

Advocacy note: See article below. In response, the General Assembly should pass the Maryland Clean Energy Jobs Act (SB 516/HB 1158) in 2019! Learn more at bit.ly/ref-RPS

CAPITAL GAZETTE

Study: Annapolis businesses have lost up to \$172,000 to nuisance flooding

Danielle Ohl February 22, 2019



Ducks swim on a flooded Dock Street just after high tide Tuesday in Annapolis. (Joshua McKerrow / Capital Gazette file)

A groundbreaking study estimates in 2017, Annapolis businesses suffered \$86,000 to \$172,000 in lost business due to nuisance flooding at City Dock.

A collaboration among Stanford University researchers, a Naval Academy professor and the city of Annapolis, the study measured the number of downtown visits lost using parking data from the City Dock parking lot.

By controlling for hour, day, time, month and precipitation, the researchers found the city lost about 2916 visitors in 2017, a 1.7 percent decrease overall.

Depending on the severity of the flood, visits dropped anywhere from 37 to 89 percent during a single event. The authors found no evidence patrons parked in nearby Market Space nor did they take their business to other nearby unaffected shops.

In fact, they found a lag that kept customers away from the City Dock area for longer than the duration of the flood event.

A lot of climate change research focuses on catastrophic events, such as hurricanes, said Miyuki Hino, the lead author of the Annapolis study, but very few studies measure the subtler effects of things like sea-level rise on daily life.

It took some time to land on Annapolis as a research subject. But the researchers ultimately chose it, and specifically City Dock, because of a confluence of factors.

Hino, a Stanford doctoral candidate studying climate change, said Annapolis stood out from other East Coast cities because City Dock has significance to the community and as a parking lot offered analyzable data from daily users.

Annapolis experienced 63 days in 2017 that topped the National Oceanic and Atmospheric Administration's threshold for coastal flooding. The Chesapeake Bay, due to both global and local climate changes, experiences sea level rise at a rate two to four times the global average, according to the study.

In Annapolis, average sea level has risen almost 1 foot since 1950 and is rising at about 3.6 millimeters a year.

Nuisance flooding downtown and in Eastport has become more frequent as sea level increases, pushing high-tide water up through city storm drains. The primary driver of the flooding on the Annapolis coast is high-tide rather than precipitation, said Alex Davies, who co-authored the report.

Davies, a meteorologist and oceanographer who teaches at the Naval Academy, had studied similar flooding at the academy for years, and found wind direction, high tide, climate change and natural land sinking all push additional water toward the shore, contributing to floods.

“There has been this sort of exponential increase in the hours above a flood stage,” Davies said. “If you can imagine you’re raising sea level throughout the bay, and suddenly a strong wind blows down the Severn (River) or Spa Creek, there’s more water now in the basin and more water to push up against the coastline.”

To calculate exactly how many visits the city lost due to flooding, the researchers reviewed pictures of floods from social media, city officials and the Annapolis Police Department. After establishing a flood threshold, they identified days where the NOAA tidal gauge showed water levels higher than the threshold.

They then compared the parking data on flood days and non-flood days, using the same day, time, month and precipitation conditions.

“Every hour, we knew how many people were coming and parking on city dock,” Hino said. “We wanted to compare apples to apples, so if we were looking at Tuesday at 8 a.m., we don’t want to compare that to Saturday at 4 p.m.”

To find the economic impact, the researchers used an online database of business data to determine the 16 businesses most reliant on City Dock parking make \$12.2 million in annual revenue.

Because the researchers did not have access to each business’s finances, they relied on an analysis the Annapolis Office of Emergency Management conducted in 2017 as part of a grant application. The city found revenue declined 22.5 percent on average on flood days.

Using the city analysis, Hino and her partners were able to determine a 1.7 drop in visitors would translate to about a .7 to 1.4 loss in annual revenue — about \$86,000 to \$172,000

Without additional mitigation, an additional foot of sea-level rise would translate to 24 percent fewer visitors than in a year without high-tide flooding.

The city is addressing nuisance flooding downtown with underground wet wells and pumps. Office of Emergency Management deputy director David Mandel, who assisted the group in their research, said the study results don’t change any of the city’s calculus in addressing flooding. Rather, it reinforces what city officials already knew.

“It tells us that we need to be focusing our efforts exactly where we already have been,” Mandel said. “This is another powerful piece of evidence that we can use in planning, policymaking and funding decisions. How many other communities can point to a peer-reviewed, groundbreaking study?”