

## Unit 4 overview

Unlike previous units, the activities in this unit constitute a local case study of the risks involved in a direct hit by a major hurricane in New York City. In the case study, students

### Unit objectives

In this unit, students will

- identify the physical factors that increase hurricane damage;
- determine the probability of a hurricane striking New York City;
- identify at-risk populations and propose strategies for allocating resources in the event of an emergency;
- use their knowledge of hurricane risks to establish emergency management procedures; and
- conduct a study of the effects of a hurricane on community infrastructure.

### NYC Geography

It would be helpful to review the geography of New York City so that students understand the locations of routes in and out of the city as well as the general lay of the land.

- explore reasons for the extreme effects of the hurricane on the city,
- examine potential impacts of the storm on society, and
- plan procedures that might help the city keep its citizens safe.

The following overview explains how the unit follows the 5-E learning cycle and gives tips for teaching specific activities.

### Engaging students

While there's no formal Engage activity in this unit, you may want to introduce the unit with a discussion about emergency management in your community.

One approach would be to present students with the following scenario:

“In six hours, your community is on target to be hit by a tropical cyclone. You've been chosen to help warn residents and get them to evacuate to safety. Some people have probably already heard the warnings, so you need to decide who might need extra warning, and get to them FAST! Think about the people in your community who might miss or ignore the warnings, and identify who you would target to make sure everyone is warned and understands the seriousness of the threat.”

Divide students into small “disaster management planning teams,” and have each team brainstorm a list of people to target and how they would warn them of the approaching danger. Each team should be prepared to share its list with the other planning teams.

### 4.1 – Analyzing physical factors (Explore)

In this activity, students first examine New York City's hurricane history and the probability of hurricane strikes of various sizes in New York City in any given year. Next, students identify coastal features that amplify the effects of storm surge and study topography and storm surge models for New York City. From this, they discover the effects of local topography on storm surge inundation for hurricanes of various sizes.

### 4.2 – Managing emergencies (Explain)

This activity sends students to the websites of emergency management agencies around the country to expand their knowledge of storm surge and emergency planning scenarios. Armed with this information, students should be able to either develop a simple emergency management plan for their community or refine the plan they created in the Engage activity described above. Discuss the concepts presented on these sites to ensure that students have a firm understanding before going on to the next activity.

**4.3 – Addressing demographic factors (Explore/Elaborate)**

Students explore US Census Bureau demographic data for New York City and identify regions where higher concentrations of at-risk segments of the population (poor, elderly, non-English speaking, etc.) live. Performing a Select by Theme operation, they identify which of these regions lies within the bounds of the category 4 storm surge. In a hypothetical flooding scenario, these regions would be targeted by emergency management planners to ensure the residents are properly warned of the impending dangers and given assistance to evacuate.

The Select By Theme operation is one of the more complex GIS techniques used in these activities. You may want to review this skill with students before beginning the activity. Additional information about Select By Theme can be found in the *Educator’s Guide to ArcView GIS*.

**4.4 – Assessing infrastructure (Elaborate/Evaluate)**

This activity provides data for four open-ended investigations of the effects of a major hurricane on different facets of community infrastructure. Students can investigate the effect of the storm on the transportation network, EPA superfund sites, shelter locations, and glass skyscraper buildings. Specific instructions are not provided, but students are given suggested lines of inquiry. As a product of their study, you might ask students to construct a layout with maps, text, and charts that explain one or more of the key concepts of their assessment. See the *Educator’s Guide to ArcView GIS* for instructions on creating layouts.