Hurricanes

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CHAPTER 1

Hurricanes

Learning Objectives

- Describe hurricane formation and the damage they cause.
- Describe how hurricanes are measured.

Ever been to The Big Easy?

New Orleans, Louisiana, is a city unlike any other. The city is known for its Cajun food, jazz music, and full out celebration of Mardi Gras. Residents love the city with a great intensity. Yet, many people who evacuated before Hurricane Katrina have not returned. The population is nearly 30% lower than it was in August 2005. Many sections of the city have still not recovered.

Hurricanes

Tornadoes may also come from hurricanes. A hurricane (Figure 1.1) is an enormous storm with high winds and heavy rains. Hurricanes may be hundreds of kilometers wide. They may travel for thousands of kilometers. The storm’s wind speeds may be greater than 251 kilometers (156 miles) per hour. Hurricanes develop from tropical cyclones. Hurricanes are called typhoons in the Pacific.

Hurricane Formation

Hurricanes are cyclones. Since they form in the tropics, they are called tropical cyclones. These storms form over very warm ocean water in summer and autumn. The temperature of the sea surface must be 28°C (82°F) or higher.
The air above the water warms and rises. This forms a low pressure cell. The air begins to rotate around the low pressure cell. Water vapor condenses. If conditions are right, the storm will build into a hurricane in two to three days.

Hurricanes are huge and produce high winds. Rainfall can be as high as 2.5 cm (1”) per hour. The total rainfall can be 20 billion metric tons daily. The enormous amounts of energy released could equal the total annual electrical power consumption of the United States. That’s from just one storm. Hurricanes can also generate tornadoes.

Hurricanes move with the prevailing winds. In the Northern Hemisphere, they originate in the trade winds and are blown to the west. When they reach the westerlies, they switch direction. So they travel toward the north or northeast. You can look at a map of hurricane tracks to see this happen (Figure 1.2). Hurricanes may cover 800 km (500 miles) in one day.

The Eye of a Hurricane

At the center of a hurricane is a small area where the air is calm and clear. This is called the eye of the hurricane (Figure 1.3). The eye forms at the low-pressure center of the hurricane. Air in the eye rises upward.
The End

Since hot water gives a hurricane its energy, the storm will grow stronger as long as it stays over the warm ocean. If it goes ashore or moves over cooler water, it is cut off from the hot water energy. This will cause the storm to lose strength and slowly fade away.

Hurricanes typically last for five to ten days. The winds push them until they are over cooler water or land. When a hurricane disintegrates, it is replaced with intense rains and tornadoes.

Classifying Hurricanes

Like tornadoes, hurricanes are classified on the basis of wind speed and damage (Table 1.1).

<table>
<thead>
<tr>
<th>Category</th>
<th>Wind Speed (kilometers per hour)</th>
<th>Wind Speed (miles per hour)</th>
<th>Damage</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 (weak)</td>
<td>119-153</td>
<td>74-95</td>
<td>Above normal; no real damage to structures</td>
</tr>
<tr>
<td>2 (moderate)</td>
<td>154-177</td>
<td>96-110</td>
<td>Some roofing, door, and window damage; considerable damage to vegetation, mobile homes, and piers</td>
</tr>
<tr>
<td>3 (strong)</td>
<td>178-209</td>
<td>111-130</td>
<td>Some buildings damaged; mobile homes destroyed</td>
</tr>
<tr>
<td>4 (very strong)</td>
<td>210-251</td>
<td>131-156</td>
<td>Complete roof failure on small residences; major erosion of beach areas; major damage to lower floors of structures near shore</td>
</tr>
<tr>
<td>5 (devastating)</td>
<td>&gt;251</td>
<td>&gt;156</td>
<td>Complete roof failure on many residences and industrial buildings; some complete building failure</td>
</tr>
</tbody>
</table>

Damage

So much rain falling so fast causes some of the damage from a hurricane. But a lot of the damage is caused by storm surge. Storm surge is very high water located in the low pressure eye of the hurricane. The very low pressure of the eye allows the water level to rise above normal sea level. Storm surge can cause flooding when it reaches land (Figure 1.4). High winds do a great deal of damage in hurricanes. High winds can also create very big waves. If these large waves are atop a storm surge, the high water can flood the shore. If the storm happens to occur at high tide, the water will rise even higher.
Hurricane Katrina

The 2005 Atlantic hurricane season was unprecedented. The hurricane season was longer than normal, and there were many more storms. The damage from the storms was the greatest in history. The total cost was estimated at more than $128 billion. There were more than 2,280 deaths.

Hurricane Katrina was both the most destructive hurricane and the most deadly. When the levees that protect the city broke, much of the city was flooded (Figure 1.5). The hurricane was the costliest natural disaster in U.S. history. Nearly 2,000 people died, and damage was estimated at over $80 billion.

Further Reading

Tornadoes
Cyclones

Summary

- Hurricanes are cyclones that form in tropical latitudes. They are called tropical cyclones.
- Hurricanes have high winds that blow around a low pressure zone. In the low pressure zones, air moves upward. This is the eye of the hurricane.
• The damage hurricanes cause is due largely to storm surge. High wind speeds and rain also cause damage.
• Hurricane Katrina was so damaging because the levees that protected New Orleans broke.

**Review**

1. What is a hurricane? What is the eye of a hurricane?
2. How does a hurricane form?
3. Where does the storm get its energy?
4. What is storm surge?
5. Under what circumstances does a hurricane die?
6. Why was Hurricane Katrina so damaging?

**Explore More**

Use the resources below to answer the questions that follow.

**MEDIA**

Click image to the left or use the URL below.
URL: [http://www.ck12.org/flx/render/embeddedobject/10255](http://www.ck12.org/flx/render/embeddedobject/10255)

1. What are hurricanes?
2. Where do most hurricanes begin to form?
3. How does a hurricane start and build so large?
4. What direction do hurricanes spin?
5. What is the eye?
6. What are typhoons and cyclones?

**References**
