

## PROPUESTA DE TEXTO DE INGLÉS - 1

### Disaster mitigation and preparedness: flood forecasting and warning

Flood forecasting and warning systems are an integral part of emergency and floodplain management. Effective flood warning systems maximize the opportunity for the implementation of response strategies aimed at securing the safety of people and property, and reducing avoidable flood damage. The total flood warning system concept has been promoted to represent all of the elements of a system that need to work together to provide effective forecasts and warnings. The total system includes elements of monitoring, prediction, interpretation, message construction, communication and protective behaviour. For flood warning systems to be effective, they must provide information for emergency service groups and the public, that is timely; accurate, easy to understand and clear in its practical application.

Specific requirements will depend on local conditions, including the scale of the problem and the level of access to information. However, as a general principle, initial requirements are:

- Advance warning of when a river will reach a specified height that will cause flooding.
- Sufficient warning lead-time for appropriate protective action to be taken.
- Awareness of the potential future level of flooding.
- Assure awareness of the flood risk in the threatened community.

Basic hydrological information, river height and flow, catchment modelling capabilities and any additional weather information that will contribute to the warning lead-time are essential factors to the forecast and warning agency.

### Concerns of information providers and user expectations

The primary issues and concerns for information providers include the operation and maintenance of monitoring systems, the quality of modelling capabilities, the accuracy (measure of uncertainty) of the forecast and the amount of warning lead-time that can be provided. In particular, key steps undertaken by information providers include the operation of in-situ monitoring and measuring devices (both rainfall and river level) and the development of hydrological models that can use current and forecast information to provide estimates of future flood levels.

Information user including the emergency services, industry, the community at risk and the media, are primarily concerned with access to the information, its accuracy, and understanding the actions they need to take. Users expect to receive accurate and timely information on which they can make specific decisions and undertake prescribed actions, such as providing supplies and equipment, prompting evacuations or building sandbag levees. Users also need information on the expected period of inundation, the possibility of follow-up events and the status of key services such as power, water supply and sewerage.

A further issue is that providers need to be prepared to “persuade” users. Users must be sensitized to the information that will be provided, so that they are ready

to take the right action. Public education also plays a role here, but it is not the whole story.

In the case of floodplain management, users require advance information on areas and services at risk of flooding. This allows them to undertake appropriate and effective land-use planning, thus mitigating the impacts of future flooding. Such information is also valuable in the development and construction of physical flood control works. However, a balance between structural and non-structural measures aimed at living with floods' is promoted.

### **How to optimize information delivery**

Delivery processes usually fall into 'push' or 'pull' mechanisms. Because of the need to deliver information promptly and efficiently to all of the required recipients, most information is provided using push techniques. These will vary from situation to situation, but include facsimiles, phone calls, SMS messages, e-mails, sirens, loud speakers, radio, television and word of mouth. The delivery mechanism will depend on the characteristics and location of the community at risk, the amount of lead warning time required and the capabilities and limitations of the early warning system in place.

Consultation and communication are therefore the key elements in determining the optimum delivery mechanism in each case. This must involve discussions and input from all of the responsible authorities and stakeholders, and in particular the community at risk. National Meteorological and Hydrological Services, water authorities, emergency service agencies and local government groups must work together to develop and implement sound and sustainable systems. The community at risk must understand when it is best to implement prescribed actions, and the possible consequences of such actions. The media can therefore play a significant role by warning of danger, but also by contributing to community education and preparedness.

The importance of community awareness should not be overlooked. The use of pamphlets, fridge magnets, newspaper articles, school education programmes, television shows and community groups should be strongly considered. In particular the Internet is invaluable as both an information source and a service delivery mechanism.

### **Bridging the gap between users and providers**

A healthy relationship between users and providers is essential, but presents numerous challenges. A fundamental, shared understanding of the risk that floods represent is needed. This includes the recognition that floods are event-based and can occur at any time, but also that there can be long periods between events, during which awareness can decline.

In a more practical sense, it is imperative that the maintenance and operational capability of service providers is ensured, and that users understand the importance of the sustainability of these systems. Furthermore, users must be aware of, and grasp the implications of the capabilities and limitations of the warning systems. This includes the vital understanding that the total system will only be as strong as its weakest link, and therefore all components must be regularly reviewed and

examined. Lastly, both parties must appreciate that advances will require an investment in research to improve the scientific and technical facets of the service.

Service providers, of course, have an equal responsibility to maintain the relationship. They must understand the specific requirements of the users in each situation, determine the key trigger points as well as when and what type of action should be taken. However, it is also necessary to consider social and cultural issues. There is no one specific solution for all situations, and even within a community, vulnerabilities differ and thus require different approaches for the effective warning of each group. There should also be common recognition that with growing populations and economies, and also the possible implications of climate change, the community at risk may be increasing and therefore that problems can arise in previously unaffected areas.

Ultimately, success relies on a balance in the relationship between the users and providers. Vitally, contact must be maintained between the two. Most users and providers have other roles and responsibilities, and therefore interaction and coordination must be formally set in place and regularly reviewed. It is also vital to recognize the important role of the media in the provision of services, and to consider how to optimise this under current arrangements. Finally, adequate feedback and event review mechanisms must be implemented, with the conditional understanding that mistakes will occur and that while negative consequences can be minimized through the application of risk management approaches, having resilient community structures in place to learn from such failures is also essential.

**Elements for life. WMO 2007. Págs. 127-128.**