

RESPONSES TO HAZARDS

Coping with hazards

How people adjust to hazards depends on:

- the type of hazard
- the risk (probability) of the hazard – several factors influence how people view risk
- the likely cost (loss) caused by the hazard.

Ways of managing the consequences of a hazard include:

- modifying the hazard event, through building design, building location and emergency procedures
- improved forecasting and warning
- sharing the cost of loss, through insurance or disaster relief.

Responses to hazards are very varied. For example, following the LAquila earthquake in Italy in April 2009, many Italian companies offered help. Mobile phone companies such as Vodafone Italy and Telecom Italia Mobile sent free credit to pre-paid customers, free mobile phones and SIM cards. However, Italy's Prime Minister Silvio Berlusconi refused foreign aid, stating that the Italians were a 'proud people' and had sufficient resources to cope with the event.

A contrasting example is that to Hurricane Katrina in 2005. Here there was a very slow internal response to the disaster. The US President George W. Bush underestimated the impact of Hurricane Katrina, and failed to visit the area for three days.

The Federal Emergency Management Agency (FEMA) had some disaster recovery response in place before Katrina hit. However, there was widespread criticism of the government's response – in particular the delayed response to the flooding of New Orleans. The images relayed worldwide of people stranded by floodwaters, evacuees in the Superdome (designed to accommodate 800 refugees but apparently some 30,000 arrived) only served to put pressure on the authorities dealing with the disaster. US President Bush appointed Michael Chertoff in charge of co-

Figure 1: Stages in a disaster – temporal sequences or phases that may be involved in disasters, with reported durations and selected features of each phase

I Preconditions	
Phase 1	Everyday life (years, decades, centuries)
	'Lifestyle' risks, routine safety measures, social construction of vulnerability, planned developments and emergency preparedness.
Phase 2	Premonitory developments (weeks, months, years)
	'Incubation period' – erosion of safety measures, heightened vulnerability, signs and problems misread or ignored.
II The disaster	
Phase 3	Triggering event or threshold (seconds, hours, days)
	Beginning of crisis; 'threat' period: impending or arriving flood, fire, explosion; danger seen clearly; may allow warnings, flight or evacuation and other pre-impact measures. May not, but merging with:
Phase 4	Impact and collapse (instant, seconds, days, months)
	The disaster proper. Concentrated death, injury, devastation. Impaired or destroyed security arrangements. Individual and small group coping by isolated survivors. Followed by or merging with:
Phase 5	Secondary and tertiary damages (days, weeks)
	Exposure of survivors, post-impact hazards, delayed deaths.
Phase 6	Outside emergency aid (weeks, months)
	Rescue, relief, evacuation, shelter provision, clearing dangerous wreckage, 'organized response'. National and international humanitarian efforts.
III Recovery and reconstruction	
Phase 7	Clean-up and 'emergency communities' (weeks, years)
	Relief camps, emergency housing. Residents and outsiders clear wreckage, salvage items. Blame and reconstruction debates begin. Disaster reports, evaluations, commissions of inquiry.

Figure 2: Changes after a natural disaster

Periods	Emergency	Restoration	Reconstruction I	Reconstruction II
Capital stock	Damaged or destroyed	Patched	Rebuilt (replacement)	Major construction (commemoration, betterment, development)
Normal activities	Ceased or changed	Return and function	Return at pre-disaster levels or greater	Improved and developed

ordinating the response. Both the President and Mr Chertoff received criticism for the lack of planning and coordination. In addition, the Mayor

of New Orleans, Ray Nagin, was criticised for failing to implement the evacuation plan until just 19 hours before the hurricane hit land.

Changing priorities

In the immediate aftermath of a disaster the main priority is to rescue people. This may involve the use of search and rescue teams and sniffer dogs. Thermal sensors may be used to find people alive among the wreckage. The number of survivors decreases very quickly. Few survive after 72 hours, although there were reports from Sichuan of people surviving for nearly 20 days – such survival is extremely rare. Rehabilitation refers to people being able to make safe their homes and be able to live in them again. Following the UK floods of 2007, some people were unable to return to their homes for over a year. For some residents in New Orleans, rehabilitation was not possible, so reconstruction (rebuilding) was necessary. This can be a very long, drawn-out process, taking up to a decade for major construction projects. The time-scales involved are shown in the model of disaster recovery below. As well as dealing with the aftermath of a disaster, governments try to plan to reduce impacts of future events. This is sometimes called hazard mitigation. This was seen after the south Asian tsunami of 2004. Before the event, a tsunami early warning system was not in place in the Indian Ocean. Following the event, as well as emergency rescue, rehabilitation and reconstruction, governments and aid agencies in the region developed a system to reduce the impacts of future tsunamis. It is just part of the progress needed to reduce the impact of hazards and to improve safety in the region.

Cyclone Nargis

Cyclone Nargis was a strong tropical cyclone. It formed on April 27 2008, made landfall by 2 May and died out by 3 May. It contained winds of up to 165 kmph (sustained for 3 minutes) and winds of over 215 kmph (sustained for over 1 minute). At its peak, air pressure dropped to 962 mB. Around 146,000 people were killed and an estimated \$10 million damage occurred. As well as Burma (Myanmar), parts of Bangladesh, India and Sri Lanka were affected. However, it was the Burmese government's actions – or rather their lack of them – that caused widespread anger and disbelief.

Figure 3: A model of disaster for urban areas

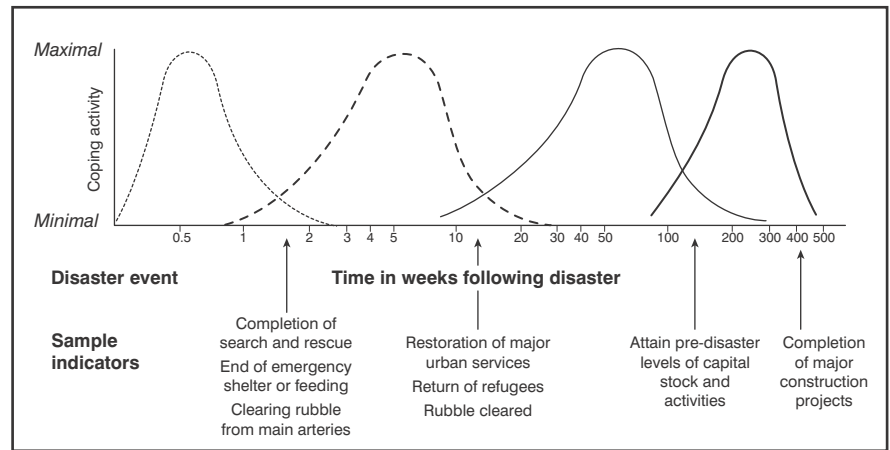
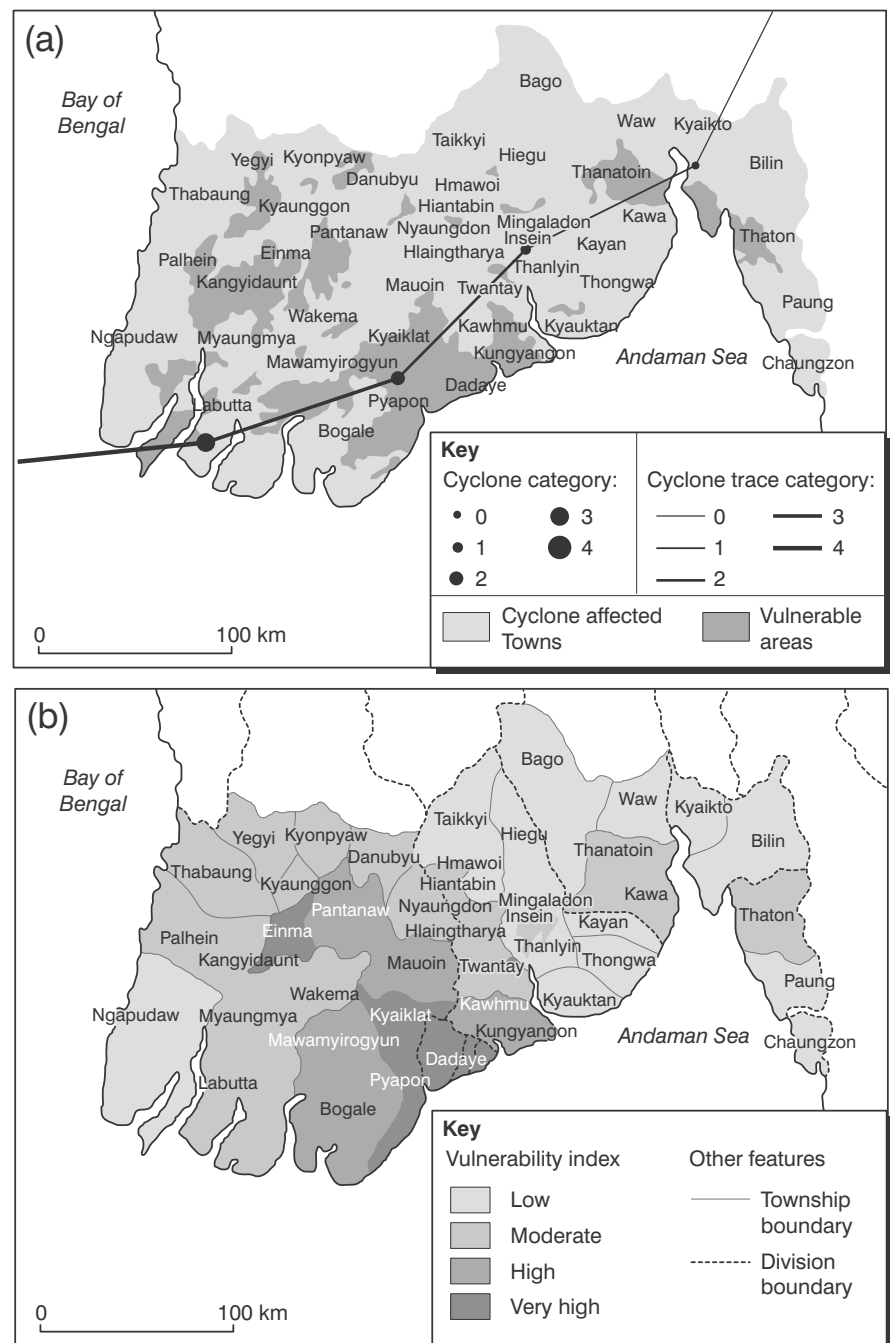


Figure 4: Cyclone Nargis (a) affected areas and cyclone path; (b) most affected areas by % of population and artea



Source: <http://apb.directionsmag.com/archives/4326-Johns-Hopkins-Research-Maps-Affected-Cyclone-Nargis-Burma-Regions.html>

The Burmese government identified 15 townships in the Irrawaddy delta that had suffered the worst. Seven of them had lost 90–95% of housing, with 70% of their population dead or missing. The land in the Irrawaddy delta is very low-lying. It is home to an estimated 7 million of Burma's 53 million people. Nearly 2 million of the densely packed area's inhabitants live on land that is less than 5 m above sea level, leaving them extremely vulnerable. As well as the cost in lives and homes, there is the agricultural loss to the fertile delta, considered Burma's rice bowl.

It was the worst-ever natural disaster in Burma. There were over 80,000 deaths in Labutta and a further 10,000 in Bogale. The UN estimated that 1.5 million people were severely affected by Cyclone Nargis. Thousands of buildings were destroyed; 75% of the buildings in the town of Labutta collapsed and a further 20% had their roofs ripped off. Up to 95% of buildings in the Irrawaddy Delta were destroyed.

According to aid agencies trying to get into Burma, up to one million people could have died from the cyclone due to lack of relief. Relief efforts were delayed for political reasons. Burma's political leaders declined international aid; the World Food Programme said the delays were 'unprecedented in modern humanitarian relief efforts'. Within two weeks, the earthquake in China had deflected aid and sympathy away from Burma.

On May 6 the Burmese junta (military government) finally asked the UN for aid, but accepted it only from India. Many nations and organisations hoping to deliver relief were unable to do so – the Burmese government refused to issue visas to many of them. On May 9 the junta officially declared that their acceptance of international aid would be limited to food, medicines and other supplies as well as financial aid, but would allow additional foreign aid workers to operate in the country.

India is one of the few countries to maintain close relations with Burma. It launched Operation Sahayata under which it supplied two ships and two aircraft. However, the Burmese government denied

Figure 5: The location of the Sichuan earthquake



Source: <http://www.maps-of-china.net/wenchuan-earthquake-map/index.html>

Indian search and rescue teams and media access to critical cyclone-hit areas. On May 16, India's offer to send a team of 50 medical personnel was accepted. Cyclone survivors needed everything – emergency shelter to keep them dry, as well as all basic food and medicines.

Many Burmese people were displeased with their government, which had provided no warning of the cyclone. According to some reports, Indian meteorologists had warned Burma of Cyclone Nargis 48 hours before it hit the country's coast. In addition, people believed the mayhem caused by the cyclone and associated flooding was further exacerbated by the government's uncooperative response.

The delays attracted international condemnation. More than a week after the disaster, only one out of 10 people who were homeless, injured or threatened by disease and hunger had received any kind of aid. More than two weeks later, relief had only reached 25% of people in need. Associated Press news stories stated that foreign aid provided to disaster victims was modified to make it look like it came from the military regime, and state-run television continuously ran images of General Than Shwe ceremonially handing out disaster relief.

Uninterrupted referendum

Despite objections raised by the Burmese opposition parties and foreign nations in the wake of the natural disaster, the junta proceeded with a previously scheduled constitutional referendum. Voting however was postponed from May 10 to May 24 in Yangon and other areas hardest hit by the storm.

2008 Sichuan earthquake

The Sichuan earthquake occurred on 12 May 2008 and registered magnitude 7.9 on the Richter Scale. The earthquake left over 69,000 dead, over 374,000 injured and over 17,900 people missing. There were over 42,000 aftershocks, of which between 149 and 284 were major.

The earthquake was caused by the northward pushing of the Indian Plate. The convergence of the two plates generally leads to the uplift of the Asian highlands. The earthquake was also felt in Beijing and Shanghai, over 1500 km away. On 6 November 2008, the Chinese government announced that it would spend 1 trillion yuan (about \$146.5 billion) over three years to rebuild areas ravaged by the earthquake.

Immediate aftermath

Office buildings in Shanghai were evacuated. Chengdu airport was shut down. All of the highways into

Wenchuan and others throughout Sichuan were damaged, resulting in delayed arrival of the rescue troops.

Officially the quake caused 69,181 known deaths, including 68,636 in Sichuan province; 18,498 people were listed as missing, and 374,171 injured. The estimates include 158 earthquake relief workers who were killed in landslides as they tried to repair roads.

The earthquake hit an area that has been largely unaffected by China's economic growth. Health care was poor in the region. Thousands of schoolchildren died due to poor building standards in schools. The earthquake left at least 5 million people without housing. Millions of livestock were destroyed. The estimated total damage exceeds US\$20 billion. Massive damage to properties and houses in the earthquake area was due, in part, because China did not create an adequate seismic design code until after the 1976 Tangshan earthquake.

Strong aftershocks affected the area for months. As late as August 5, an aftershock of 6.1 occurred, causing at least one death.

Rescue efforts

President Hu Jintao announced that the disaster response would be rapid, and within 90 minutes Premier Wen Jiabao flew to the earthquake area to oversee the rescue work. China's Chengdu Military Area Command dispatched 50,000 troops and armed police to help with disaster relief work. Due to the rough terrain and close proximity of the quake's epicentre, the soldiers found it very difficult to get help to the rural regions of the province.

Many rescue teams were reported ready to join the rescue effort in Sichuan within 48 hours. According to the Red Cross Society of China the disaster areas needed tents, medical supplies, drinking water and food. Landslides continuously threatened the progress of a search and rescue groups. The extreme terrain conditions prevented the use of helicopter evacuation.

The Chinese Government accepted aid from Taiwan on May 13. China stated it would gratefully accept international help to cope with the quake. Rescue efforts performed by the Chinese government were

praised by the critical western media. The *Economist* stated that China reacted to the disaster 'rapidly and with uncharacteristic openness', contrasting it with Burma's secretive response to Cyclone Nargis.

By May 16, rescue groups from South Korea, Japan, Singapore, Russia and Taiwan had arrived. The USA sent planes and shared satellite images of the affected areas with Chinese authorities.

As a result of the magnitude 7.9 earthquake and the many strong aftershocks, many rivers became blocked by large landslides, which resulted in the formation of 'quake lakes'; 34 lakes formed in nine earthquake-affected counties.

The government declared a three-day period of national mourning for the quake victims. This was the first time that a national mourning period had been declared for something other than the death of a state leader.

Collapse of schools

Although the Chinese government was initially praised for its response to the quake, it was severely criticised by its own people over the number of schools that collapsed in the earthquake. Over 7,000 schoolrooms collapsed in the earthquake. Due to China's one-child policy, many families lost their only child when schools in the region collapsed during the earthquake. Although local officials have lifted the restriction for families whose only child was killed, some of the affected parents are now too old to conceive again, while others have undergone sterilisation.

Thousands of parents around the province have accused local officials and builders of cutting corners in school construction, citing that after the quake other nearby buildings were little damaged. Censors have discouraged stories of poorly built

schools from being published in the media, and there has been an incident where police drove away the protestors.

Foreign and domestic aid

Up to 10.7 billion yuan (approximately US\$1.5 billion) was donated by the Chinese public. In addition the Red Cross of China collected \$26 million. Multinational firms located in China announced large amounts of donations. Following the earthquake, donations were made by people from all over mainland China. People also donated blood.

Summary

In May 2008, over 134,000 people were killed and a further 56,000 people were missing as a result of Cyclone Nargis in Burma. The disaster caused damage estimated at \$10 billion. However, the event is also a man-made disaster, as Burma's military rulers refused international aid at first. In contrast, following the 7.9 magnitude Sichuan earthquake, the Chinese government received praise for its swift rescue attempts and its willingness and openness to receive foreign aid. Over 69,000 people were killed and nearly 18,000 people were missing as a result of the earthquake. A further 4.8 million people were made homeless. However, the relief operation could hardly have been more different to that which followed Cyclone Nargis.

F O C U S Q U E S T I O N S

1. How do the short-term and long-term responses to natural disasters contrast?
2. Outline the ways in which human activities can impact short-term responses to natural hazards.
3. 'Natural disasters are caused by the mismanagement of the natural environment'. Discuss the validity of this statement.