

Improving early flood warning for communities in Vietnam



October 2023 flood in An Dong ward, Hue City.
Photo: Hue City DRM

Key findings

Flooding is one of the most serious natural hazards in Vietnam. While flood early warning has improved significantly in recent years — reducing the damage caused by floods — many difficulties and challenges remain, especially related to flood forecasting and delivering early warnings to communities. The following are key limitations and challenges:

- **Changes in flood behavior and extremes:** Extreme flooding is becoming more frequent, unusual and diverging from historical patterns due to climate change, operational impacts, and improper development planning and urbanization. If forecasting and early warning do not fully and comprehensively consider these factors, the accuracy of early warning messages can be substantially undermined.
- **The content and usefulness of early warning messages:** Current flood warning messages mainly serve specialized state agencies, thus are often too complicated for community members to understand. For example, these warning messages mainly include information about rainfall, river water levels, and flood warning levels. Information useful for community members — such as when flood water is expected to reach the community, likely flood depth, possible flood scenarios, and actions people should take under each flooding scenario — are typically not provided.
- **Rapidity and redundancy in early flood warning:** The delivery of early flood warning messages to community members, especially vulnerable people and those living in remote areas, still lacks rapidity. This is due to several factors, including complicated and multi-step warning delivery procedures; limited human resources to support early warning delivery at the commune and community levels; shortage and inadequate maintenance of early warning equipment at the commune/ward level; lack of contingency planning for unexpected situations such as prolonged power outage, deeply flooded roads, or consecutive flooding events (such as the Central Vietnam flooding events in 2020).

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Training of officials from Dong Le ward, Mo O commune, Huong Hiep commune and Dong Ha City Economic Department, Quang Tri on early warning system assessment tools and indicators. Photo: Plan-international Vietnam

1. Introduction

This document is prepared based on the studies and findings of the Zurich Flood Resilience Alliance project¹ powered by Z Zurich Foundation, which is currently being implemented by ISET and Plan International (Plan) in Vietnam. The project involves 30 communities, including five communities in Thua Thien Hue, five communities in Binh Dinh, two communities in Can Tho, and 18 communities in Quang Tri.

A key task of this project is to assess and analyze the flood resilience of interested communities overtime against the Flood Resilience Measurement for Communities (FRMC) Framework. This framework examines 44 sources of resilience, including one about early warning systems. Four data collection methods were used in this process, namely household survey, focused group discussion, key information interview, and secondary data.

2. Issues and findings

Changes in flood behavior and extremes, due to both climatic and non-climatic factors, cause difficulties to flood forecasting and warning.

Forecasting for flood early warning is facing growing challenges because flooding is becoming more extreme and unusual, and diverging from historical patterns. For example, in October and November 2020, several storm and tropical depression events occurred one after another, causing four major consecutive floods in Central Vietnam, leading to significant human and asset losses. An unusual dry-season flood occurred in Thua Thien Hue in March 2022 with total rainfall of 250-400mm. Unusual events like these posed many

¹ <https://floodresilience.net/countries/?VN>

challenges to ensuring the accuracy and timeliness of early warning.

In addition, rapid changes in infrastructure and land use in urban and peri-urban areas — such as increased rates of concreting and levelling to build new urban areas in low-lying areas which play a role in flood moderation and storage and raising and building of new roads with inadequate drainage — are resulting in changes in water flow direction, flow speed, and flood depth. For example, although both the total rainfall and water level on the Huong River (at Kim Long station) in the October 2022 flood were lower than in the 2020 flood, the flood level at Nhi Dong Area of An Dong ward, Hue city was higher in October 2022 due to the impacts of urbanization. This situation could affect the accuracy of early warning, and challenge flood preparedness and response. Therefore, agencies working in disaster management in general and flood early warning in particular need to consider infrastructure and land use changes to make more accurate judgements and provide useful flood warning to communities.

Content and usefulness of early warning messages.

Currently, flood early warning messages often use specialized terminology from the meteorology and hydrology fields and are written mainly for the use of state agencies. Many people in the project areas said they had difficulty understanding the meaning of the warning messages or that the information they needed was not included in these messages. Normally, warning messages include information about rainfall and water levels at relevant monitoring stations; warning level, time, and discharge amount/rate if the province plans to release

water from hydropower reservoirs or irrigation lakes upstream; and recommendations on actions people need to take. However, the information that people really need and can easily understand is the expected level of flooding in the area where they live, the expected time when flood water will reach their community, reach peak level, and begin to recede, and how to prepare and act in response to different warning levels. This information is often not included in warning messages.

Rapidity and redundancy of early flood warning.

Currently, flood early warning messages are forwarded down a multi-tiered structure from the province to the district level and then to the commune/ward level, from which they are delivered to communities. In certain emergency situations, the Standing Office of the Provincial Steering Committee for Disaster Risk Management (DRM) can make direct phone calls to lower-level Steering Committees for DRM. However, this procedure for warning delivery takes a long time (about 2 to 4 hours for local people to receive the warnings). Moreover, warning delivery from the commune/ward level to community members can also be disrupted or delayed by the shortage and/or poor state of repair of equipment such as loudspeaker systems and portable loudspeakers. Meanwhile, the DRM groups responsible for delivering information to community members are quite thin, work on a volunteer basis, and are often not properly trained. These limitations were demonstrated clearly during recent flooding events such as the major flood in November 2020 in Nhon Binh and Nhon Phu ward, Quy Nhon city.

Furthermore, according to FRMC study results, **the delivery of flood early warning information in wards and communes** is often interrupted by power outages during prolonged severe flooding periods or consecutive flooding events (such as the 2020 flood in Central Vietnam). This is due to several redundancy-related factors such as: not having/preparing generators; and both DRM staff at the ward, commune, village, and neighborhood levels and households in general not having or preparing backup phone power banks. As a result, people cannot access information about flood developments and subsequent floods (if any). Village and neighborhood DRM groups also face many difficulties in delivering information using portable loudspeakers because travelling in heavy rain and flooding situations is very dangerous.

Finally, **the capacity for forecasting and early warning of anomalous floods is limited.** For example, people in Quang Thai commune, Quang Dien district, Thua Thien Hue province said they did not receive proper and timely warnings about the dry-season flood in March 2022. The shortfall in the early warning of this flood showed up in the project’s study results (Figure 1 and Figure 2).

3. Recommendations

Flood early warning is a very important part of disaster risk management and resilience building. However, successful flood monitoring and early warning require accuracy and timeliness of warning messages and need to ensure that people receive the necessary information, can understand the warning content, and know how to act in response.

Figure 1 Comparing the effectiveness of early warning in Quang Thai commune, Quang Dien, Thua Thien Hue

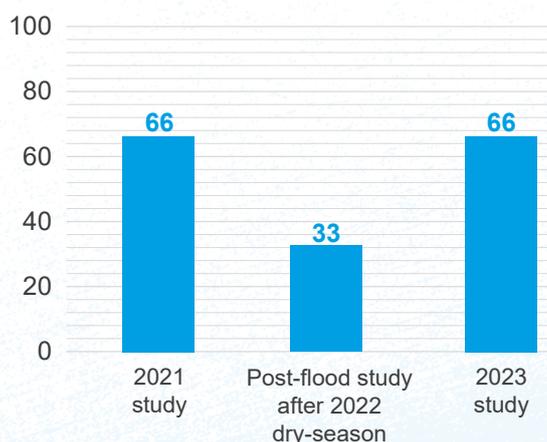
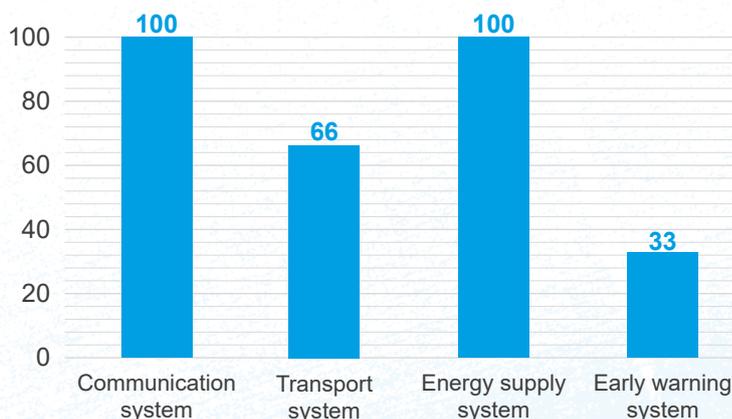


Figure 2 The effectiveness of early warning system compared to other systems during the dry-season flood in 2022 in Quang Dien district, Thua Thien Hue



The following recommendations highlight opportunities to strengthen early warning to achieve these goals:

- **Develop and periodically update a simple, real-time flood modelling tool in each province/city** to identify typical flood scenarios, taking into account both hydro-meteorological and non-climatic factors such as changes in infrastructure and elevation from construction and urban development, etc. This tool would help provide information to support forecasting and early warning about flood patterns and flood



Staff of Dong Le Ward, Dong Ha City, Quang Tri province assessing the early warning system with the participation of various community stakeholders. Photo: Plan-international Vietnam



Smart flood gauge, co-funded by the FRMC project and Watec company, installed in Quang Thai and Quang Tho communes, Quang Dien district, Thua Thien Hue. The flood gauges measure flood water depth, send warning signals, and are automatically connected to the national hydrometeorological data system. They are equipped with a small solar panel and backup battery so that it can operate without power for up to 30 days. Photo: Hue City DRM

scenarios in each province/city. The tool should be as simple as possible to ensure that provinces/cities can use it easily and can update it with their own budget and human resources.

- **Simplify the content of flood early warning messages to make them more understandable.** In addition to the stipulated information, messages should provide information about the expected flood depth, the expected time when flood water will arrive, reach peak level, and start to recede, possible flood scenarios, and recommendations on actions that people should take corresponding to each warning level.
- **Strengthen flood early warning communication and the delivery of warning messages to DRM staff from provincial to commune and community levels.** Streamlining the delivery of messages so that they can be delivered more rapidly provides households with more time to prepare and take action to secure themselves and their assets. At the same time, organize awareness raising and capacity building for communities on flood early warning, reliable sources of flood early warning information, and how to respond under each emergency flood warning level so that they are better prepared to act quickly when they receive warnings.
- **Develop contingency plans to ensure continuity in delivering flood early warnings to community members** in situations such as prolonged power outages, or failure of official communication channels. Some measures to consider are: (i) diversifying with new information channels such as Zalo, Facebook, and apps connected to smart rainfall and water level monitoring systems; (ii) equipping the Steering Committees for DRM of wards and communes with backup generators or solar powered systems, and providing backup phone power banks to forces working on disaster prevention and control; (iii) providing sirens or gongs to alert people in case other communication channels do not work, and setting up rules and providing instructions on the meaning of siren and gong signals.
- **Conduct periodic assessments of early warning systems at local levels** to detect shortfalls and limitations in forecasting, early flood warning, and communicating information to communities, especially to disadvantaged groups such as the elderly, people with disabilities, migrant workers and students from other provinces.