

## COASTAL STORMS IN NORTHEAST OHIO: A CASE STUDY OF COMMUNITY VULNERABILITY AND RESILIENCE

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Coastal storms and resulting flood events have historically been the most destructive natural hazards in northeast Ohio. According to the Cuyahoga County Natural Hazards Mitigation Plan (2011), storms and heavy rains are responsible for 8 of the past 11 presidential declarations of disaster in the county resulting in over \$67 million in damages from 1950-2010. Climatic changes are predicted to worsen these hazards by producing increased precipitation and more frequent and severe storm events. For many communities, the physical and economic impact of storm hazards are particularly difficult to absorb because of a lack of institutional resources (personnel, financial and technical resources), and large percentage of low- income home and business owners.

This study seeks to understand the relationship between vulnerability and resilience to coastal storm hazards in Cuyahoga County, Ohio. Data collection and analysis will employ a mixed method approach, including Geographic Information System (GIS) mapping and climate modeling to explore the distribution and frequency of natural hazards (vulnerability), and a document analysis supported by interviews with municipal stakeholders to measure institutional capacity (resilience). Socioeconomic data will also be reviewed to help analyze the distribution of highly vulnerable households where residents are Asset-Limited, Income-Constrained, and Employed (ALICE).

The study is a collaboration between Ohio Sea Grant, Northeast Ohio Regional Sewer District (NEORS), and representative municipalities in the study area. Data will be gathered in two phases; GIS data from NEORS Regional Inter-community Drainage Evaluation (RIDE) study will be used to identify areas of flooding in residential watersheds and potential risks to businesses, transportation infrastructure, and utilities (“assets”). GIS data from NEORS Storm Water Inventory and Inspection project will help identify areas of erosion and exposed utilities in the study area. Precipitation projections from NOAA’s Atlas 14 – a precipitation-frequency atlas of the U.S. – will be used to predict changes in local rainfall amounts. The U.S. EPA Climate Resilience Evaluation and Awareness Tool (CREAT) will be employed to conduct a ‘risk assessment and scenario-based planning exercise’ for water resources. Government documents and U.S. Census data will be reviewed. Interviews will be conducted with representatives from all 59 municipalities in Cuyahoga County. Questions will focus on knowledge of environmental threats, resources available for resilience, and potential barriers to adaptation.

Results will be analyzed to better understand the relationship between vulnerability and resilience across the study area. Municipalities will be categorized according to three levels of vulnerability (low, medium, high) depending on the amount and frequency of flood, erosion, and CSO events that have the potential to harm “assets” and residential properties. Municipalities will also be grouped into three categories of resilience (low, medium, high) based on the availability of municipal resources for adaptation and socioeconomic variables.

Trends will be evaluated to identify areas of high vulnerability and low resilience. These municipalities will be the focus of a comprehensive outreach campaign designed to build

adaptive capacity and educate local populations about coastal storm hazards.