Dynamics of Disasters

High wind disasters

The term "high winds" covers a range of phenomena given different names in different parts of the world, including typhoons, hurricanes, cyclones, tornadoes and tropical storms. Because of their similar impact on coastal communities, tsunamis are also included here

Tropical and sub-tropical countries are the most exposed to high winds, and there is a range of clear predisposing factors for high wind disasters, particularly the location of human settlements in exposed, low-lying coastal areas and near hills or mountains prone to landslides. With such settlements, poor quality structures, especially in construction weight and stability, increase the risk of damage and loss of life, as do the loss of trees, which act as wind breaks, and the lack of protective works, dikes or embankments. As always, the relative wealth of families and strength of community services will also affect on people's ability to recover after disaster.

Tropical storms are the commonest form of high winds, and the cause of storm surges. They can occur in ocean areas at latitudes close to the equator when water temperatures reach 27°C. Storms are tracked by meteorological surveillance and internationally-coordinated warning organisations, giving opportunities for early warnings.

Forecasts of broad landfall areas are possible one or two days in advance but accurate landfall predictions are not usually possible until a few hours before, as storms can change speed and direction unpredictably. That lack of precision makes it difficult to communicate credible forecasts to those at risk.

The trigger for a high-winds disaster is a weather system of cyclical, high-speed winds of 100-300kph accompanied by heavy rain and sharp differences of atmospheric pressure, over an area usually at least 100kms in diameter.

Humid air twists up from warm sea water into cooler air and the tropical storm moves forward at 10-50kph, increasing in strength until it passes over land or cooler water. In the northern hemisphere the wind circulates anti-clockwise and storms generally move north-west; in the southern hemisphere the wind circulates clockwise and storms generally move south-west.

Reduced pressure at the centre of the depression can cause sea levels to rise by up to one metre, with high winds also building up waves. Gradual slopes from the sea bed to shore slow the "drainage" of water back into deeper areas and increase the effect of water piling up. The effect is increased by tides, while the storm's heavy rains can create flash floods

Tsunamis, sometimes inaccurately dubbed tidal waves, are the result of undersea earthquakes, which create a wave or waves of a few centimetres or metres in height spreading out from the epicentre at up to 600kph

As the sea becomes shallower closer to shore, wave speed falls to perhaps 20kph but its height will increase to up to 15 metres. Normal seismic observations will be able to monitor the earthquake but, without good communications, their speed and near-invisibility until close to shore make local tsunami warnings difficult.

Storm winds, pressure differentials, flooding, storm surges and landslides will all engulf coastal settlements, damaging and destroying housing, factories, infrastructure. Flooding and storm surges will sweep away boats and nets, damage standing crops and trees, and cause erosion, while salt water can affect crops, land and water supplies.

Landless labourers and people living by or close to the shore with limited or no land rights will be most vulnerable to high wind disasters, especially in areas where community resources and organisation are low, hindering the construction of embankments or dikes to control storm surges. Those lacking land rights are doubly vulnerable; they will be the last to leave their land, fearing loss of whatever rights they possess, and will have fewer resources before or after a disaster.

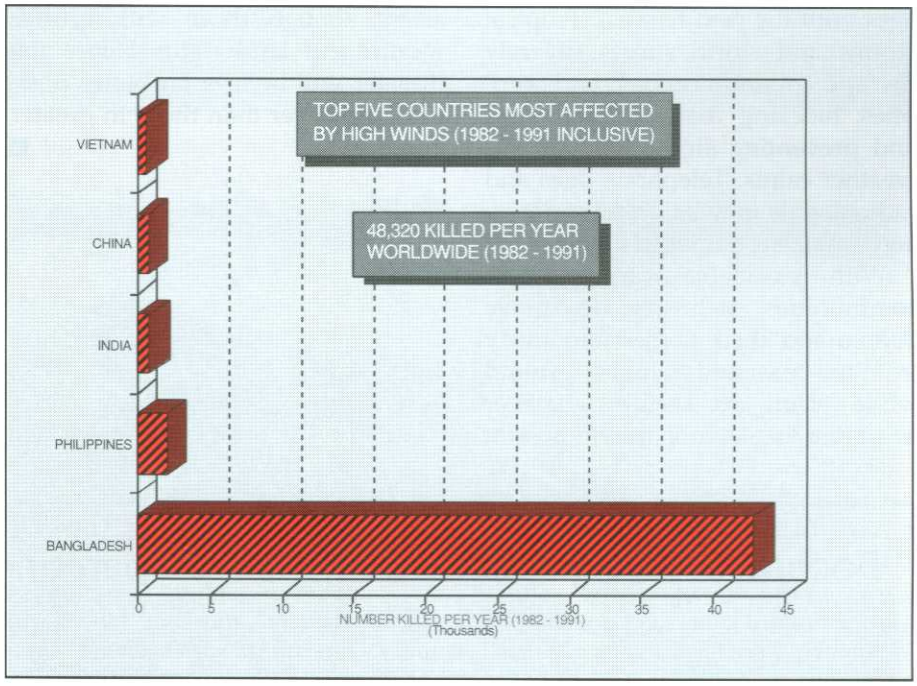

Figure 14a: Top five countries affected by high winds, numbers killed. High winds, including cyclones, typhoons and hurricanes, kill more than 48,000 people a year.

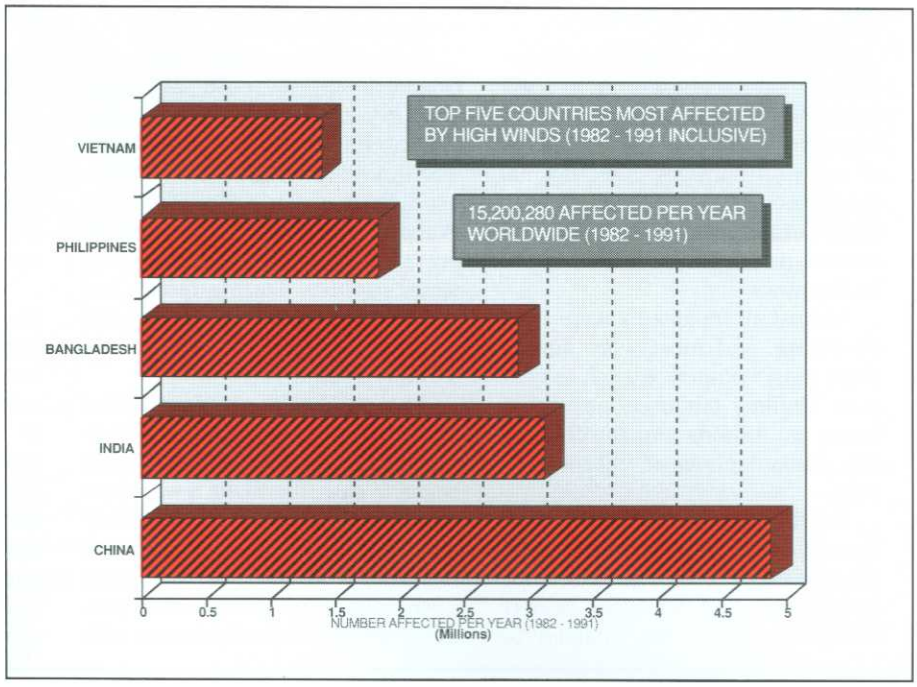

Figure 14b: Top five countries affected by high winds, numbers affected. The countries of coastal Asia, exposed to cyclones, are home to the majority of those affected by high-wind disasters.

Storm winds alone cause few casualties, usually from flying debris, but storm surges can cause a high loss of life, though relatively few severe injuries. Flooding can increase disease risks. Apart from improving conditions for malaria mosquitoes, floods may temporarily contaminate wells and other ground water supplies, while animal bodies, human corpses or sewage may cause longer-term contamination.

Damage to standing crops and food stores often means food shortages until the next harvest. Tropical storms and storm surges severely disrupt communications and supplies, blocking road and rail links and preventing air traffic until the weather calms. Telephone lines and radio aerials may be brought down, and transport damaged.

With reasonable warning, local communities will try to move people and their possessions away from the coast and to higher ground while trying to secure whatever must remain. As soon as winds calm and the flood waters recede, the local community will begin searching and salvaging. In the short term, they will require temporary shelter, food and safe drinking water, and help with transport and communications; in the longer term, help with rebuilding, and support for agricultural and fisheries.

Destruction of homes, crops, stores, transport and other possessions will undermine the livelihoods of all those affected, making them even more vulnerable to future disasters, though those with greater wealth and land rights before the disaster will be in a far better position to recover than those in greater poverty. ■

Focus 16: Bangladesh 1991, local preparedness for response

With a third of its land a metre or less above sea level and its position in a cyclone belt, with peak activity in May and October, Bangladesh has suffered a succession of disasters from high winds.

A severe cyclonic storm hit coastal areas on the night of 29-30 April 1991. With hurricane winds reaching over 225kph and storm surges of up to 10 metres over normal tides, the cyclone killed 138,000, made millions homeless and caused damage worth billions of Swiss francs.

Almost all the deaths were from drowning, and most were among those most vulnerable, such as very poor landless labourers and those living on islands unprotected by any embankments or natural barriers.

But the number of deaths would have been far greater if the cyclone preparedness programme of the Bangladesh Red Crescent Society (BDRCS) had not enabled 62 cyclone shelters (out of the country's total of 315 such shelters) to be built, complete with a 57-station radio communications network covering the entire Bangladesh coastal belt.

Following warning of the cyclone's approach on 25 April, BDRCS mobilised its 100-plus staff and more than 25,000 volunteers to warn millions of people of the impending disaster, with advice on evacuation or preparation, including the need to bury food and water supplies. During rescue and evacuation work, 21 Red Crescent volunteers died and 776 were severely injured.

At least 125,000 people crowded into the Red Crescent cyclone shelters and, when the wind and rain began to ease, the BDRCS went into action, using its warehouse, 100 relief centres, truck fleet, permanent staff and volunteers to distribute 7,946 tonnes of food, water purifying tablets, oral rehydration salts and clothes to hundreds of thousands of people.

With many communication channels damaged, the BDRCS telecommunications network was used by the Society to relay accurate information about the disaster's impact, people's needs and available supplies.

Red Crescent medical teams were deployed in 100 locations, treating up to 10,000 people a day and reporting 30-40% affected by diarrhoeal diseases.

The Federation issued an appeal on 2 May 1991 for 12 million Swiss francs, and 18 Federation delegates assisted the BDRCS for up to five months. The appeal generated over 15 million Swiss francs. Within 10 weeks of the cyclone, while relief operations were still going on, the BDRCS met to decide priorities for rehabilitation and disaster preparedness, including tripling the size of its cyclone shelter and telecommunications network.

High wind disasters: People who live on the coastal lands most badly hit by cyclones are reluctant to leave their homes and land until the last minute. Women are often the last to leave and the least able to escape.
India, 1977. Raghu Rai/Magnum.