

## HURRICANE KATRINA – A NATURAL AND A MANAGEMENT DISASTER?

by David Rayner

**M**ANY ORGANISATIONS, including Oxfam, labelled 2005 as the 'Year of Disasters'. The 12 months that followed the Asian tsunami on Boxing Day 2004 saw a series of floods, landslides, famines, earthquakes and hurricanes strike around the world.

As far as hurricanes were concerned, it was also an exceptional year that broke many records. Of the 27 tropical storms that started life in the Atlantic Ocean, a record 14 became hurricanes and of these 7 strengthened sufficiently to become **major hurricanes**.

The **National Hurricane Centre (NHC)** in Miami, Florida monitors Atlantic storms and keeps a list of alphabetical names ready to give to each significant storm that develops. In 2005, the NHC ran out of names after the 21st tropical storm and had to resort, for the first time, to using

the Greek alphabet. The year ended with storms still forming in the Atlantic, weeks after the official end of the hurricane season (30 November).

**Hurricane Katrina** formed south-east of the Bahamas on 23 August 2005. It was the 12th tropical storm of the season and was to prove to be the most deadly for over 75 years (over 1,300 deaths) and the costliest ever (\$75 billion worth of damage).

### Why do hurricanes form?

Hurricanes (known as cyclones or typhoons in other parts of the world) form in summer over very warm tropical oceans. The ocean water needs to be at least 25°C. The local thunderstorms that form off the west coast of Africa draw heat energy and moisture from the warm ocean water. The warm, moist air rises and cools to form tall cumulonimbus storm clouds. Eventually, the spin of the Earth causes the air in the storms

to spiral anticlockwise (in the northern hemisphere) around the area of low pressure. As air continues to rise, pressure falls even further, sucking in more warm, moist air from all around.

Up until the winds reach a speed of 38 mph (61 km/h), the system is known as a **tropical depression**. When the storm strengthens and winds reach 39–73 mph (63–117 km/h), the system is known as a **tropical storm** and is given a name from the official list for that year. The tropical storm becomes a **hurricane** when wind speeds are greater than 74 mph (119 km/h). At this stage, the storm may show the characteristic cloud-free 'eye' (Figure 1).

Hurricanes can last for 2–3 weeks, spinning violently but moving forward only slowly at speeds of 15–20 mph. In this time, however, they can cover huge distances and each year,

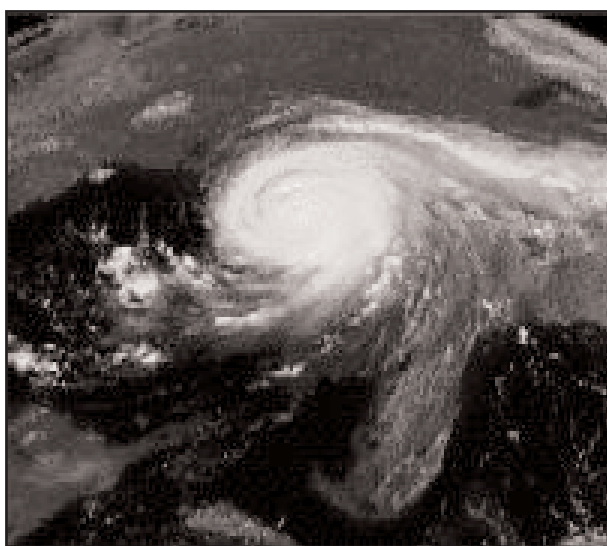


Figure 1: Satellite image of Hurricane Katrina, showing the 'eye' at its centre



Figure 3: The track of Hurricane Katrina

many manage to cross the Atlantic and strike the Caribbean islands, Central America and the USA. Once a hurricane makes landfall, it loses its source of heat energy and moisture and begins to decay.

## The impact of hurricanes

Many tropical storms and hurricanes never reach land and so have little effect on humans. Organisations such as the NHC in Florida use **satellites** to spot the early storms off the coast of Africa and then monitor their progress as they move westwards. They continuously make predictions about the path and possible **landfall** sites. This information is then fed to the media and to the emergency services, who have to make life or death decisions about whether to evacuate areas or not. In the USA, a special organisation called FEMA (Federal Emergency Management Agency) co-ordinates all the emergency work (Figure 2).



Figure 2: The FEMA logo

## Hurricane Katrina timeline

Katrina was quite a short-lived system and when it was first identified as a tropical depression on 23 August, it was already close to the USA. It quickly strengthened in the first 48 hours to become a Category 1 hurricane with wind speeds of 75 mph (121 km/h). It hit the east coast of Florida and then continued moving slowly westwards into the Gulf of Mexico where it became a Category 5 hurricane with

average wind speeds of 175 mph (282 km/h) and gusts of 215 mph (346 km/h). Its path was now taking it towards the state of Louisiana, with the city of New Orleans as a possible target. As it swerved back round to the north-east, it weakened in strength but grew in size and eventually struck the Louisiana coastline in the early hours of 29 August as a **Category 3** storm. The hurricane-force winds had built up huge waves of 10–35 feet (3–10 metres) and the **storm surge** battered the coastal settlements. Strong winds caused much damage to buildings, and huge amounts of rain fell in a short period of time, causing widespread flooding.

The hurricane moved eastwards along the Louisiana coast and then headed inland through the state of Mississippi (Figure 3). The hurricane-force winds and heavy rain continued until the storm reached over 240 km (150 miles) inland, where it finally weakened but even then it continued to cause problems right through into Canada.

## Hurricane preparation and management

In Florida, although there was little time to prepare, the state is very used to hurricanes and has well-organised plans in place. These included:

- the governor declaring a **state of emergency**
- **hurricane warnings** being issued on all radio and TV channels
- **schools** closing down
- **shelters** with feeding facilities being opened
- **compulsory evacuation orders** being issued for people living in low-lying coastal areas
- all the **police and emergency services** being on standby to help people.

When the hurricane struck, it killed 11 people and caused a huge amount of damage (over \$1 billion). Almost one million

people were without electricity for several days. In many areas people were told to boil water because it had become contaminated and was not safe to use. Around 2,260 people stayed in the official shelters that were opened.

Meanwhile, it had already been predicted by the forecasters that Louisiana and the city of New Orleans might be the next target for the strengthening hurricane. People were particularly worried about this city because 80% of the area is below sea level and is only protected by a series of **levees** or flood embankments. For many years, experts had warned that if a large hurricane hit New Orleans, the levees might break.

On 26 August, the Louisiana state governor issued a state of emergency notice and on 27 August President George W. Bush issued state of emergency notices for Louisiana, Alabama and Mississippi. On 28 August, the National Weather Service predicted ‘devastating damage’ and the Mayor of New Orleans ordered the compulsory evacuation of the city. All train services into and out of the city were suspended and the nearby nuclear power station was shut down.

The city of New Orleans has a population of around half a million people and the State Evacuation Plan leaves it up to individuals to organise their own evacuation using private vehicles. This is in spite of the fact that the USA Census for 2000 shows that about a quarter of the city’s residents do not own a car. In addition, the city has one of the highest **poverty rates** in the USA (38% of the people). Of those who were unable or unwilling to leave, a disproportionate number were elderly, disabled or sick.

The city authorities made a number of facilities available,

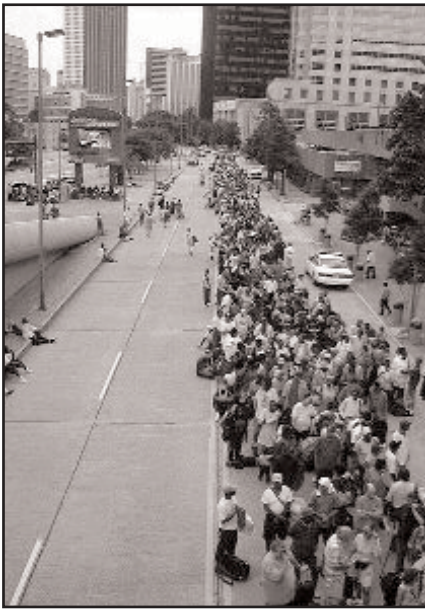


Figure 4: People queueing to get into the Superdome in New Orleans

including the Superdome, which had enough food and water for three days for around 15,000 people (Figure 4). In the event, at least twice as many people tried to find shelter there and when the electricity, air conditioning and running water all failed, conditions quickly became unsanitary and uncomfortable.

When the levees broke, huge areas of the city were flooded, with the water up to 8 metres (25 feet) deep in places. The remaining people were now trapped in the city. With shops and businesses closed, people's homes underwater, roads closed and no electricity, the situation quickly became very serious (Figure 5).

Sick people ran out of medicines, people ran out of food and water and crime started to get out of control (snipers on rooftops, looting from shops and homes, etc). It took several days for the police and army to regain control and for the remaining 120,000 people to be safely evacuated to other cities.

It took a very long time for the water trapped in the city streets to be pumped out. Bodies of victims were left lying in the streets and the search for missing people was very poorly organised (Figure 6



Figure 5: The Superdome was damaged and the surrounding area flooded

and 7). Months later, thousands of people remained homeless and unemployed. Most were still staying in cities hundreds of miles away. Many believed that the government and emergency services had mismanaged this terrible disaster.



Figure 6: Emergency services look for survivors trapped on rooftops



Figure 7: Helicopters desperately try to block a broken levee wall

# Activities

- 1 (a) Why was 2005 labelled the 'Year of Disasters'?
- (b) What was particularly special about Hurricane Katrina?
  
- 2 Use Figure 3 and the text to describe the track of Hurricane Katrina and how the storm changed over time.
  
- 3 (a) How does the National Hurricane Centre in Miami get hurricane location information?
- (b) What does the Centre do with the information that it collects each day?
  
- 4 What do the initials FEMA stand for?
  
- 5 The state of Florida lies right in the path of the Atlantic hurricanes. It has been described as 'having well organised plans in place'.
  - (a) What do these plans involve?
  - (b) How effective were they when Hurricane Katrina struck Florida?
  - (c) Why are some people reluctant to evacuate their homes and businesses?
  - (d) Design a poster which could be used to warn people about the dangers of staying in their homes when a hurricane strikes.
  
- 6 (a) Study Figure 8. How accurate were the predictions in the article?
- (b) Why did no-one do anything about the problem? Use the phrase 'extraordinary measures' from the article in your answer.
- (c) Who pays for all the work needed to monitor storms and protect cities from danger?
  
- 7 When disasters strike, thousands of people are forced to abandon their homes and are unable to return for a long time.
  - (a) What effect is being evacuated likely to have on each of the following groups of people?
    - (i) Schoolchildren of your own age
    - (ii) Old age pensioners
    - (iii) Sick or disabled people

(b) Houston, Texas received 150,000 people after Hurricane Katrina struck. What effect will this forced migration have had on the city and people of Houston?

8 When Hurricane Katrina struck and destroyed large parts of New Orleans, a variety of viewpoints were put forward about the **future** of the city. These included the following:

- Billions of dollars should be spent as quickly as possible to allow the city to be cleaned up, repaired, homes rebuilt and all the original inhabitants helped to return to New Orleans so that everything is exactly as it was before the hurricane struck.
- The city should be cleaned up and repaired but before everyone returns a much better protection system should be built – otherwise the same problems could happen again next year.
- The city should be abandoned! It is located in a dangerous place and as sea-level continues to rise due to global warming the dangers will only get worse. It is impossible to protect a city that has been built below sea-level.

(a) Use the internet to research more information about New Orleans and then in small groups discuss the three options stated above. You can also include any ideas of your own.

(b) Write a short report for the Mayor of New Orleans suggesting what you think should happen to the city. List actions and reasons for these actions.

9 Some people blame all the problems and the controversy over the management of hazards such as Hurricane Katrina on the American Government. Thinking about natural disasters in general, how far do you agree with the opinion expressed by David McEntire in Figure 9?

"The combination of sinking land and rising seas has put the Mississippi River delta as much as 1 metre lower relative to sea level than it was a century ago. That means hurricane floods have risen by similar amounts. Storms that once would not have had much impact can now be devastating events, and flooding penetrates inland to places where it rarely occurred before. Though protected by levees, New Orleans is surrounded by water and is well below sea level at many points. A flood from a powerful hurricane could get trapped for weeks inside the levee system. Without extraordinary measures, key ports, oil and gas production, one of the nation's most important fisheries, the historic French Quarter and more are at risk of being swept away in a catastrophic hurricane."

Figure 8: Extract from the *Times-Picayune* newspaper, 2002

Source: John McQuaid and Mark Schleifstein, *The Times-Picayune*, June 2002  
[www.nola.com/hurricane/index.ssf?/washingaway/part1.html](http://www.nola.com/hurricane/index.ssf?/washingaway/part1.html)

There is a '... general reluctance of government at any level to invest money in infrastructure or emergency management. No-one cares about disasters until they happen.'

David McEntire, a lecturer at the University of North Texas

Figure 9: Who is to blame?

Source: Reuters report by Alan Elsner, September 2005