

Natural Disasters Can Generate a Substantial Volume of Debris

Natural disasters strike with varying degrees of severity and pose both short- and long-term challenges to public service providers. The most severe natural disasters generate debris in quantities that can overwhelm existing solid waste management facilities or force communities to use disposal options that otherwise would not be acceptable. The table below gives examples of how much debris was generated in a few recent natural disasters.

Debris removal is a major component of every disaster recovery operation. Much of the debris generated from natural disasters is not hazardous. Soil, building material, and green waste, such as trees and shrubs, make up most of the volume of disaster debris. Most of this waste can be recycled into useful commodities. Debris from hurricanes, earthquakes, tornadoes, floods, and fires falls into a few major categories, as shown in the table on the facing page.

Hurricane debris

Hurricanes generate high-velocity winds, cause oceans to surge well above high tide levels, and create waves in inland waters. Hurricanes leave behind debris made up of construction materials, damaged buildings, sediments, green waste, and personal property. Hurricane debris obstructs roads and disables electrical power and communication systems over wide areas.

Most of the damage and resulting debris is in the area where the hurricane first hits land;

Disaster Debris Volume Examples

COMMUNITY	DISASTER	DATE	VOLUME OF DEBRIS
Metro-Dade County, FL	Hurricane Andrew	August 1992	43 million cubic yards of disaster debris in Metro-Dade County alone
Los Angeles, CA	Northridge Earthquake	January 1994	7 million cubic yards of disaster debris
Kauai, HI	Hurricane Iniki	September 1992	5 million cubic yards of disaster debris
Mecklenburg County, NC	Hurricane Hugo	September 1989	2 million cubic yards of green waste ²

² In this guide, the term "green waste" refers to all types of organic yard and landscaping waste, including shrubs, leaves, grass, and tree materials. "Wood waste" refers to tree limbs that have been ground into mulch.

however, the destruction also can extend many miles inland. For example, in 1989, Hurricane Hugo made landfall at Charleston, South Carolina, and continued inland, causing great damage as it cut across the state and into North Carolina. The hurricane generated 400,000 tons of green waste in Mecklenburg County, North Carolina, 200 miles from Charleston. This amount of green waste would have taken up two years of landfill capacity, while only two and a half years of capacity was available in the local landfill. The county considered burning the green waste, but rejected the idea to protect the county's air quality. Instead, all the debris was ground up into mulch and given away to local citizens and businesses for use.

Earthquake debris

Earthquakes generate shock waves and displace the ground along fault lines. These seismic forces can bring down buildings and bridges in a localized area and damage buildings and other structures in a far wider area. Secondary damage from fires, explosions, and localized flooding from broken water pipes can increase the amount of debris. Earthquake debris includes building materials, personal property, and sediment from landslides.

Los Angeles is still collecting and managing debris from the Northridge earthquake that hit the city in January 1994. The amount of debris reached 3 million tons at the end of July

1995. Three months into the debris removal process, city officials decided to attempt to recycle as much of the debris as possible to conserve the remaining landfill capacity. Most of the waste was construction and demolition (C&D) debris, which could be processed by local recycling businesses. City officials worked with the Federal Emergency Management Agency (FEMA) and local businesses to expand existing recycling capacity and approve permits, thereby enhancing the ability of these businesses to meet the city's waste management needs. The city developed contracts with existing businesses, provided them with clean source-separated materials, and piloted a project to recycle mixed debris. After one year, the city had created more than 10,000 tons of new, privately operated daily processing capacity for mixed and source-separated debris.

Tornado debris

Damage from tornadoes is caused by high-velocity rotating winds. The severity of the damage depends on the size of the tornado funnel and the length of time the funnel touches the ground. Damage is generally confined to a narrow path extending up to half a mile wide and from a hundred yards to several miles long. Tornado debris includes damaged and destroyed structures, green waste, and personal property.

The city of Sandusky, Ohio, did not have a plan for managing disaster debris when a

Major Categories of Disaster Debris

	DAMAGED BUILDINGS	SEDIMENTS	GREEN WASTE	PERSONAL PROPERTY	ASH AND CHARRED WOOD
Hurricanes	✓	✓	✓	✓	
Earthquakes	✓	✓	✓	✓	✓
Tornadoes	✓		✓	✓	
Floods	✓	✓	✓	✓	
Fires	✓			✓	✓