# Extreme Storms in the Saginaw Bay Region Impact Public Health, Community Safety, and Economic Stability



Extreme storms can impact public health and safety, and can also devastate an area's economy. In 1986, a flood (above left) caused loss of life and property in the Saginaw Bay area. In June 2017, (above right) the area experienced another extreme storm that caused flooding. Michigan Sea Grant is working to increase awareness of extreme storms and highlight tools available for risk management and planning.

Extreme storm events present a serious threat to community health, safety, and economic stability. Stormwaters can flood land but also cause erosion, destabilize infrastructure, release polluted runoff, transmit waterborne diseases, and damage agricultural crops.

Saginaw Bay has some traits that make it especially vulnerable to the environmental impacts of stormwater runoff. The bay is a shallow body of water fed by a very large drainage basin. Its drainage basin covers an area seven times bigger than the bay itself. A full 15 percent of the state of Michigan (8,709 square miles of land) is included within the Saginaw Bay watershed, meaning any rain that falls in this area eventually makes its way into Saginaw Bay.

A flood in 1986 in the Saginaw Bay area caused at least 10 deaths and millions of dollars in damage. In June 2017, there was substantial damage during another large rain event. Bay, Isabella, Gratiot, and Midland counties were declared disaster areas by the state, allowing them to receive state and federal financial assistance.

### **PUBLIC HEALTH IMPACTS**

Runoff from extreme storms can lead to an increase in water pollution, sewer overflows, basement back-ups, and beach closures due to contamination. In addition, an increase in nutrients from farm field runoff leads to more nitrogen and phosphorus flowing into inland lakes and the Great Lakes.

The causes of algal blooms are complex but often a combination of warm temperatures, excess nutrients, and shallow, slow-moving water that create the perfect conditions for a major bloom. These three ingredients are most often present in shallow bodies of water that drain large areas of land, such as Saginaw Bay.

In some cases, algal blooms can produce toxins harmful to the health of humans and animals. These incidents are referred to as harmful algal blooms (HABs). A harmful algal bloom contaminated the water supply for Toledo, Ohio, in August 2014.

Extreme storms and flood waters also may contain waterborne diseases and impact freshwater drinking sources such as wells and public drinking water systems. In addition, water may become contaminated from damaged infrastructure and can carry a range of hazardous materials, as well as human pathogens. Flooded homes and buildings also create a suitable habitat for mold which has been linked to upper respiratory tract symptoms, according to the Michigan Department of Health and Human Services.



Damage from a storm in June 2017 included crop loss. (Photo: Michigan Sea Grant)

## **COMMUNITY SAFETY IMPACTS**

Extreme storms often impact electricity services not only to residents but to essential community services such as police and fire departments, hospitals, and other emergency responders. Transportation often is impacted as highways, roads, and bridges may be damaged and weather often impacts airline, boat, and train travel.

#### **ECONOMIC IMPACTS**

It is estimated the 1986 flood caused nearly \$500 million in damages and impacted 1.8 million people. Damage from the storm included crop loss, flooded homes, infrastructure failures, businesses, and roads. Twenty-two counties were declared disaster areas.

According to the Michigan Hazard Mitigation Plan, from 1996 to 2013, 32 flooding events in Isabella County alone resulted in damages of more than \$14 million. During that same time period, Bay County experienced 24 flooding events with more than \$9 million in damages. Saginaw County had 48 flooding events with nearly \$10 million in damages.

### WHAT CAN BE DONE?

For communities in the Saginaw Bay region, preparing for the impacts of extreme events such as heavy downpours and floods is critical.

# **ACTION STEPS TO CONSIDER**

- Review your community's emergency response plan and update it as necessary.
- Raise awareness about the impacts of extreme storms and encourage citizens to have disaster preparedness plans.
- Encourage citizens to enroll in floodplain insurance programs.
- Encourage green infrastructure to purposefully hold water during storms.
- Conserve/preserve wetlands and floodplains in your community.
- Ensure that structures are built to the proper building code.
- Find more information and resources at *www.michiganseagrant.org/storms*.

# CONTACT

#### Dr. Heather Triezenberg

Program Leader, Michigan Sea Grant (517) 353-5508 vanden64@msu.edu

This report was prepared by Michigan Sea Grant College Program under awards NA140AR4170285 from the National Oceanic and Atmospheric Administration, U.S. Department of Commerce through the Regents of the University of Michigan. The statements, findings, conclusions, and recommendations are those of the author(s) and do not necessarily reflect the views of the National Oceanic and Atmospheric Administration, U.S. Department of Commerce, or the Regents of the University of Michigan.

#### michiganseagrant.org







Michigan Sea Grant helps to foster economic growth and protect Michigan's coastal, Great Lakes resources through education, research, and outreach. A collaborative effort of the University of Michigan and Michigan State University, Michigan Sea Grant is part of the NOAA-National Sea Grant network of 33 university-based programs.