

## **PLANNING AND PREPARATION FOR HAZARDS ON DIFFERENT TIME-SCALES**

*Over the years, this community has learned to plan and prepare for tropical cyclones and associated phenomena, such as floods and landslides. Elsewhere, other communities have to face other hazards which are of different size and occur on completely different time-scales.*

Tropical cyclones are large, powerful systems, whose life cycle and behaviour are well known and whose movements are predictable 48-72 hours ahead. Meteorologists can observe and forecast the onset and evolution of both tropical and extratropical cyclones, and can track them quite easily. Other hazards, on the other hand, behave quite differently, with each having its own unique features which must be coped with. The planning cycle of mitigation, preparedness, response and recovery will consequently be somewhat different for each hazard. The examples of tornadoes and droughts will highlight certain commonalities and specific differences in recommended responses.

### **Tornadoes**

A great deal is known about tornadoes, their awesome power and destructive capability, and in which regions they are most likely to occur. Tornadoes are violent windstorms, characterized most often by a visible, twisting, funnel-shaped cloud that reaches from the thunderstorm cloud base to the ground. Tornadoes are spawned from severe thunderstorms (they also sometimes result from tropical cyclones) and can be accompanied by lightning and hail, and by heavy rains that can result in flash floods.

A tornado can last from minutes to more than an hour, but most last for 10-20 minutes. This short life-span makes the warning of tornadoes one of the most difficult tasks for National Weather Services, which are the official sources of tornado forecasts. Because tornado development is quite well understood, the conditions likely to cause them can be seen up to a day or two in advance in model output. The Weather Service forecast teams are extremely vigilant, consulting satellite and radar imagery, studying data from wind

profilers, land stations, upper-air balloons, and lightning sensors, for early signs of development. Too many small-scale factors are involved for accurate forecasting several days ahead of convective activity. Also, tornadoes are eccentric during their short lives. Detailed predictions of how many will form or the path along which they will travel are therefore not possible at present.

National Weather Services, specialized prediction centres and research institutes study tornadoes, their occurrence, characteristics and risks, and develop forecasting techniques and warning services that can be of considerable use in mitigation and preparedness phases. Climatological information is used to strengthen building codes and helps influence structural design for extreme wind situations. In the short-term, the National Weather Service issues watches for and warnings of tornadoes. When a watch is called, people are advised to locate their family members and make sure everyone has access to shelter. As with any other hazard, it is wise to have on hand an emergency kit with a flashlight, radio, first-aid materials, emergency food and water and essential medication.

If a tornado is seen, or if radar shows the characteristic signs of one developing, the Weather Service will immediately issue a warning. People will perhaps have only minutes to take shelter. Experts advise that safe shelter would be a windowless, interior room in a basement, or the lowest place possible in a building—a small inner room like a closet could be safe. It is important to stay away from windows because of breaking glass, and to get out from under wide-span roofs such as in auditoriums. If caught outdoors, people are advised not to take shelter under a bridge, to get out of their cars and to lie low in a ditch (but to beware of flash flooding).

Once the tornado has passed, it is wise to stay tuned to the National Weather Service broadcasts, in case there is more to be braced for. People are advised to stay out of damaged buildings until they are inspected, to avoid downed power lines and to be alert to chemical spills, water contamination, gas leaks and fires.