

of the inhabitant of a poor country may very well be a greater loss, taking into account the time invested in it and the years of irreplaceable and uninsured savings that it represents. The cyclone that hit Bangladesh in 1991 was responsible for an estimated 131,000 deaths and a monetary cost of \$1.7 billion, whereas a hurricane of similar strength that hit Florida in 1992 (Hurricane Andrew) killed only 60 people but caused damage estimated at \$20 billion.

## Tropical storm events

### Hurricane Katrina (southern USA), August 2005

In 2005, Hurricane Katrina was the eleventh named tropical storm, fourth hurricane and first Category 5 hurricane in what was to become one of the most active hurricane seasons ever recorded in the Atlantic area. The storm first developed on 23 August over the Bahamas and was upgraded and named Katrina the next day.

On 28 August, Katrina was upgraded to Category 4 and it became clear that it was heading for the coasts of Mississippi and Louisiana (Figure 5.31). It continued to intensify that day, rapidly becoming a Category 5 hurricane with sustained windspeeds of 280 km/hr and gusts of up to 345 km/hr and a central pressure of 902 mb, making it the fifth most intense Atlantic basin hurricane on record.

Advance warnings were in force by 26 August and the possibility of 'unprecedented cataclysm' was already being considered. President Bush declared a state of emergency on 27 August in Louisiana, Alabama and Mississippi, two days before the hurricane was expected to make landfall. Risk assessments conducted in preparation for such an event had been published; for example the *National Geographic* magazine had run an article less than 12 months before the storm occurred. When it happened, however, the authorities found it difficult to respond to the sheer scale of the disaster. At a news conference on 28 August, shortly after Katrina had been upgraded to a Category 5 storm, the mayor of New Orleans ordered that the city be evacuated.

- **Risk and vulnerability:** As New Orleans lies on the Gulf Coast of the USA, it is in an area which can expect severe tropical storms at certain times of the year. Since 1924 there have been 33 Atlantic hurricanes that have reached Category 5 and Katrina was the only one to hit New Orleans. The city is also at risk because the original flood control measures had resulted in the shrinkage of soils, which meant that over 50 per cent of the land was now below sea level.

This made much of the population vulnerable to a severe storm, of which Katrina at Category 5 was certainly a good example. Much of the levee system that had been built to protect the city had not been constructed to modern standards

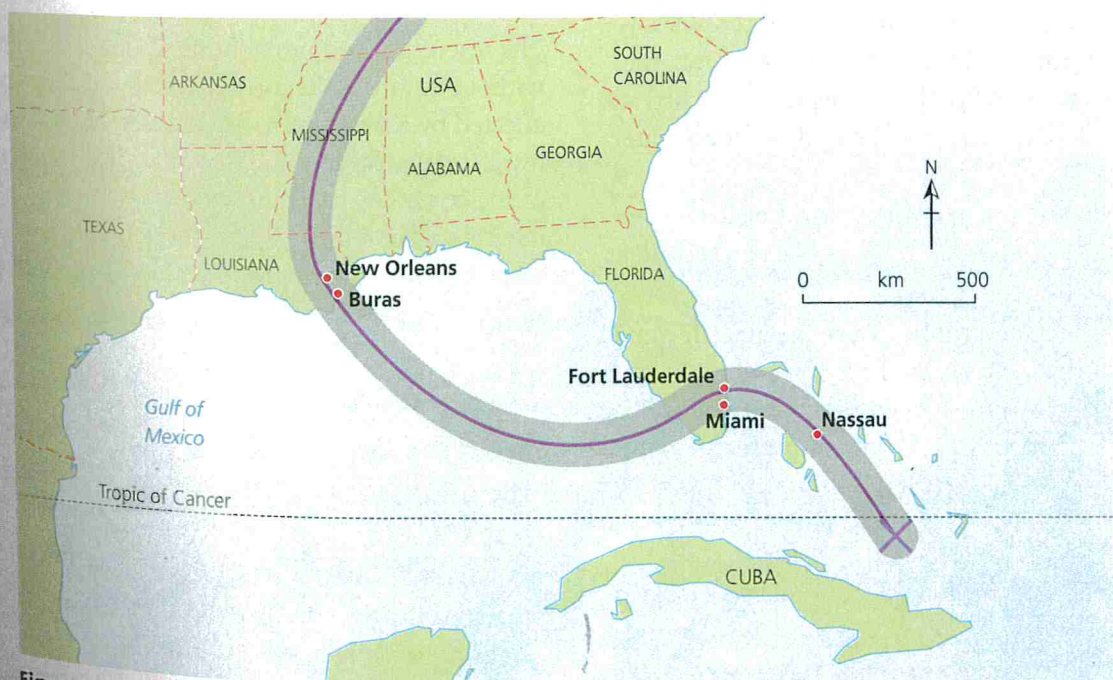


Figure 5.31 The path of Hurricane Katrina

and the replacement work was only 60–90 per cent complete. The situation was severe enough for the magazine *Scientific American* to state that 'New Orleans is a disaster waiting to happen.' As a consequence, levee failure was inevitable given the severity of the storm surge. In the aftermath it was alleged that the population had been made more vulnerable through a lack of leadership, an evacuation plan being drawn up by the state authorities only 19 hours before Katrina's landfall.

Most of the population managed to leave in private cars and on school buses, but some 150,000 people remained, mostly by choice. As a last resort, refugees who had been 'left behind' were encouraged to seek protection in the massive Louisiana Superdome. Basic supplies of food and water were delivered to support 150,000 for three days. When Katrina hit Louisiana on the morning of 29 August, it was accompanied by a massive storm surge, up to 10 m high in places. Although it had weakened to a Category 3 storm as it reached the border of Louisiana and Mississippi, the storm was so intense that its powerful winds and storm surge smashed the entire Mississippi Gulf Coast as it passed through.

Main effects of hurricane Katrina:

- More than 1 million people became **refugees**, displaced from their homes. One month after the storm, refugees from Katrina were registered in all 50 states. Although 75 per cent of evacuees had stayed within 400 km of their homes, tens of thousands had located more than 1,000 km away.
- In New Orleans, a city mostly below sea level, the complex system of flood defences was breached and 80 per cent of the city was deluged by **flood water** (Figure 5.32).
- Of the 180,000 **houses** in the city of New Orleans, 110,000 were flooded and 55,000 were too badly damaged to repair.
- **Power and water supplies were disrupted.** Almost 233,000 km<sup>2</sup> were declared a disaster zone, an area almost as large as the United Kingdom. An estimated 5 million people were left without power and it took almost two months for everybody to be reconnected.
- The number of **fatalities**, 1,242 people, was far below initial estimates. Of these, 1,035 were in Louisiana and 228 in Mississippi. Few people died in the aftermath of the storm because the USA had the infrastructure to ensure that people had access to clean water, medical care and food supplies.

- Many **oil installations (rigs and refineries)** in the Gulf area were damaged. An immediate effect of this was that the price of oil shot up, affecting people worldwide. For the first time, the price of petrol in the United Kingdom reached £1 per litre.
- The famous French Quarter of New Orleans was severely damaged, thus **reducing tourism revenues.**
- **Looters** ransacked the abandoned homes and shops in New Orleans. This resulted in the deployment of the National Guard, which was given orders to treat looters ruthlessly.
- The **financial cost** of the storm broke all records in the USA, with damage estimated to be in the region of \$200 billion.
- Many **businesses** were affected by storm damage. Most were adequately insured, which led to some major **insurance companies** issuing profit warnings to their shareholders in light of the large number of claims which they had to meet.

Government aid was rapidly assigned to help recovery. The US Senate authorised a bill assigning \$10.5 billion in aid in the first week of September. On 7 September another \$51.8 billion was allocated from Federal funds. Other countries also responded to the disaster, even Afghanistan! The public donated \$1.8 billion to the American Red Cross alone; more than the amounts raised for 9/11 and the 2004 Indian Ocean tsunami appeal.

The rescue and aid programme, though, was not without its critics. Reports claimed that those most affected by Katrina were black American urban dwellers, the poorest and most disadvantaged members of society. It has been alleged that the authorities would have responded differently if those affected were white. President Bush also came in for criticism for being slow to visit the affected area.

### Key question

Study Figure 5.2 (page 187), which shows the processes involved in risk management. Use the information given in the study of Hurricane Katrina to assess if the authorities, both national and local, were efficient in dealing with this event, both before and after the storm had affected New Orleans.