

# **The Role of Land Use and Infrastructure Planning in Managing Risks from Climate Change and Extreme Weather**

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Danielle Swallow, CC-P  
Coastal Hazards Specialist  
Delaware Sea Grant  
[www.deseagrant.org](http://www.deseagrant.org)

# Professional Background

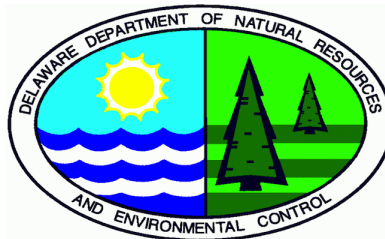


25+ years of experience integrating science into policy and planning decisions

## Education:

B.A. Political Science, Wellesley College  
M.U.P. Urban Planning, NYU

Certified Climate Change Professional





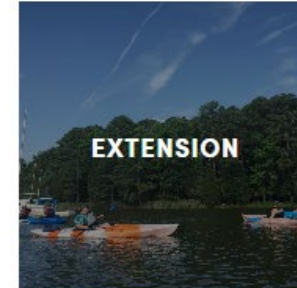
# Delaware Sea Grant

[www.deseagrant.org](http://www.deseagrant.org)



## What We Do:

Help communities become more sustainable and resilient, and wisely conserve and manage coastal resources



**My role as an Extension Specialist:** outreach, technical assistance, & capacity-building

# Due to Climate Change, the U.S. is Experiencing More Extreme Events

Learn to travel smarter to avoid vacation regrets  
With summer ending, it's a good time to review past mistakes before your next trip. **In Money**

Longhorns steal top spot in US LBM Coaches Poll  
Texas takes No. 1 despite Alabama's thrilling weekend victory against Georgia. **In Sports**

Lady Gaga showcases voice, flair for drama  
Review: New songs and rendition of classics on "Harlequin," surprise companion album to "Joker 2" show singer's finest work yet. **In Life**

**USA TODAY**  
THE NATION'S NEWS | \$3 | MONDAY, SEPTEMBER 30, 2024

**ELECTION 2024**  
**6 things to watch at the VP debate**

Walz, Vance face off with dueling visions for future  
**Phillip M. Bailey**  
USA TODAY

In this exceedingly tight election race, Democrat Tim Walz and Republican JD Vance are serving up one of the most consequential vice presidential debates in U.S. history, one that could make or break their respective tickets in the final five weeks of the fight for the White House.

The running mates typically host a snoozy undercard, but polls show a seesaw contest in each of the battleground states, and given that Tuesday's meeting in New York is likely the final debate of the 2024 campaign, this marks one of the last chances for either campaign to score a decisive blow against the other.

And as much as Walz and Vance differ, politically speaking, both have presented themselves as the everyman who better represents Midwestern values and spotlighted their rural, working-class roots in an attempt to win over undecided voters.

**Helene leaves path of death, damage**



**Death toll expected to rise as millions still lack power**

**N'dea Yancey-Bragg and Will Hofmann** USA TODAY NETWORK

TRUSTED. BALANCED. LOCAL.

**Orlando Sentinel**  
Thursday, October 3, 2024

**MENACING MILTON**



**Hurricane makes landfall in Siesta Key as a Category 3 storm with 120 mph winds**

Thousands take head of warning, flock to shelters in Central Florida

Storms take head of warning, flock to shelters in Central Florida

Hurricane Milton, a Category 3 storm, made landfall on Siesta Key, Florida, on Thursday, Oct. 3, with 120 mph winds and 10-foot waves. The storm is expected to bring heavy rain and power outages to the region.

# Top Natural Hazards in Delaware

- 2023 State Hazard Mitigation Plan

2023 Ranking	2023 Hazards
1	Coastal Flooding
2	Tropical Cyclones (hurricanes & tropical storms)
3	Inland Flooding (riverine, flood, flash)
4	Severe Winter Weather (blizzard, freezing fog, heavy snow, ice storm, sleet, winter storm)
5	Coastal Erosion
6	Severe Thunderstorms & Tornadoes (heavy rains, high winds, strong winds, thunderstorm winds, hail, lightning)
7	Extreme Temperatures (heat & cold)
8	Drought
9	Dam/Levee Failure Flooding
10	Wildfire & Smoldering Fires
11	Local earth movement (sinkholes & landslides)
12	Earthquakes





MODELED VISUALIZATION  
NOAA 2022 intermediate-high sea level rise  
scenario for 2070 + 1% annual chance flood  
3' 5" above road level  
Water height: 7' 10" above local high tide line  
© 2024 Climate Central

Courtesy of Climate Central

## Visualization of Coastal Flooding in Lewes, DE



Ernesto

Ida (top), Melissa

# Delaware Does Not Need a Direct Hit to Feel Impacts





What Could a Direct Hit Look Like?



MAJOR HURRICANE  
WEDNESDAY INTO  
THURSDAY



Know Your Zone - <https://preparede.org/know-your-zone/>









**NE Wilmington, 2021**













## State Climate Extremes Record

Delaware 24-Hour Precipitation

Harbeson, Delaware

**12.48 inches**

September 28–29, 2016



NOAA National Centers for Environmental Information

Harbeson, DE 2016





**STORE  
CLOSING**

**CLOSING  
THIS STORE  
ANYTHING**

## NATURAL DISASTER IMPACT

IMMEDIATE

**40%**

OF SMALL  
BUSINESSES WON'T  
REOPEN

ONE YEAR LATER

**25%**

MORE SMALL  
BUSINESSES  
WILL CLOSE

THREE YEARS  
LATER

**75%**

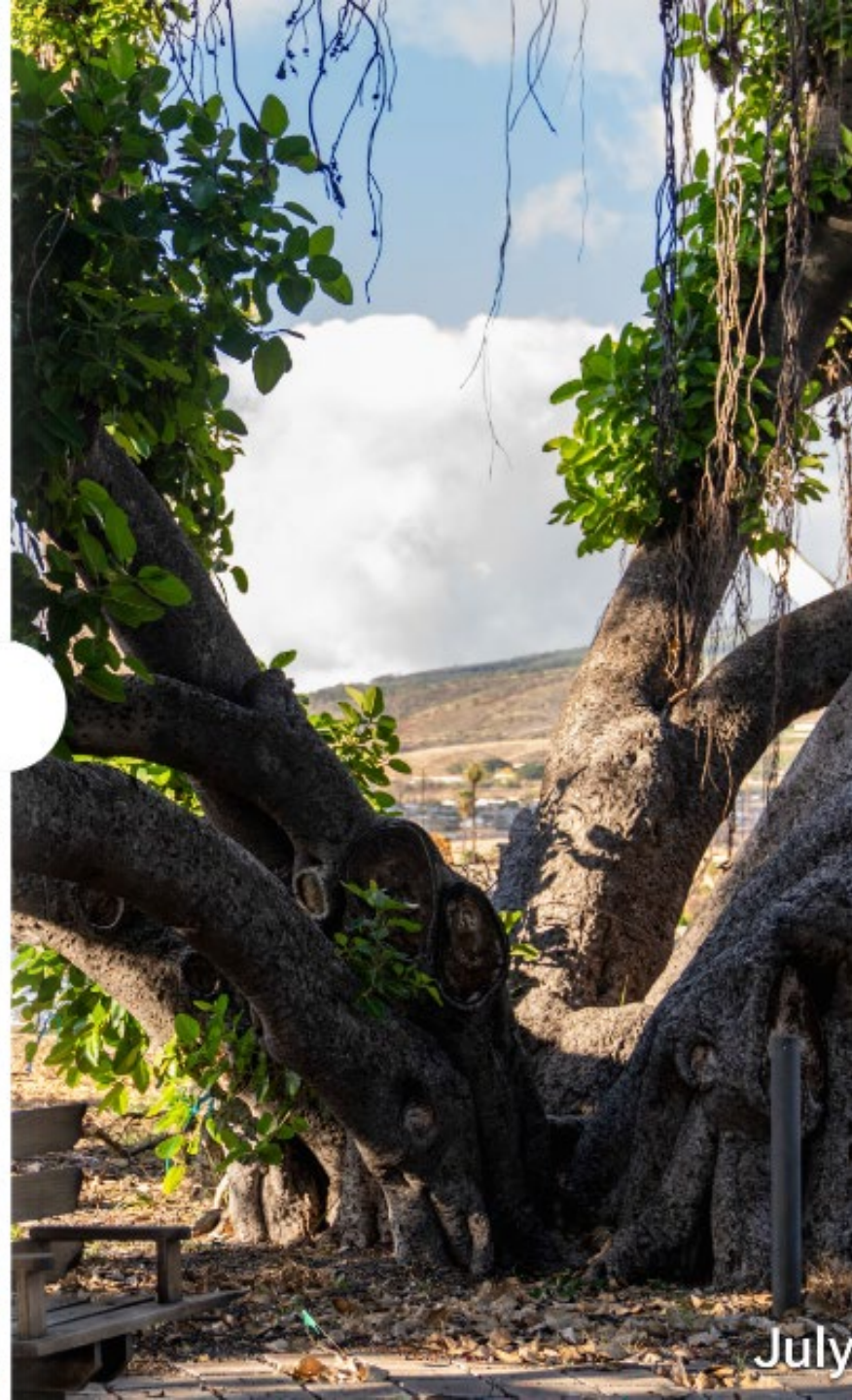
OF BUSINESSES  
WITHOUT A  
CONTINUITY PLAN  
WILL FAIL

Source: 2014 data from the Federal Emergency Management Agency (FEMA) and US Department of Labor



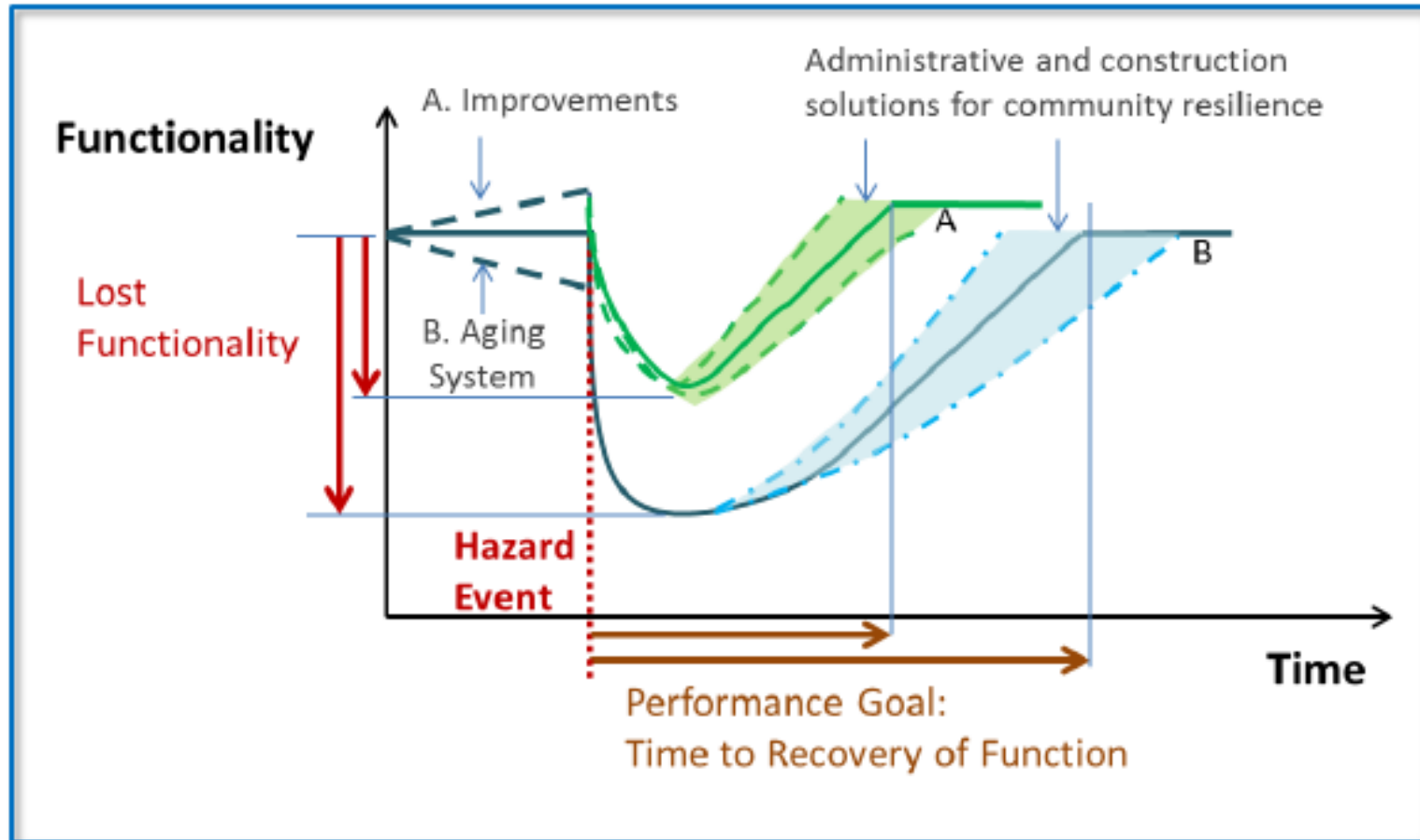
# Resilience:

The ability to bounce back after disruptive events





# How long before life returns to “normal?”





# Building Resilience Requires a Comprehensive Approach to Planning



# Land Use and Infrastructure Planning

*“Human settlements have been designed in a way that reflects a climate of the past, and this increases the likelihood that disaster-related losses will continue to rise.”*

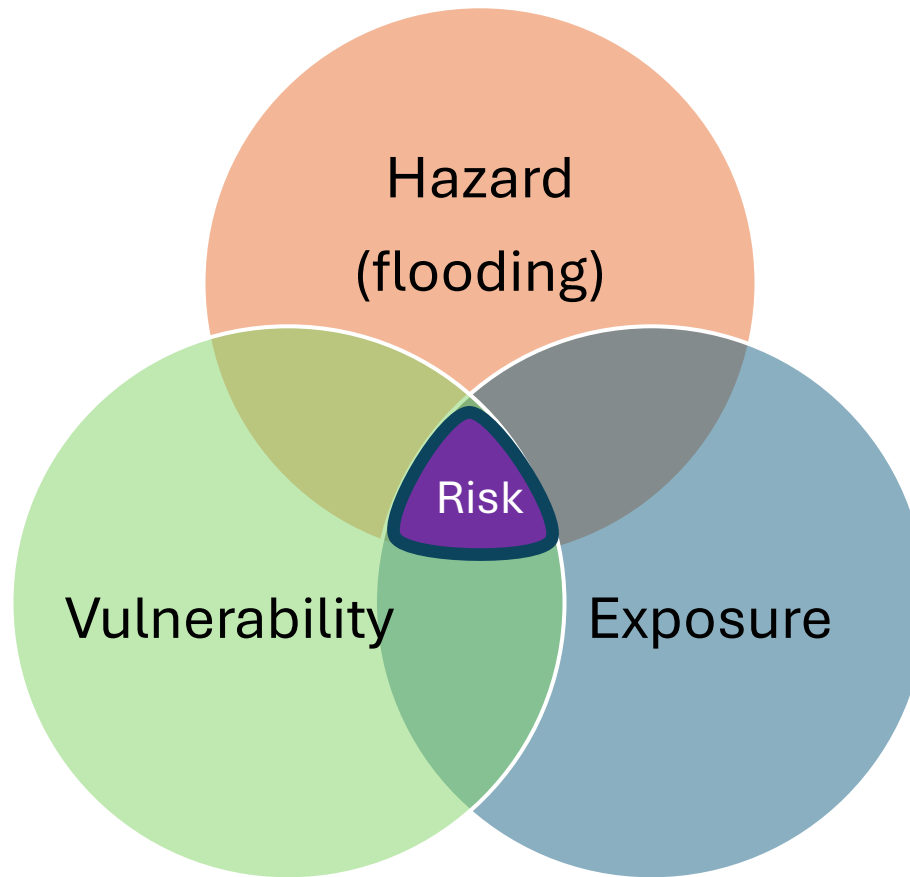
- Gavin Smith, Professor at UNC Chapel Hill, Coastal Resilience Center

South Bethany

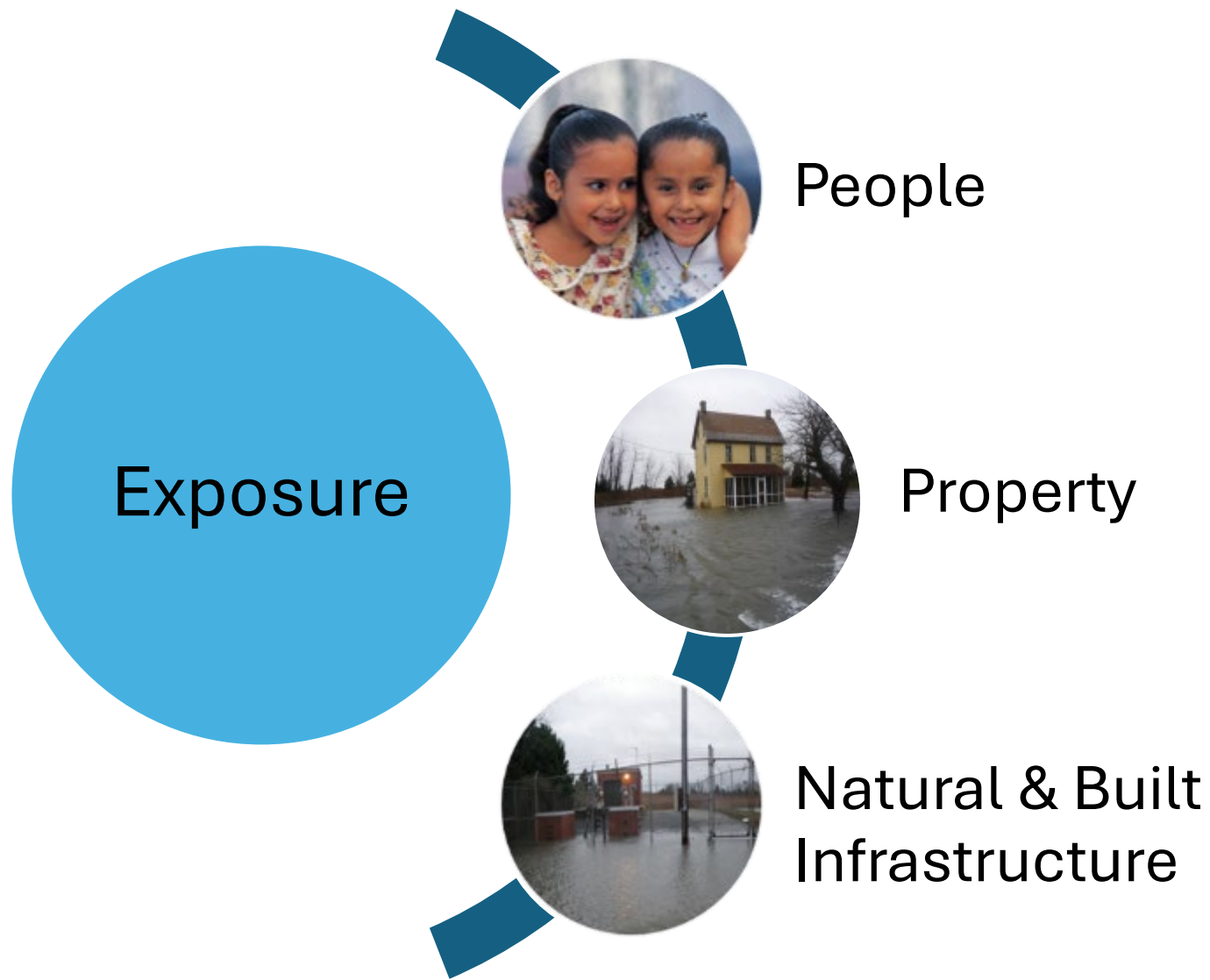




$$\text{Risk} = \text{Hazard} + \text{Exposure} + \text{Vulnerability}$$



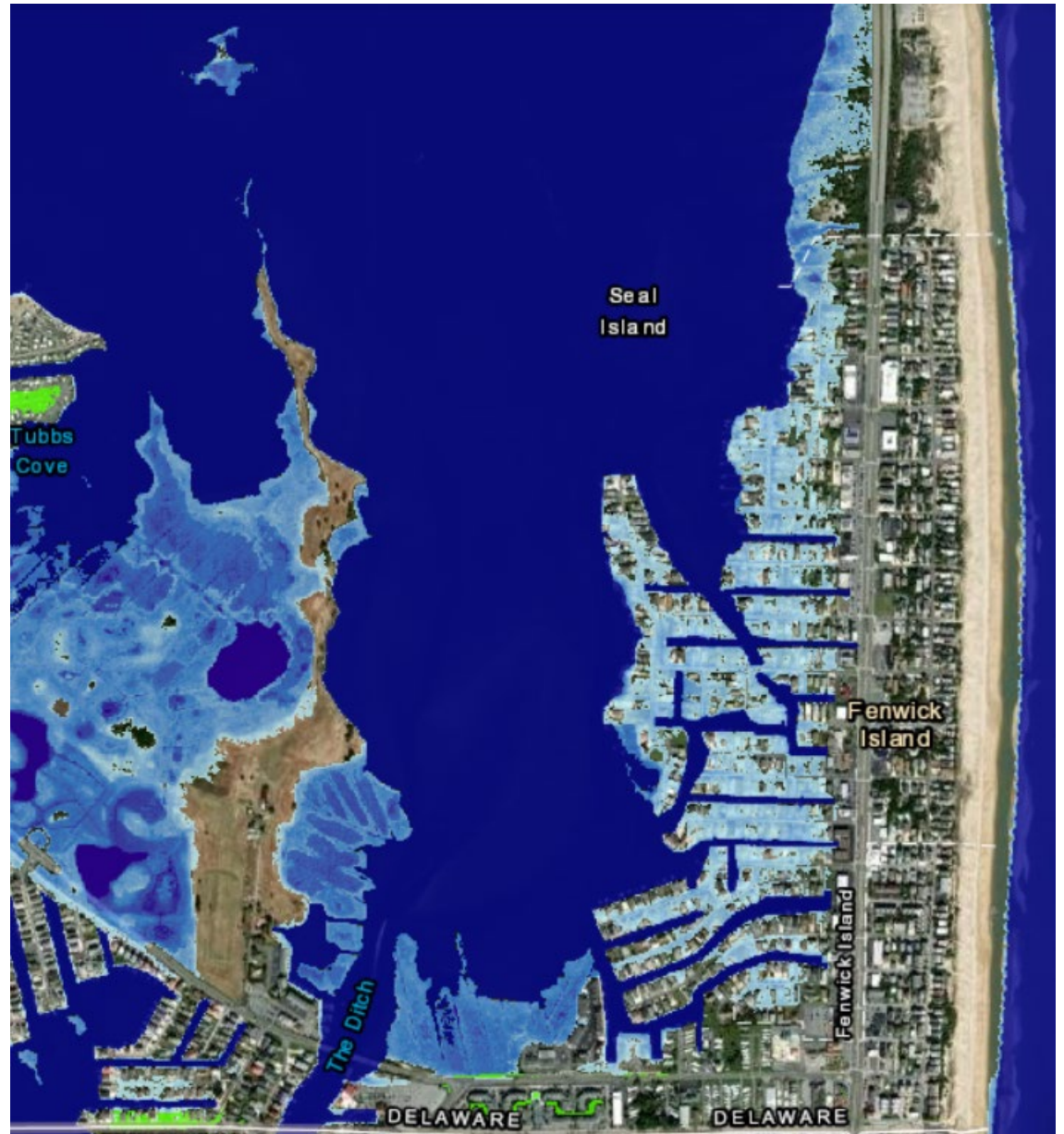
Adapted from FEMA, IS-393.A  
Introduction to Hazard Mitigation



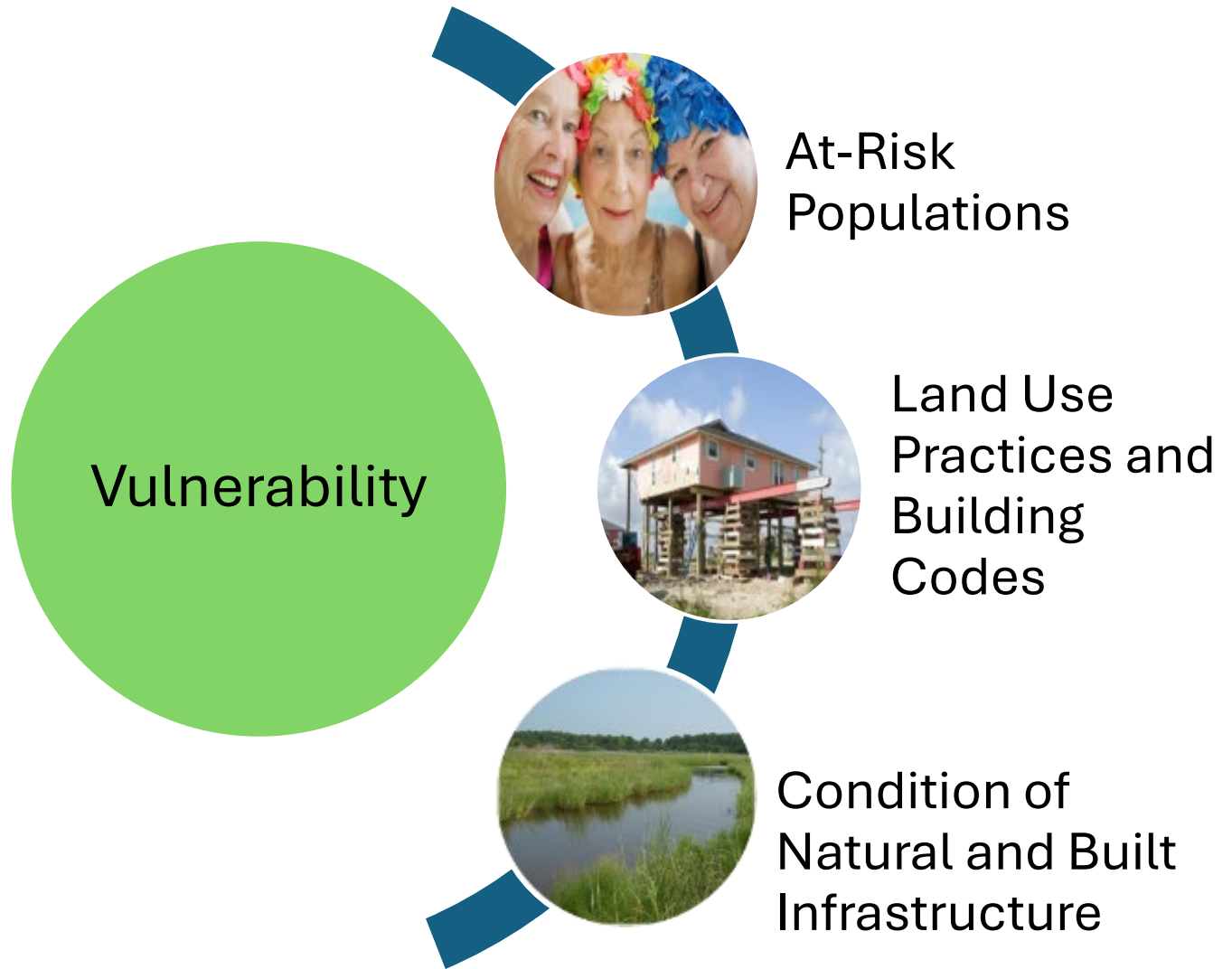
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# Fenwick Island and Rt 54 Corridor

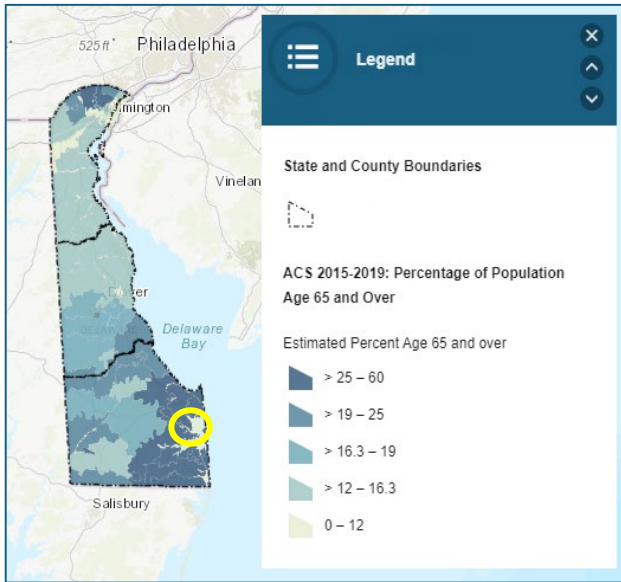


2 feet of sea level rise



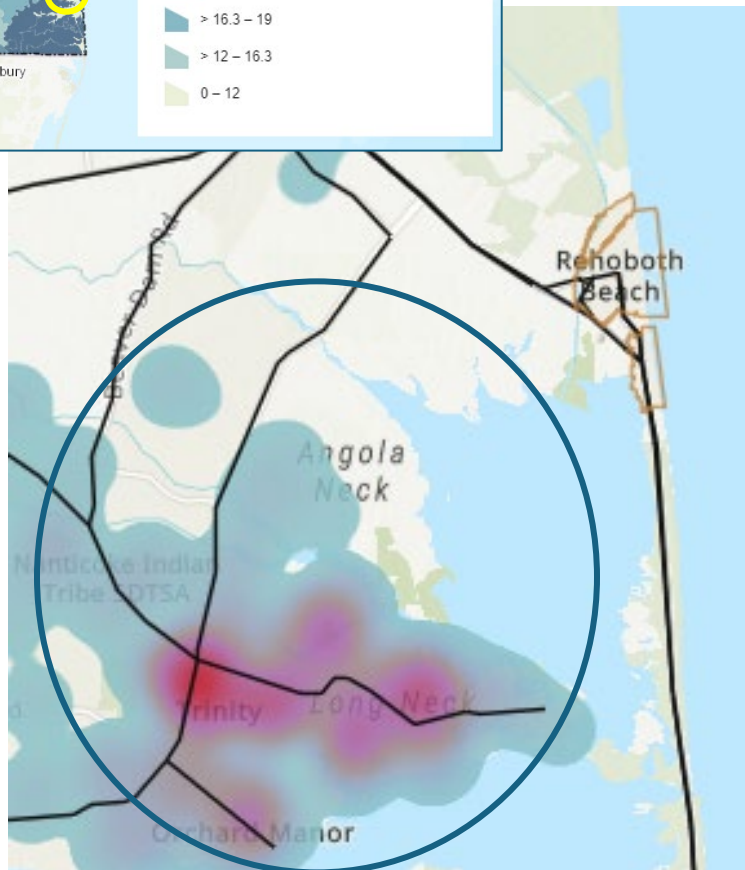
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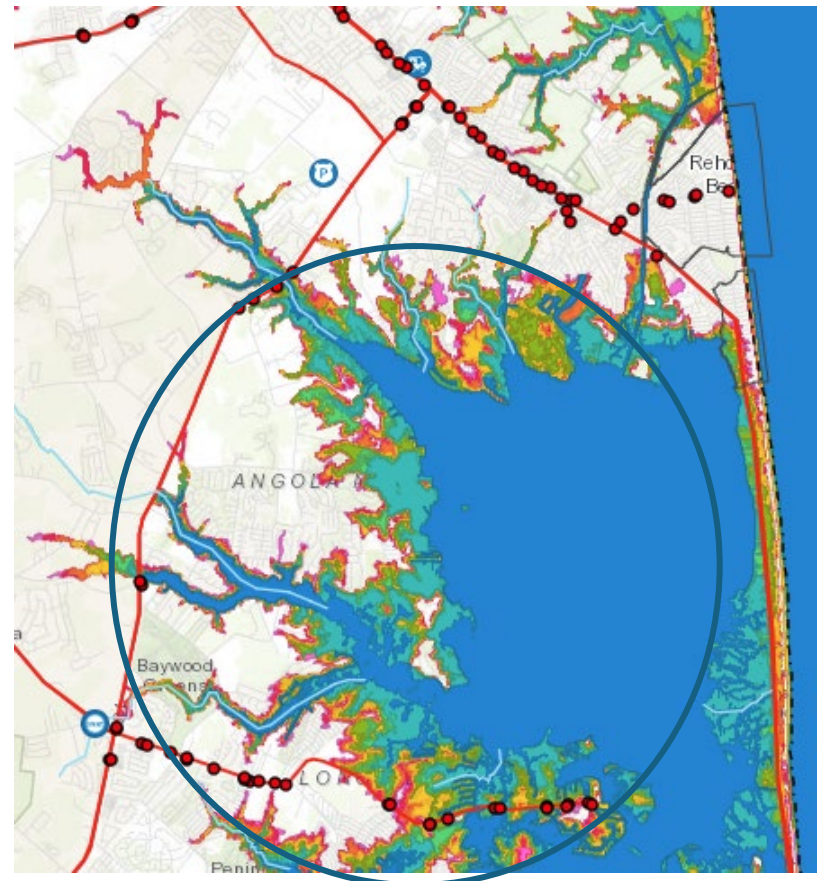


# Southeastern Sussex County

Source: DE-PLANs <https://www.deseagrant.org/>



Homebound adults



Flood risk and evacuation options



Long Neck during sub-tropical storm Melissa

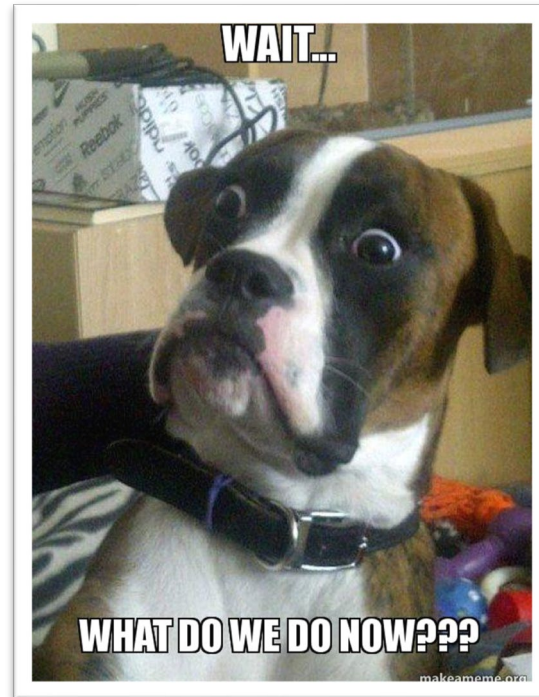
Angola and Long Neck at 2 ft SLR.

Source: NOAA Sea Level Rise Viewer <https://coast.noaa.gov/slr/>



Our land use and infrastructure planning patterns are increasing our exposure and vulnerability to extreme weather and climate change  
...at a time when our population is aging









Which home is more vulnerable to flooding?

Home elevations improve adaptive capacity



# Green Infrastructure Practices







## The natural floodplain is:

- Best at receiving, conveying, and discharging excess water
- A form of “green” community-based infrastructure that Nature gives us for **free**.
- Produces multiple benefits vs. grey infrastructure.
- Costs us \$\$\$ to replace it or mimic it with engineered solutions

# Reducing Vulnerability Through Land-Use and Infrastructure Planning



## Adopt

### Higher Standards

- Protect critical facilities
- VE construction standards in AE zones



## Invest in

### Green infrastructure

- Expand buffers
- Conserve and restore wetlands and forests
- Increase open space



## Reduce

### Impervious surfaces

- Downsize maximum lot coverage
- Encourage vegetated yards

*“Communities that invest in nature-based approaches to reducing disaster risk can save money, lives, and property in the long-term AND improve quality of life in the short term.”*

*– Building Community Resilience with Nature-Based Solutions: A Guide for Local Officials (FEMA)*



# Reducing Vulnerability Through Land-Use and Infrastructure Planning



## Avoid

Use of Fill

- “No Adverse Impact” approach



## Modernize

Building Codes



## Integrate

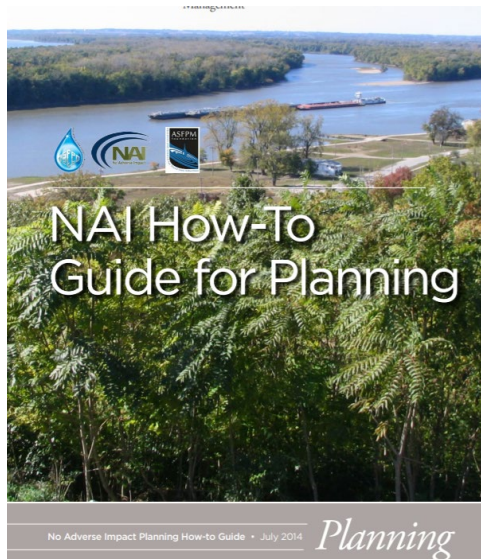
Climate change  
in all plans and  
policies

*“Nearly all floodplain filling activities create negative consequences to adjacent areas. Improperly designed and constructed fill can also jeopardize structures elevated on fill.” - Association of State Floodplain Managers*

For every \$1 invested in mitigation under modern building codes, \$11 is saved in disaster repair and recovery costs - FEMA



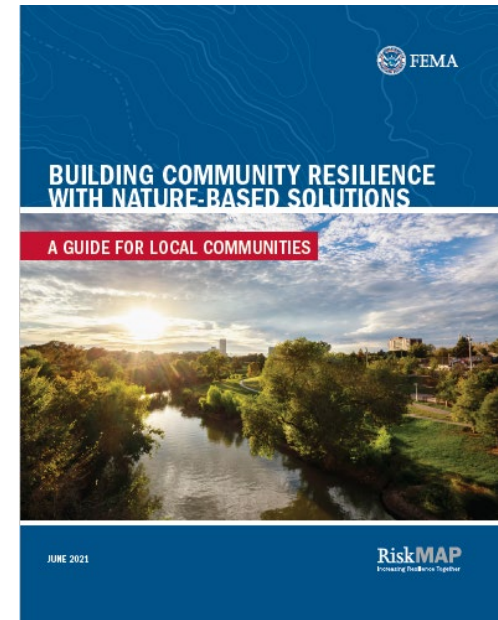
<https://www.nibs.org/projects/natural-hazard-mitigation-saves-2019-report>



# Resources



<https://www.planning.org/publications/report/9112664/>



<https://toolkit.climate.gov/reports/building-community-resilience-nature-based-solutions-guide-local-communities>

- Association of State Floodplain Managers  
<https://www.floods.org/resource-center/association-of-state-floodplain-managers-nai-no-adverse-impact-floodplain-management/>





Thank you!  
[dswallow@udel.edu](mailto:dswallow@udel.edu)