Establishing an Integrated System

There are a number of steps that should be followed in establishing an integrated flood forecast, warning and response system. These steps are very important and have been introduced in greater detail earlier in these Guidelines. The intent of this section is to provide a brief overview of these steps. In doing so, there will be some reiteration of previously introduced concepts and material

The first step for a community, country or region is to conduct an assessment of the existing flood forecast programme Each of the links or components of the forecast system should be evaluated as to its effectiveness.

After the existing system has been assessed, a new and improved system can be designed. The new system design should strengthen the weak links of the existing forecast system, meet the needs of the users, and provide sufficient accuracy and lead time to reduce flood losses to the maximum possible extent Like any other project, the new forecast system will be subject to cost constraints and must therefore concentrate on those improvements that will yield the greatest benefits in terms of reducing human and economic losses

Frequently financial institutions supporting flood forecast modernization projects will require an economic analysis or feasibility study to determine the benefits versus the costs of the project and subsequent programmes. Usually there are significant economic gains that can be realized by investing in an integrated flood forecast system. For example the U.S. National Oceanic and Atmospheric Administration National Weather Service (NOAA/NWS) is proposing investing $US 60 million in the Advanced Hydrologic Prediction Services (AHPS) project. The economic analysis demonstrated benefits of $US 360 million per year from reducing flood losses and from providing forecasts to the water management sector of the economy.

The following are steps required for establishing an improved integrated system. Each of these components should be considered in the overall design with emphasis on strengthening the weakest links within the existing system.

- Design improved meteorological observing network
- Design improved hydrological network (precipitation and stream gauges)
- Automate the meteorological and hydrological networks
- Establish real-time communication system to move data reliably from field to the forecast office
- Establish operational network maintenance plan
- Determine feasibility of existing and new ground-based radar for estimating quantitative precipitation products
- Determine feasibility of using geostationary and polar orbiting satellite products
- Integrate in-situ precipitation data with satellite and radar precipitation estimates
- Establish hydrometeorological database and management system
- Select hydrological and hydraulic models appropriate for river basin conditions and needs of the users
- Establish real-time linkages between databases and modelling system

- Link numerical weather prediction model products to the hydrological forecast system (Quantitative Precipitation Forecasts and Climate Forecasts)

- Determine the training needs for new hydrological forecast methods versus current forecaster knowledge

- Establish training programmes and materials

- Design real-time communications system to disseminate routine forecasts and warnings to target audiences (e.g., communities, media, mayors, government officials)

- Establish user group networks and protocols to interact with forecasters and system outputs to ensure forecast products are appropriately designed for the users

- Establish an "Operations Concept" that defines how the hydrological forecast centre will operate in routine operations as well as during major flood episodes in the improved system

- Establish response strategies with communities, emergency services, and civil protectorate organizations

Once the design of the improved integrated system has been completed, this design must then be incorporated into a project proposal with associated costs and time lines for approval by the various governmental entities involved, as well as by donor and financial institutions. Once approved, a detailed implementation plan must be developed. It should show how the various components of the new system would be completed and integrated into a sustainable forecast programme.

The science and technology required to produce a fully integrated flood forecast and response system are available today. There are many systems now operating that have achieved a high degree of integration and sustainability. Cooperation amongst levels of government, ministries, civil society and private industry is absolutely necessary to achieve an integrated programme. Interaction between meteorological and hydrological organizations is essential for establishing a viable flood forecasting, warning and response programme.

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Annex

Case Study 1: Community Education

Practical experiences in preparing a community for a disaster in the Philippines

As a hazard strikes a community, the degree of preparedness of the local population and the local authorities sometimes spells the difference between the occurrence of a disastrous event or one that the community can cope with. In areas where a hazard regularly "visits", the population build methods for coping with it, even though it may be in an unorganized way. The demand for survival forces people to "invent" ways to withstand a disaster. On the other hand, local authorities who already know the cycle of disaster management often lack the skills and/or resources to undertake activities to operationalize the measures for risk reduction Such is the case in the Philippines, which has comprehensive legislation to address disaster events. The provisions of this law mandate the national. regional. provincial, city/municipal, and village officials to organize "Disaster Coordinating Councils/Committees" (DCCs) with delineated functions and to conduct a series of activities to operationalize these functions.

Lack of or limited resources at all governmental levels are cited as the usual reason for the lack of support to the formation of these village structures. However, this situation can be improved if the local authorities encourage the participation of the local population. The quality of participation that seems to be most suited to the formation of an involved community is one that is not forced or coerced

The village of Talba, in Central Luzon, Philippines, with a population of 779 families or 4,674 people, was situated along a river through which lava from Mt. Pinatubo had flowed. The possibility of an overflow of the river in the near future was a real danger. A non-governmental organization (NGO) focusing on disaster management was requested by a health-service NGO working in Talba to assist in the training and setting-up of a disaster management group in the community. The NGO established a community-based group, known as Barangay Disaster Response Organization. The participation of a Barangay councilman in this affair facilitated the interface between the Barangay Disaster Coordinating Committee and the people's organization, by making the members of the latter group also members of the committees of the former group. The Barangay Disaster Response Organization, however, maintained its identity by holding regular meetings with other organizations and stakeholders in the village.

Among the first activities of the community's disaster mitigation plan were the sandbagging of the area along the river's route and the construction of an "uplifted" walking path for the residents, which was also made of sandbags. The sandbags along the shoreline were intended to slowdown the flooding of the area in case a rampaging lava flow was to strike the village. In 1995, a lava overflow destroyed the village of Talba. In that event, the government communication system was disrupted and failed to give the proper warning to the residents. It was the parallel warning system developed by the community people that warned them on time to evacuate the area and avoid any loss of life. Resources of the community, such as privately owned small boats, jeeps and a truck, were used to move the village's population to safety.

In the Talba experience, the local authorities were "open" to the engagement of the people's organization and agreed to a cooperative approach. The involvement of a Barangay councilman in the people's organization enhanced this cooperation. This also points to the willingness of some local authorities to share their responsibilities with the local populace This kind of cooperation enhances their relationship. Allowing the people's organization to maintain its identity, instead of co-opting it or forcing its integration with the government structure increased the "goodwill" and facilitated mutual support between the two sectors. A trained and organized village community can undertake lifesaving measures that complement the goals of the local authorities. They can initiate activities that can be sustained even after the occurrence of disasters. Therefore, in areas where active civil organizations or groups can be engaged to complement a local government's limitations, their participation has been proven to ensure the community's welfare in the face of disaster.