact, and exposure information to co-design, implement and co-evaluate a community-based IB-EWS.

Recommendations / Guidance

Communities, their vulnerabilities and needs must be at the centre of any people-centred IB-EWS. To develop and implement the SS-EWS across vulnerable locations the following aspects should be taken into account:

- The SS-EWS framework adopts a community-based work scheme consisting of quantitative and qualitative data collection methods (work meetings, focus groups, mixed-method questionnaires and interviews) with community representatives.
- It is critical to understand local risk communication strategies and the characteristics that make specific locations highly exposed and vulnerable during hazards.
- Regional news outlets, social media, official reports from the authorities, insurance data and the recollections of the community representatives should be used to create community-specific hazard-impact databases.
- By evaluating these databases on a severity level scale, impact and advisory tables are co-developed and impact-based rainfall thresholds are proposed for the community and vulnerable locations.

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The SS-EWS in Spain: The city of Terrassa, Catalonia

The SS-EWS framework has been implemented in the Catalonia region, Spain, to explore its performance and the influence of site-specific warnings (SSWs) on the anticipatory protective actions of end users during emergencies. In Terrassa, Spain, the framework was implemented at three highly vulnerable and exposed locations: one public school located in a flood zone area and two ford crossings.

For this purpose, from mid-2020 to late 2021, seven general meetings and five focus groups were held to co-design the elements of the SS-EWS with the local communities.

Overall, the SS-EWS showed promising results in triggering location-based or site-specific warnings compatible with the reported impacts and proposing appropriate anticipatory actions to reduce the local risk. Additionally, a crisis app (seen in the figure below) called A4alerts was designed within the SS-EWS to disseminate the SSWs, the official active alerts in the region and the weather information from radar-based nowcasting and numerical weather prediction models.

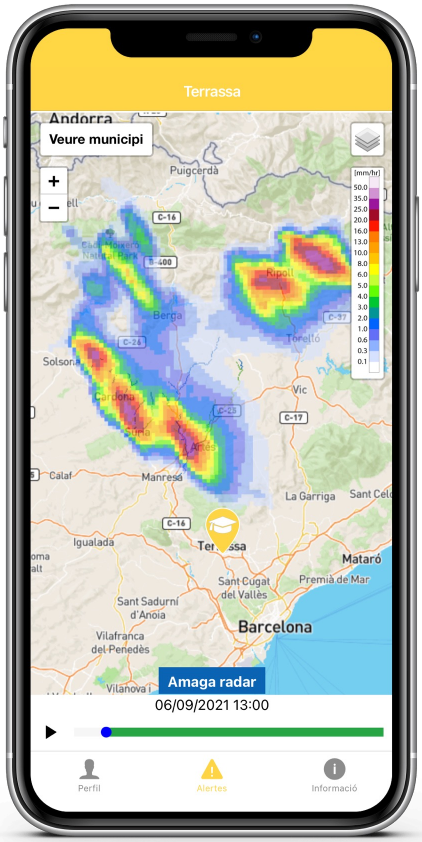
The SS-EWS application in Terrassa proved to be a straightforward and cost-efficient complement for the regional EWS to increase the preparedness of communities. The Terrassa authorities currently use the SSW levels to trigger corresponding protection actions in real-time through the city-scale operational version of the multi-hazard EWS platform developed within the framework of the European Union's Horizon-2020 project ANYWHERE.

The future of impact-based communication for anticipatory actions

Disasters such as the 2021 deadly floods across Europe highlight the need for EWSs to connect forecasts with the vulnerabilities and response capacities of at-risk communities. As established by the SFDRR [3], effective DRR including climate change adaptation must enable 'risk-based' decision-making by understanding all aspects of hazards and vulnerabilities (including exposures) to increase community preparedness, resilience and adaptation.

IB-EWSs have been promoted to address the gaps within the EWS communication chain under the assumption they can increase the understanding of individuals and generate more appropriate anticipatory protective actions to reduce their risk. Designing an effective community-based EWS requires the identification of the target population, their needs, response capabilities and the best available protective action to decrease their risk during emergencies.

Regional and national EWS often have limited ability to effectively communicate risk information at a community scale to appropriately reduce local impacts. In this context, implementing community-based SS-EWS can be a valuable local measure within the overall emergency management system across a region to increase the preparedness of the most vulnerable communities for emergencies.



References

[1] World Meteorological Organization (2015). WMO guidelines on multi-hazard impact-based forecast and warning services (Issue 1150).

[2] Meléndez-Landaverde, E.R & Sempere-Torres, D. (2022). Design and evaluation of a community and impact-based site-specific early warning system (SS-EWS): The SS-EWS framework. Journal of Flood Risk Management, e12860. https://doi.org/10.1111/jfr3. 12860

[3] UNISDR (2015). Sendai Framework for Disaster Risk Reduction 2015-2030. United Nations Office for Disaster Risk Reduction, Geneva.

Authors:
Erika Meléndez-Landaverde[1] and Daniel Sempere-Torres[1]
[1]Center of Applied Research in Hydrometeorology (CRAHI)