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Infinity: Storm

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A STORM STRIKES

HURRICANE KATRINA

Most people are no longer superstitious about storms, but weather catastrophes still affect us. Many of us like to live where the weather is going to be safe and predictable but that can never be guaranteed. Other people knowingly live in areas that are prone to certain types of storm – for example, people living in the Caribbean and the southeast coast of North America experience the hurricane season every year, which falls between August and October.

A city at risk
New Orleans lies on the southeast coast of North America. It is situated in an area prone to hurricanes. On average, one hurricane hits it every three to four years.

DANGER ON THE HORIZON

By predicting when and where a storm will strike, weather forecasters can prevent severe loss of life. In August 2005, they noticed a tropical depression forming out to sea off the coast of North America. It increased to a tropical storm, before it finally turned into one of the most powerful hurricanes the world has ever seen – Hurricane Katrina.

Flood alert!
New Orleans is also at risk because it is built below sea level. In 2005, the flood defences could not contain the full force of the floodwater. Since then, new drainage systems and flood banks have been built.

Hurricane hunters
Specially equipped hurricane hunter planes fly into and through hurricanes to record weather information. They collect data on temperature, winds, humidity and air pressure. This data is fed into computers to help forecast the hurricane's strength and if, when and where it will hit land.

Coming in to land
Hurricanes are violent storms that are always born over sea but sometimes move towards the coast and "make landfall". They bring heavy rain and extreme winds. A hurricane watch is announced to alert the public that a storm could hit within 36 hours. This is upgraded to a hurricane warning if landfall is likely in the next 24 hours.

STORM NAMES

In 1953, the United States Weather Service began naming storms after women. These were often the names of the wives of the meteorologists (weather forecasters). In 1979, men's names were added. Now six lists of names, working from A to Z, have been created. Every six years the list is repeated, so names from 1997 (Ana, Bill, Claudette, Danny . . .) were also used in both 2003 and 2009. However, if a storm is a huge disaster, that name is never used again.

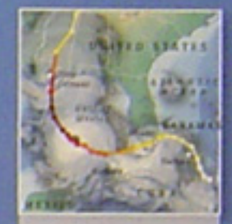
FLAGGING DANGER *Triangular storm-warning pennants and hurricane flags signal danger. Two flags on the same pole indicate a severe warning.*

The eye of the storm
It is easy to identify a hurricane from above: there is always an eye somewhere near the middle. Spiralling bands of clouds containing strong winds and thunderstorms surround the eye. If this satellite photo were put in motion, the clouds would rotate around the eye.

Saffir-Simpson scale
This scale, from 1 to 5, is used to estimate the damage that will happen if a storm hits land. A category 1 storm has winds blowing at more than 120 kilometres per hour (75 mph). A category 5 hurricane has winds of 250 kilometres per hour (155 mph).

Switch sides, quick!
Because of Earth's rotation, the right-hand side of a hurricane has stronger winds in the northern hemisphere. This side of the hurricane might even have tornadoes embedded in it.

Mass evacuation
In cities such as New Orleans, where the citizens have experienced tropical storms in the past, many people pack up and leave as soon as a hurricane warning is given. Queues of traffic develop on the highways, all heading in the same direction – away from the storm.



Deadly timeline

- 23 August 2005: Tropical depression forms over the Bahamas.
- 24 August: Upgraded to Tropical Storm Katrina.
- 25 August: Upgraded to Hurricane Katrina. Makes landfall on Florida coast.
- 26 August: Downgraded to Tropical Storm Katrina. Upgraded to Hurricane again over Gulf of Mexico. State of Louisiana first alerted for possible landfall.
- 27 August: Federal emergency issued for Louisiana and evacuations begin.
- 28 August: Winds up to 280 kph (175 mph) with gusts to 345 kph (215 mph). Evacuation ordered for New Orleans.
- 29 August: Landfall at 6.10 am. First levee breaks at 8.14 am. Parts of the city begin to flood. More levee breaks at 2 pm. First casualties observed at 3 pm. School buses sent to help with evacuation.
- 30 August: Levee breaches cannot be plugged. Federal troops sent in to help.
- 31 August: 80 percent of city is under water.
- 1 September: Search and Rescue sent to help stranded victims.

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THE STORM SURGE

THE MOST DESTRUCTIVE aspect of a hurricane is often not the wind but the surge of flood water that comes with it. As the hurricane rages at sea, it sucks up water into the eye and its winds create high waves. When this hits the shore, the tidal wave can pour inland and cause massive flooding. Storm surge waves were more than 9 metres (30 ft) high when Katrina thrust onto land.

HIGH AND DRY *These huge ships were washed ashore and then left stranded when the water receded.*

Spiral of destruction
Bands of cloud rotate around the eye in a spiral pattern because of Earth's rotation. In the northern hemisphere, hurricanes rotate anti-clockwise and in the southern hemisphere, clockwise.

Terrifying heights
Hurricanes can vary vastly in height but Katrina was estimated at 16 kilometres (10 miles) high. This meant that the top of some of its clouds bulged into the next layer of Earth's atmosphere.

Death of a storm
A hurricane needs warm water to fuel it. Once it has made landfall, it runs out of this fuel and gradually loses power and intensity. It downgrades to a tropical storm and eventually dies out.

SPINNING TOWARDS LAND

Hurricanes are fuelled by heat. They form over tropical oceans with a temperature of at least 26.7°C (80°F). The warm moist air rushes upwards as if up a chimney, sucking in more air around it at sea level. Earth's rotation makes it start to spin, and this rising, spinning whorl of rain bands usually grows to 500 kilometres (300 miles) across, although some hurricanes can become twice that size. Hurricanes, typhoons and cyclones are all the same type of storm; they are just given different names around the world.

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The eye wall
Warm winds rise sharply at the eye wall. Here, the bands of clouds are highest and this area has the most destructive winds. These winds usually occur within 500 metres (1,600 ft) of the ocean's surface.

All calm in the eye
The storm's eye is usually about 50 kilometres (30 miles) across but in the largest storms it can be 320 kilometres (200 miles) wide. The eye is usually free of rain and cloud, forming a small area of blue sky and eerie calm in the centre of the storm.

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Track of Hurricane Katrina
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- Tropical storm
- Category 1
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CATASTROPHIC LANDFALL

Katrina was one of the deadliest and the most costly hurricanes in American history. When it hit land, it brought strong winds, heavy rains and a massive storm surge. New Orleans' specially built system of drainage levees (flood banks) failed in over 50 places. There was so much flooding that stranded citizens floated on boats, doors, mattresses or whatever they could find. Some just climbed onto their roofs and hoped to be rescued. Dead bodies could not be picked up for days and parts of the city were flooded for weeks.

Roof sections were torn away

Ripped away

The Superdome was estimated to be able to withstand winds of 320 kilometres (200 miles) per hour, but two sections of its roof and its waterproof membrane were torn off by Katrina.

National Guard Search and Rescue vehicle

Streets of dirty water

An amazing 95 percent of the city of New Orleans was submerged by the storm surge. The floodwater was quickly contaminated by debris.

– EYEWITNESS ACCOUNT –

HURRICANE KATRINA RESCUE PILOT

AFTER THE DISASTER the air was filled with the sound of helicopters trying to rescue the 60,000 people stranded in New Orleans. I was one of those rescue pilots. Many people waved to us with towels and makeshift flags from rooftops. They were desperate, but sometimes we had to ignore their pleas. We could only rescue one or two people at a time and we had to prioritise the sick and injured.

Sometimes, as we hovered over the houses to lower the rescue bucket, we saw sad and bizarre sights. Pets were abandoned on rooftops, and at one house we saw an alligator swimming out of the attic of a flooded home.

JOHNNY HOOPER, SEARCH AND RESCUE

Superdome safety

Eventually, more than 20,000 refugees gathered at the Superdome. Many waded through floodwater to get there, having left their ruined homes and possessions. The National Guard and volunteer groups organised relief and clean-up efforts.

The last resort

Citizens who had not evacuated were urged to take shelter in the Louisiana Superdome as a "refuge of last resort". The street outside was flooded 1 metre (3 ft) deep.

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