

Flood monitoring and early warning

HomeWhat makes an effective flood early warning system?

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An effective flood early warning system is one that meets the needs of the people at risk of floods. It needs to be people-centred and inclusive.

An effective Early Warning System is comprised of four interrelated elements as illustrated in the graphic on the right. Each of these areas is touched upon below.

Zurich Flood Resilience Alliance partner Practical Action has a long history of developing Flood Early Warning Systems that work for flood vulnerable communities. Their key tips based on experience in Nepal and Peru is summarised in the blog [How do you build an effective Early Warning System?](#) Other blogs that can be useful include:

- [Linking early warning with early action: Closing the gaps for stronger resilience](#)
- [Gender and Early Warning Systems: Lessons from Nepal and Peru](#)
- [The importance of disaster risk communication in the time of COVID-19](#)
- [An inside look at flood forecasting](#)
- [How can participatory monitoring help us better understand rainfall?](#)
- [Missing Voices and a New Approach to Community Research](#)
- [Fighting cyclones and coronavirus: how we evacuated millions during a pandemic](#)
- [Citizen science-based cheap monitoring sensors to support flood risk management of Karnali Basin](#)

Risk Knowledge

You need to understand the risk that affects a community, and how different groups within that community experience this risk. To do this you will need to work both with the community members affected by the risk, and those who are responsible for reducing it, including government stakeholders.

Using a framework and tool like the Flood Resilience Measurement for Communities will help you get an holistic understanding of a community's risk profile, vulnerability, and existing capacity.

Monitoring and warning

A scientifically robust, cost-effective, contextually appropriate, scalable, and sustainable approach to monitoring environmental conditions is fundamental to creating timely, accurate, and useful warnings.

What this looks like in practice will differ depending on the context. Low cost monitoring systems can be developed using cheap micro-computers like Raspberry Pi, in Nepal high-tech river level monitoring stations are owned by the Department of Hydrology and Meteorology while data from community owned staff gauges are used as validation and act as a back up in case the high-tech sensors fail.

While assessing what technology to use for monitoring consideration must be given to how they will be financed and maintained long term.

It's also vital to consider how data will be analysed and by whom.

Dissemination and communication

For warnings to be effective they need to be accessible, easily understood, and actionable by those who are meant to receive them.

Things to consider when designing communications and dissemination strategies include people's access to technology, literacy, local languages, and how these factors might differ among groups within the same community. Regular review based on drills and real events should be carried out to identify gaps in your strategy and make improvements so warnings can reach more people who depend on them.

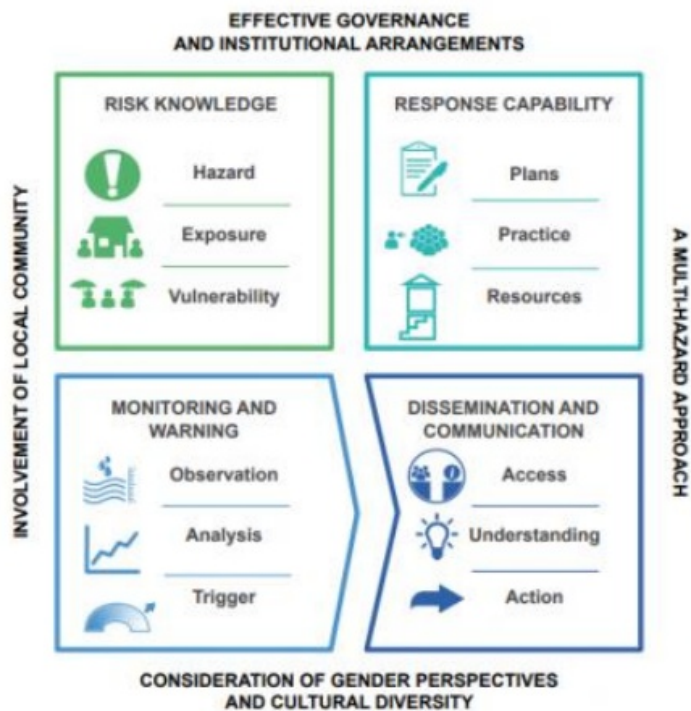
Examples of tools that can be useful for dissemination are mobile telephones (via text and voice messages), radio, television, sirens and loudspeakers (static and portable), trained volunteers going door to door, weather boards, and colour coded flags or lights.

Response capability

People need to have the capability to respond effectively to warnings they receive, this requires knowledge and practical skills which need to be kept up to date through communications and regular drills.

Everyone from government officials and emergency responders, to individuals living in a flood prone community needs to know what their responsibility is in the event of a flood, and what action to take to fulfill this.

The video below is from an annual pre-monsoon preparedness drill that is held every year in Nepal connecting government departments, the development organisation Practical Action, and local communities. It's a great example of how response capability is built.



Elements of an effective EWS. This diagram provides a useful way of framing these complex systems in order to understand the different elements that make up an effective EWS Source: adapted from World Meteorological Organization (2017)



Maintenance of Early Warning System monitoring station. Photo by Practical Action



Volunteers disseminating early warning message using megaphones and coloured flags during a drill.
Credit: Archana Gurung

