

Hurricane Katrina as a hazard

Specification topic: Hazard types, perceptions, response & models 3.1.5.1

Case study: Hurricane Katrina

Formation of the hazard type:

Hurricane Katrina initially formed about 200 miles (322 km) southeast of the Bahamas on Aug. 23, 2005. With winds of about 40 mph (65 kph), the storm was named Tropical Storm Katrina. By August 25th Katrina was upgraded to a category 1 hurricane. It hit land and passed over Florida but was still relatively weak at this time. Katrina then travelled out over the Gulf of Mexico and rapidly gained energy. By August 28th Katrina had become a category 5 hurricane with winds blowing at 175mph (280kph). The storm, which had stabilised over the Gulf of Mexico, changed direction, turned north and headed towards the Louisiana coastline. It hit land on August 29th and had reduced to a category 3 storm. However, winds were still at 120mph (193kph). After moving inland over Mississippi it started to weaken and was downgraded initially to a category 1 and then back to a tropical storm once again. It eventually dissipated over the Great Lakes later that day.

Hazard perception:

Perceptions of Hurricane Katrina and the potential effects are important to consider. Of the population affected by Hurricane Katrina 58% evacuated before it made land fall with 42% remaining in their homes. Of this 42% - 53% lived in Mississippi, 29% lived in Louisiana and 18% lived in Alabama. One third of those who didn't evacuate did so because they didn't want to leave their homes, families and pets. The remaining non-evacuees had no choice but to stay due to having limited means to be able to travel. The main reasons included a lack of transport and having nowhere to relocate to.

The third of those who chose not to evacuate did so due to the expectation that the hurricane would not be as catastrophic as it turned out to be. Awareness of mitigation, such as the artificial levees in New Orleans and the sophisticated tracking technology meant many people felt secure staying in their homes. Obviously, with the failure of the levees and the intensity of the storm being much greater than anticipated, many who stayed struggled with the aftermath or, sadly, lost their lives.

Hazard response:

Short term: Much of the short-term response revolved around the coast guard and other rescue groups trying to reach the residents who had chosen to stay in their homes. Out of the 60,000 people stranded in New Orleans, the coastguard rescued more than 33,500. The people left behind were the poorest and most vulnerable within the city. Authorities were criticised for being too slow to respond and the ensuing looting within the city which resulted in Marshall Law being invoked was testament to the lack of organisation regarding the rescue operation. For many who were rescued from their homes they sought refuge in the Superdome; this was criticised by many as conditions were unhygienic and there was a lack of food and water. \$50 billion was given in aid by the US government.

Long term: Many areas had to be completely rebuilt, although there were some areas which were devastated and remain so today. One of the main impacts that affected the city of New Orleans was the failure of the levees to protect the city from the storm surge. The Army Corps has rebuilt the levee system and the barriers are much higher than before Katrina struck. The levees are supported by steel beams that are as deep as 65 feet. To ensure that future hurricanes have a less devastating impact, the

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city of New Orleans has also created a text and e-mail message system called “Nola Ready” that will alert residents regarding evacuation procedures before a hurricane strikes.

In 2006, Congress passed an act which allowed grants to be offered to cities to improve their evacuation plans. These improved plans included the provision of translators to allow non-English residents to be fully informed. Also, it was recognised that evacuation for the disabled and those people with pets had never been taken into consideration before and many of these people had remained in their homes during Hurricane Katrina because they weren't properly taken care of.

Hurricane hazard modelling:

This is used by governments prior to hurricanes to assess the potential damage and mitigate against these risks. The aspects of the model that are considered include:

1. Laboratory simulations to estimate wind speed. This will allow city officials to provide the right cladding materials for people to use on their houses. It will also ensure that new buildings are structurally regulated and can withstand the wind speeds that are expected.
2. Coastal risks from storm surges. Simulations regarding wave height are predicted. This enables officials to build sea walls and levees that will help to protect large residential and commercial areas.
3. Insurance losses are estimated. This allows the insurance companies to set premiums which will cover the residents in the worst case scenario.

Prior to Hurricane Katrina hitting land, meteorologists were generally accurate in their forecasts. Wind speed and storm surge wave height were accurately predicted. The storm reduced to a category 3 when on land and the meteorologists had predicted it would be stronger; however, it was the lack of mitigation which caused much of the damage, not the scientific modelling itself. Sea walls and levees were built to withstand category 3 storms and many failed which caused citywide flooding and contributed to many of the 1833 deaths associated with the event.

Hurricane Katrina is now used as an example of a “super catastrophe” and planning across the USA looks at this event in order to plan for future similar events to Katrina. One of the main areas for hazard modelling is looking at the wider impact of a “super cat” (beyond-usual catastrophic events) and not just planning for the inevitable winds and storm surges of a hurricane like Katrina, but also considering the secondary impacts; such as impacts on energy, oil spillages which can have a longer environmental effect and financial implications.

Exam style questions:

1. **Evaluate the impact that a tropical storm has had on the character of a place that you have studied and how the storm has affected people's lived experience of this place after the storm. (9 marks)**
2. **'The Disaster Response Curve (The Park Model) has contributed to improved understanding and therefore management of the impact of tropical storms.' To what extent do you agree with this view? (20 marks)**

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- 1. Evaluate the impact that a tropical storm has had on the character of a place that you have studied and how the storm has affected people's lived experience of this place after the storm. (9 marks)**

It is important to recognise that in order to reach the higher marks on this question, that it is not enough to simply recall facts regarding the case study of choice, but to be able to show how those impacts changed the place being discussed. Hurricane Katrina is a perfect example of how, in both the short and long term, the character of New Orleans has been changed.

The answer is best answered through a timeline approach, with the start of the response focusing on the damage that Katrina did and how that affected the people. Comments regarding the number of deaths and the impact upon community are creditworthy as are the comments regarding those not evacuated from the poorest areas and how that would affect the character of the city.

The "safe" feeling that many had about the city before the event completely changed. Reference to the breaching of the levees, which many had felt protected by, led to many people moving out of the city permanently as the trust in these strategies had disappeared. Equally, the media focus on the social breakdown in the days following Katrina, namely the looting and issues in the Superdome will have affected residents' perceptions of the city.

Long term there are many changes to the character of the city which include the following:

- 4-metre-high floods have left some areas uninhabitable, even today.
- Many areas have experienced outward migration; affecting the demographics of the area.
- Still a feeling that "poorer non-white communities" were left to suffer. This was emphasised more so by Kanye West's interview where, 4 days after the event, he accused President Bush of "not caring for the black people". Whilst this was a short term event, the long term psychological impacts from this are still evident in many communities.

Finally, a conclusion is required, whereby the candidate discusses the extent to which residents in New Orleans are still suffering; both physically and psychologically and how the inherent character of New Orleans has changed forever.

- 2. 'The Disaster Response Curve (The Park Model) has contributed to improved understanding and therefore management of the impact of tropical storms.' To what extent do you agree with this view? (20 marks)**

Whilst the response to this question surrounds the critique of the theory of the "Disaster Response Curve", it is useful to apply the theory to the Hurricane Katrina event as it will allow firm judgements to be reached regarding whether this theory has helped to improve understanding and management of tropical storms.

The answer should follow this structure:

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1. An outline of what the “Disaster Response Curve” is.
2. A discussion through the five stages of what is done at each stage and how that manages impacts. Students should be careful not to purely describe each stage, but comment upon what can be done and how effective it is. An example of this is as follows:
Stage 1 is regarding “modifying the cause of the event”. Mitigation strategies such as the sea walls and New Orleans’ levees are examples of how the city officials are aware of the potential risks from a tropical storm. However, many levees particularly those next to many of the canals which criss-cross the city weren’t originally built to withstand above category 3 storms, so they were breached and led to an increased loss of life. Whilst the curve gives officials an awareness that mitigation needs to happen, it is at a basic level and doesn’t take into account the range of impacts from different category tropical storms. Officials therefore need to have an awareness of the curve yet look at actual events and impacts to fully mitigate against storm impacts.

Once the five stages have been critiqued an overall judgement should be reached which justifies the extent to which the “Disaster Response Curve” has helped to manage the impacts.