

# Supporting Coastal Community Resilience through Natural Infrastructure

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EPA Office of Research & Development

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# Coastal Resilience and Natural Infrastructure

## Goals:

- Investigate **natural infrastructure** strategies like saltmarshes or living breakwaters for addressing **coastal resilience issues** in and around Crisfield
- Assess **economic, social and environmental co-benefits** of natural infrastructure strategies
- **Co-develop information** with the community that is useful for decision making about Crisfield's future
- Help increase **community awareness** about resilience and environmental issues and **community capacity** to help address them







THE U.S. ENVIRONMENTAL PROTECTION AGENCY  
INVITES YOU TO APPLY FOR THE



## CRISFIELD RESILIENCE ACADEMY

APPLICATIONS NOW OPEN FOR CRISFIELD-AREA RESIDENTS INTERESTED IN  
THIS ENVIRONMENTAL EDUCATION OPPORTUNITY

### ELIGIBILITY & REQUIREMENTS

- »»»» RESIDENT OF CRISFIELD, MARYLAND OR SURROUNDING AREA
- »»»» AGED 15-99+ YEARS OLD
- »»»» HAVE AN INTEREST IN THE ENVIRONMENT
- »»»» CAN BE IN-PERSON FOR TRAINING SESSIONS IN CRISFIELD
  - > SIX SATURDAY SESSIONS IN FALL 2024
  - > CRISFIELD SESSIONS APPROXIMATELY 2 HOURS EACH
  - > INCLUDING COMPLETION OF SURVEYS

ACADEMY MEMBERS WILL BE ELIGIBLE TO RECEIVE A STIPEND  
OF UP TO \$300 FOR PARTICIPATION IN THE ACTIVITIES ABOVE

Questions? Contact Us

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Please go to  
<https://www.epa.gov/gcx/crisfield-resilience-academy>  
to learn more and to apply today!

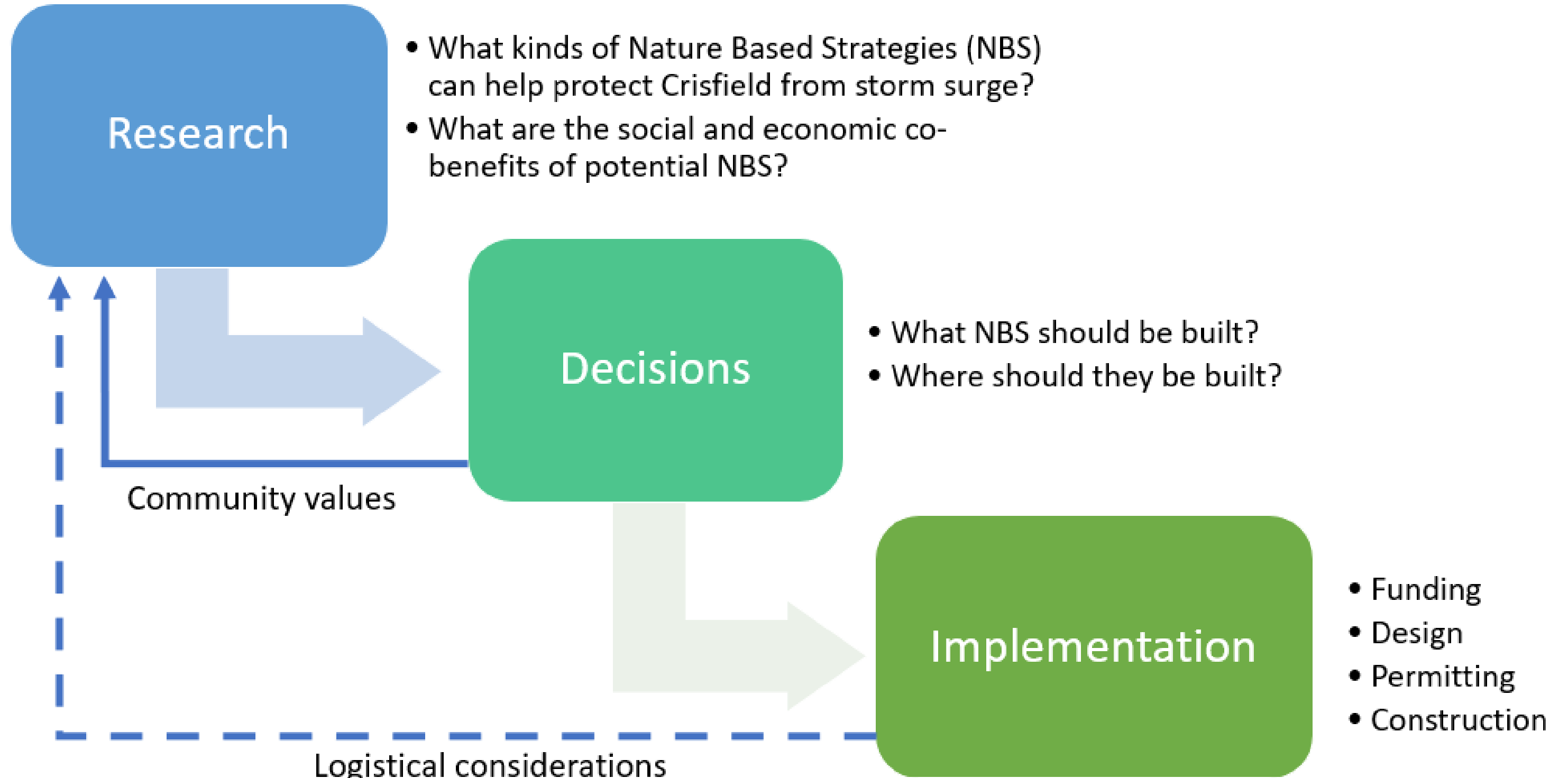


THE CRISFIELD RESILIENCE ACADEMY IS HOSTED BY THE INTEGRATED CLIMATE SCIENCES DIVISION (ICSD), WHICH IS IN THE CENTER FOR PUBLIC HEALTH & ENVIRONMENTAL ASSESSMENT (CPHEA) WITHIN THE OFFICE OF RESEARCH & DEVELOPMENT (ORD) AT THE U.S. ENVIRONMENTAL PROTECTION AGENCY

# Session topics:

- Session 1: Resilience
  - Saturday, February 1, 2025
- Session 2: Crisfield's ditch drainage system
  - Saturday, February 22, 2025
- Session 3: Flood warning systems
  - Saturday, March 1, 2025
- Session 4: Nature-based solutions
  - Saturday, March 22, 2025
- Session 5: Coastal Tourism and Recreation
  - Saturday, April 5, 2025
- Session 6: Crisfield Resilience Academy Celebration!
  - Saturday, April 26, 2025

# Research Co-Production





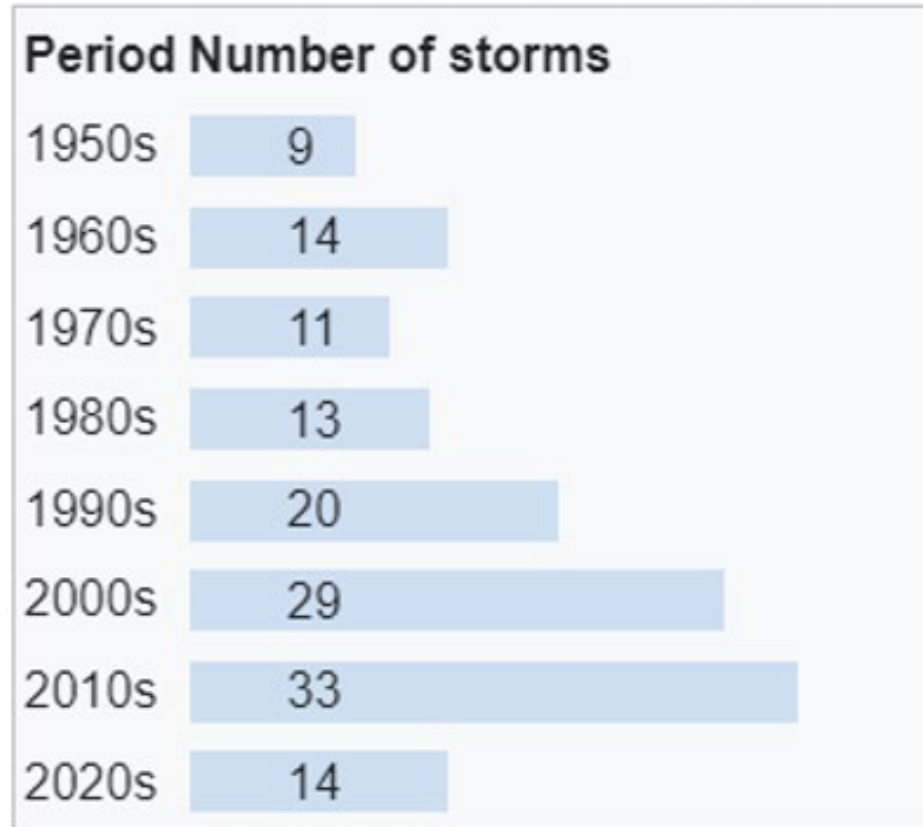
# Nature + FEMA project





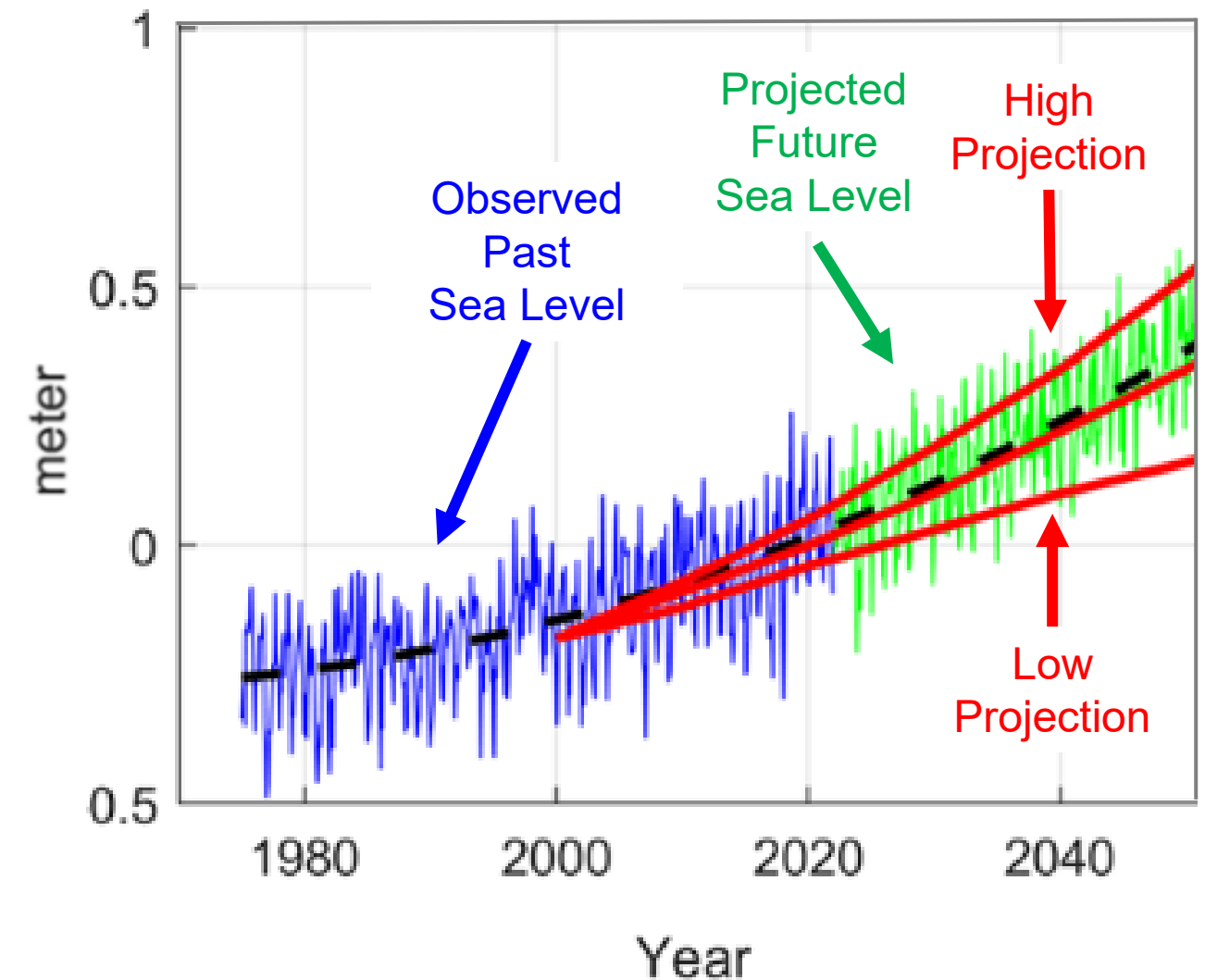
# Increasing storms and sea level rise

Storms affecting Maryland by period

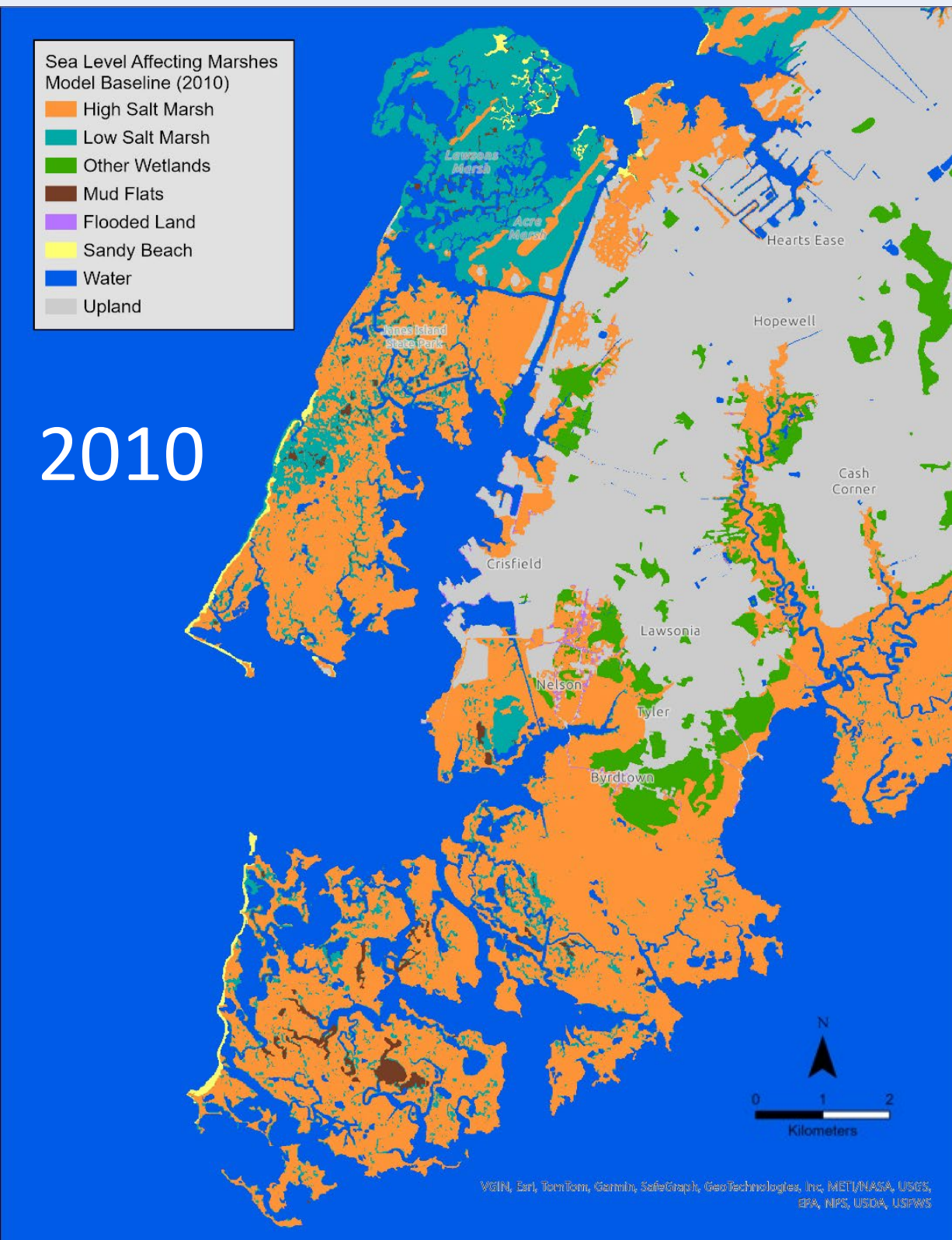


<https://www.wpc.ncep.noaa.gov/tropical/rain/tcrainfall.html>

Monthly Sea Level Observations and Projection (Chesapeake Bay)



# Current marsh inundation



High salt marsh =

Area flooded irregularly by larger  
than average tide resulting in  
weekly to monthly flooding

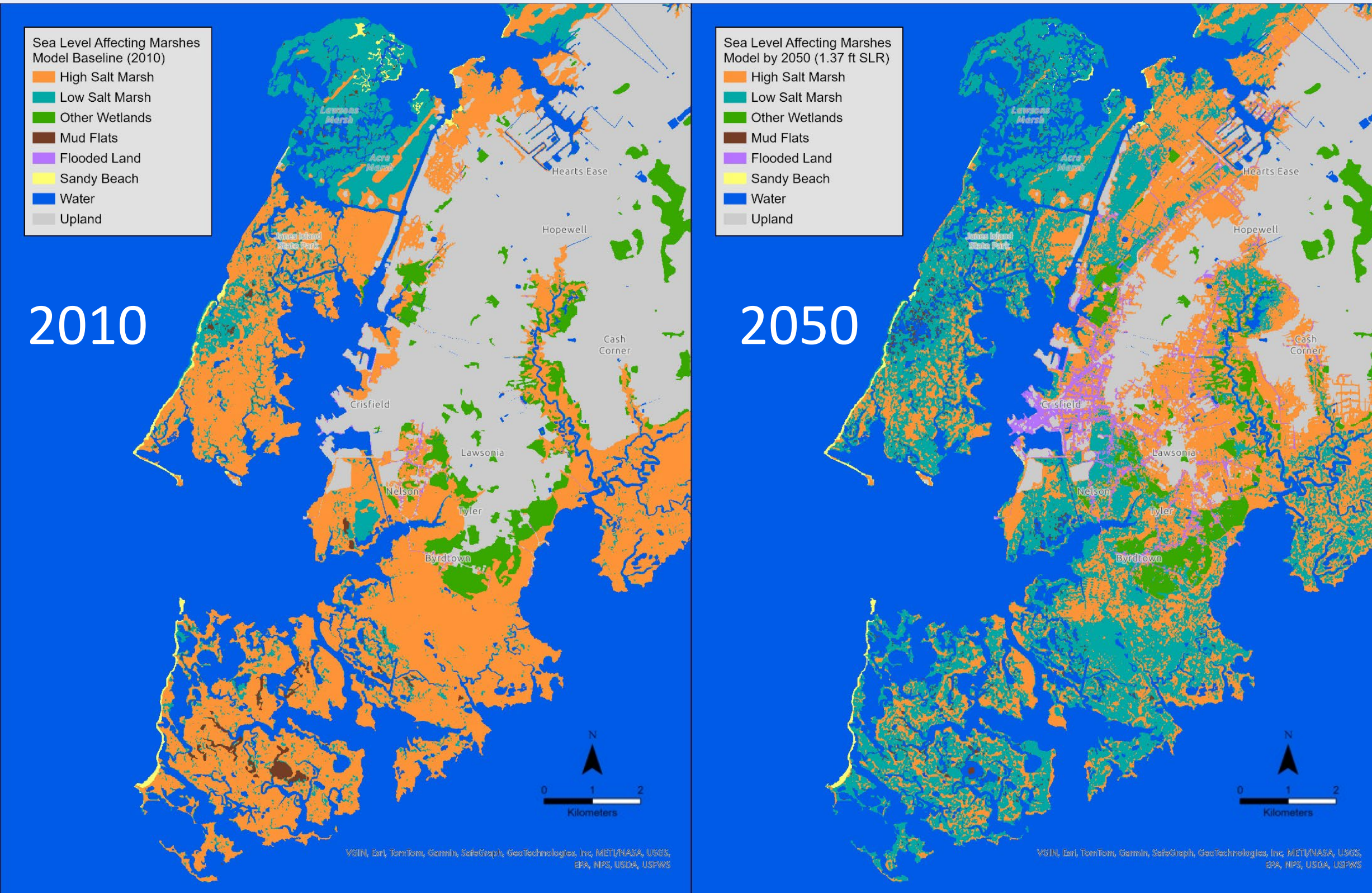


Low salt marsh =

Area flooded regularly by daily tides



# Future expected marsh inundation



High salt  
marsh



Low salt  
marsh

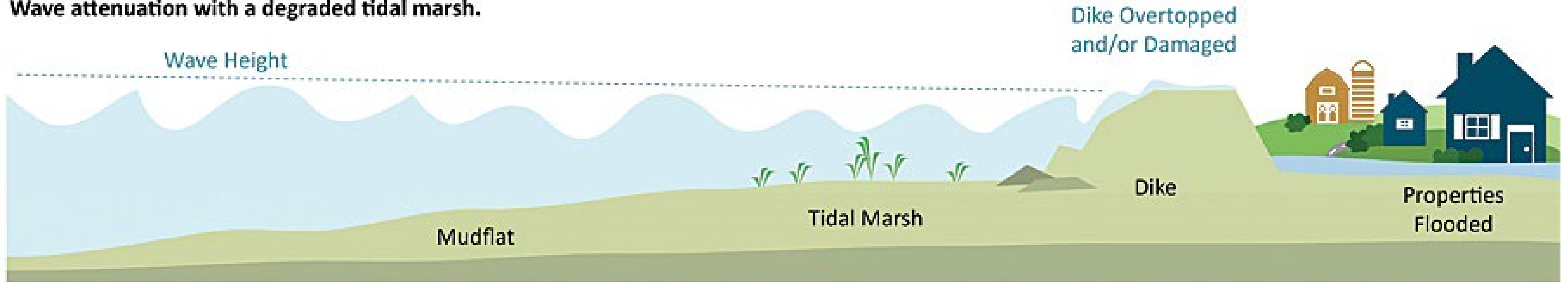
Projected sea level rise: 1.4 feet (since 2010)



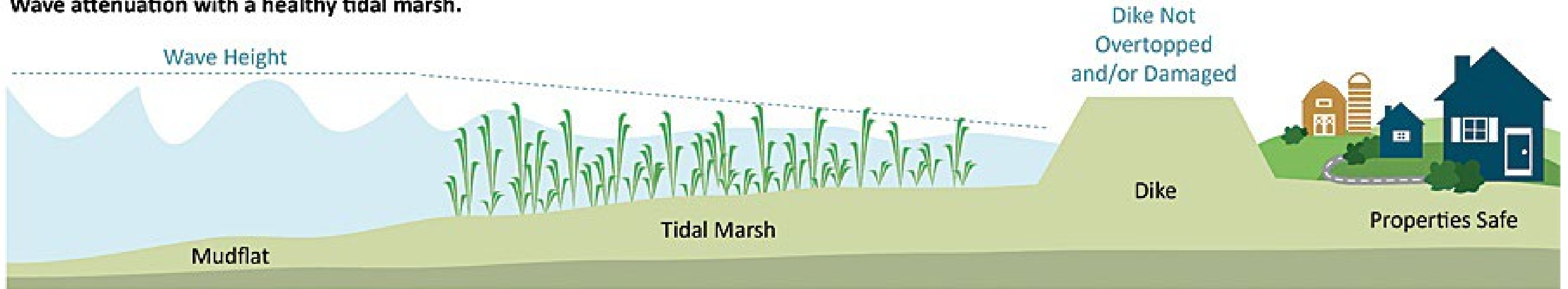
# How do Nature-Based Strategies work?

**Wave attenuation = Wave energy reduction**

**Wave attenuation with a degraded tidal marsh.**



**Wave attenuation with a healthy tidal marsh.**



<https://www.esri.com/about/newsroom/arcnews/gis-helps-integrate-coastal-hazard-risk-and-sea-level-rise/>



# What are Types of Nature-Based Strategies?

Salt Marsh Restoration



Living Shoreline



Artificial Reef/Living Breakwater

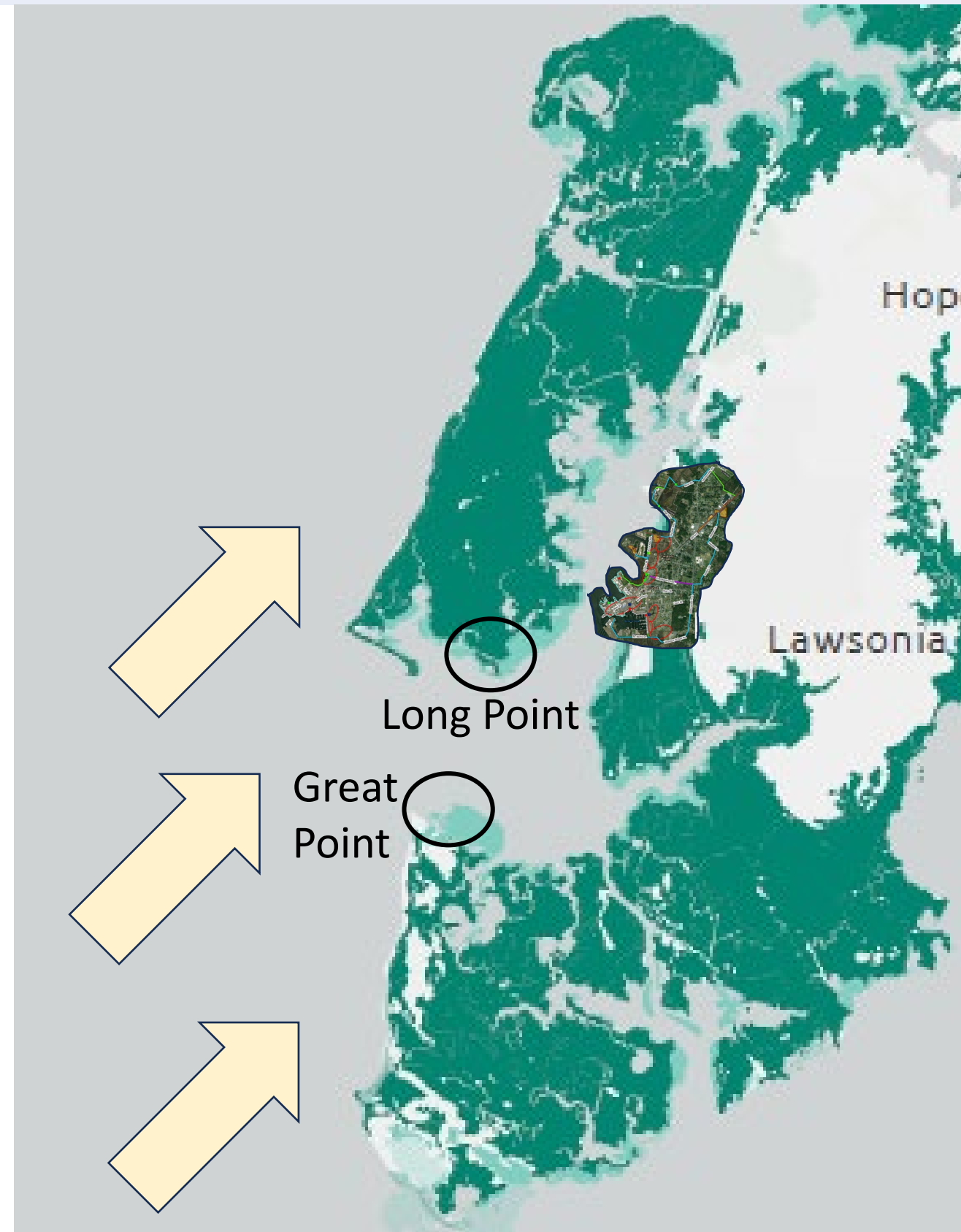
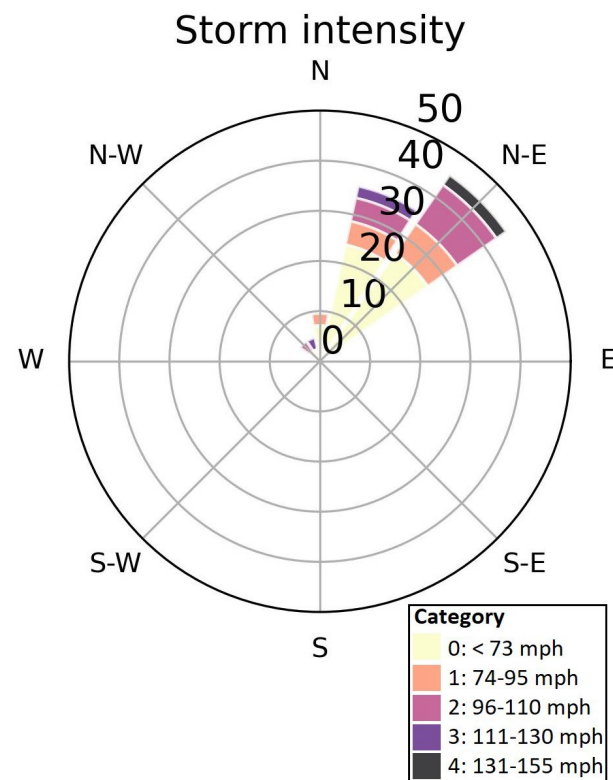


Sand Dune Restoration





# Possibilities most likely to attenuate waves and storm surge



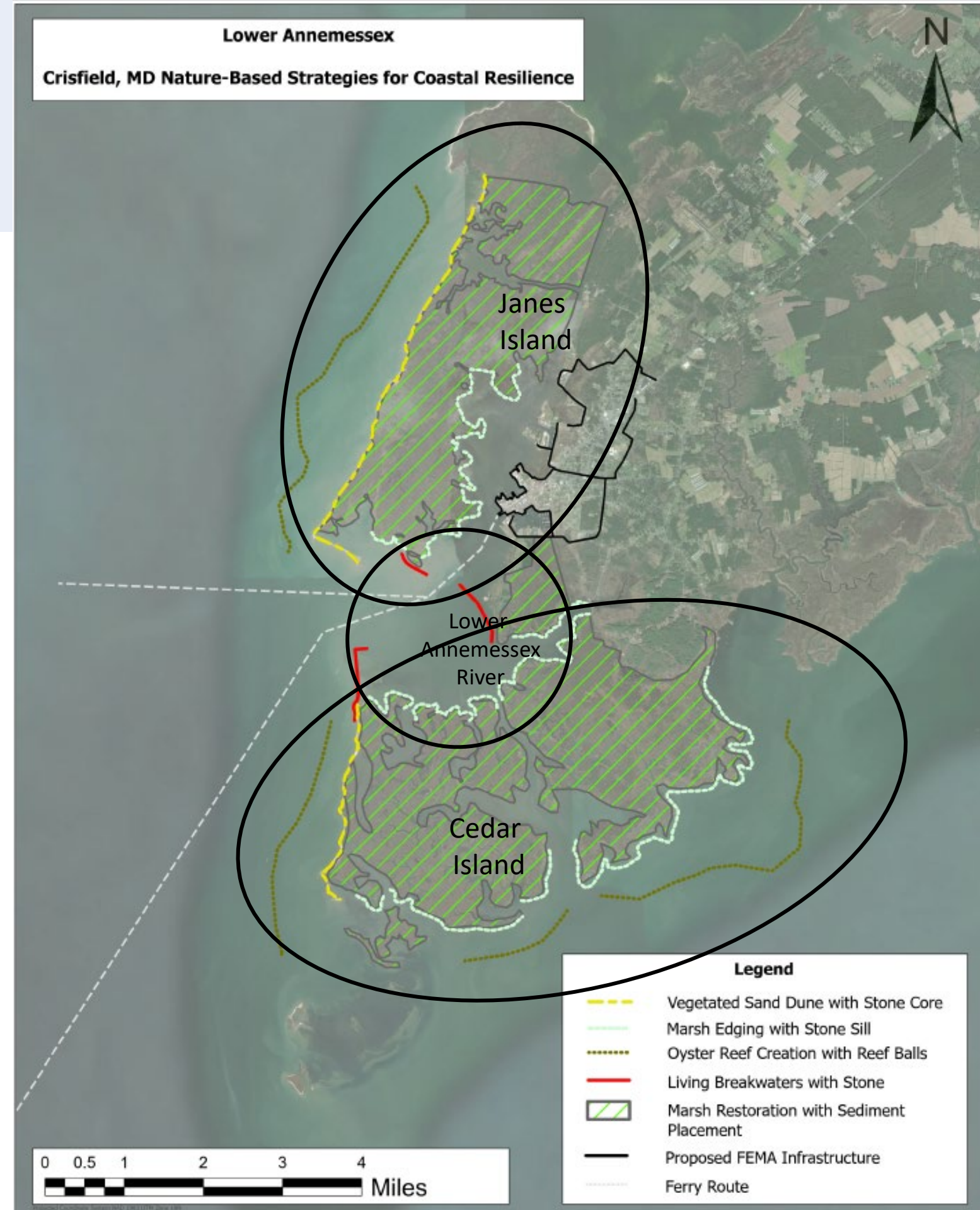
## Natural infrastructure success and siting criteria:

- Shallow enough water depth
- Conditions that support vegetation
- Low enough wave height & energy
- Gentle coastal land slope
- Healthy, complex ecosystems



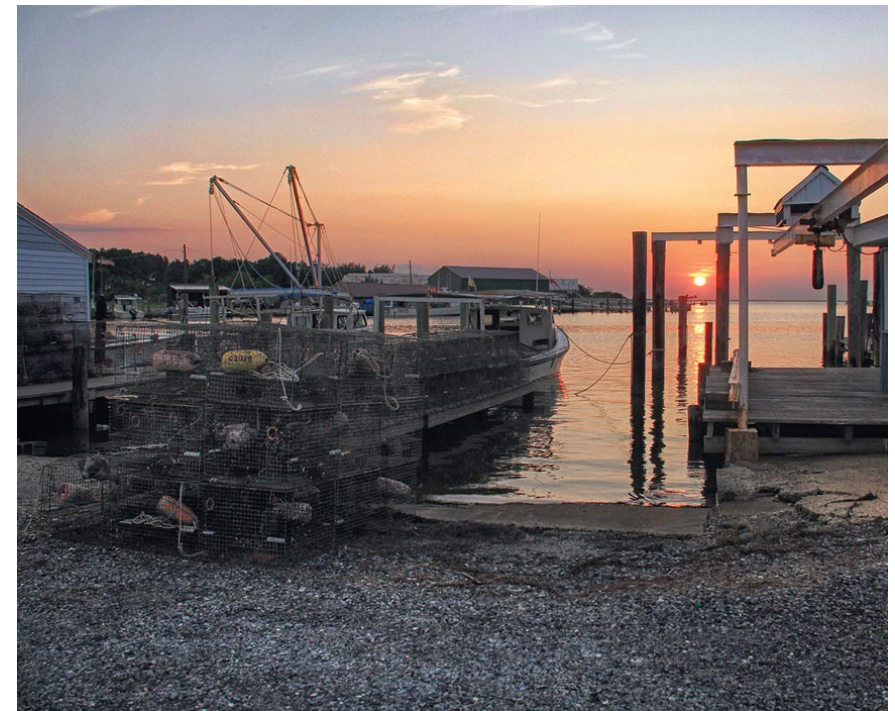
# Crisfield nature-based project options

- Janes Island
  - **Marsh restoration**: ~2,800 acres
    - ~7.8 inches sediment placement by 2050
  - **Sand dune restoration**: ~24,000 feet
    - ~6.5 feet above local mean sea level
  - **Artificial oyster reefs**: ~28,000 feet
    - ~60 feet width (multiple lines of reef balls)
    - ~3 feet tall in water depths of ~6-9 feet
- Lower Annemessex River
  - **Living breakwaters**: ~10,000 feet
    - ~4 feet above local mean sea level
- Cedar Island marsh complexes
  - **Marsh restoration**: ~5,000 acres
    - ~7.8 inches sediment placement by 2050
  - **Sand dune restoration**: ~12,000 feet
    - ~6.5 feet above local mean sea level
  - **Artificial oyster reefs**: ~48,000 feet
    - ~60 feet width (multiple lines of reef balls)
    - ~3 feet tall in water depths of ~6-9 feet





# What are Other Potential Social & Economic Benefits of Nature-Based Strategies to Crisfield and the Surrounding Communities?





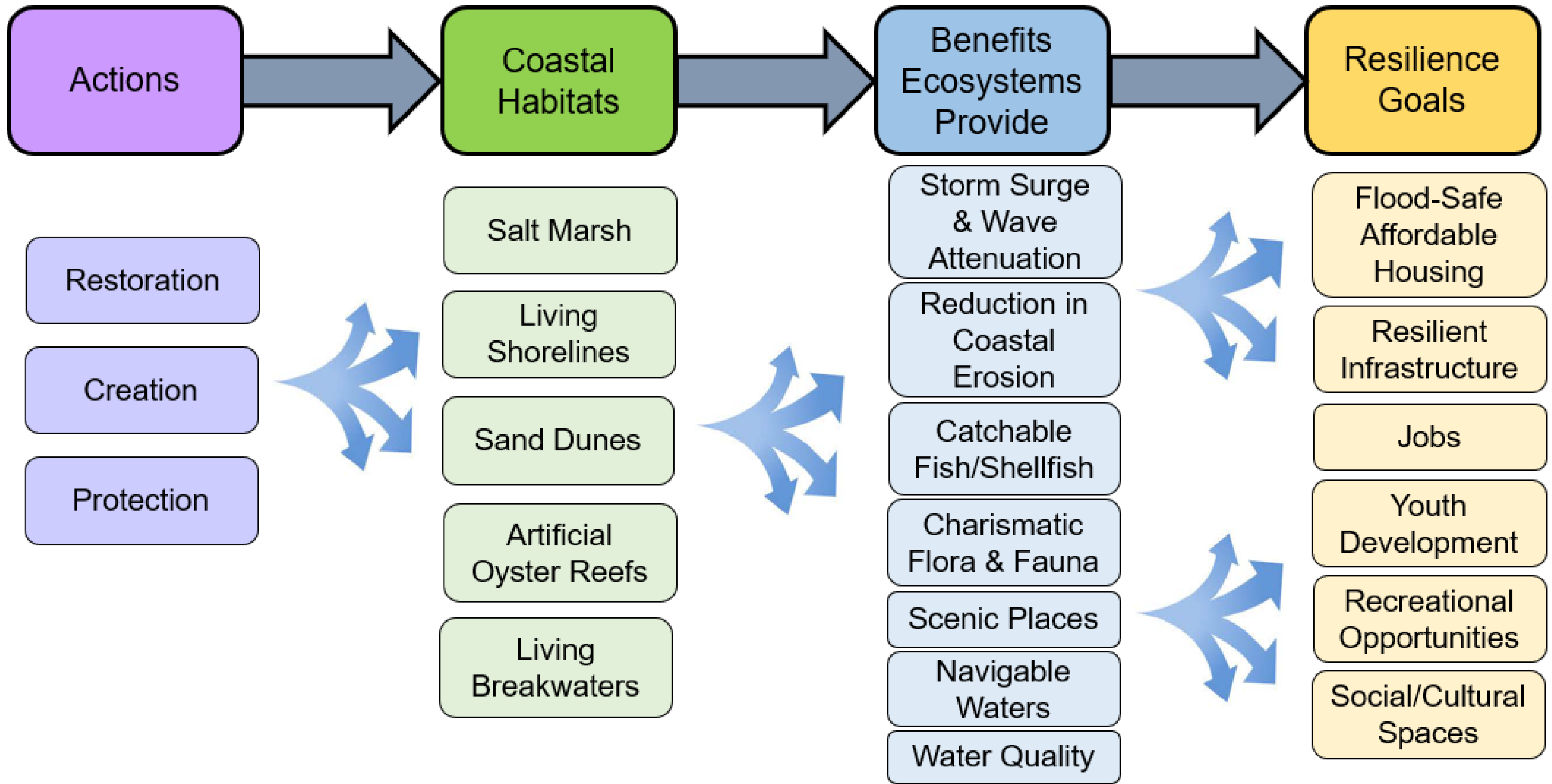
# Crisfield's Community Resilience Goals

- Resilient infrastructure, job creation and training, flood-safe and affordable housing, recreational opportunities, social/cultural spaces, youth development
- Also interested in community retention and cultural preservation, tourism tied to the waterfront (maritime history/heritage tourism, boating, fishing, nature appreciation), and fisheries (oysters, blue crabs)

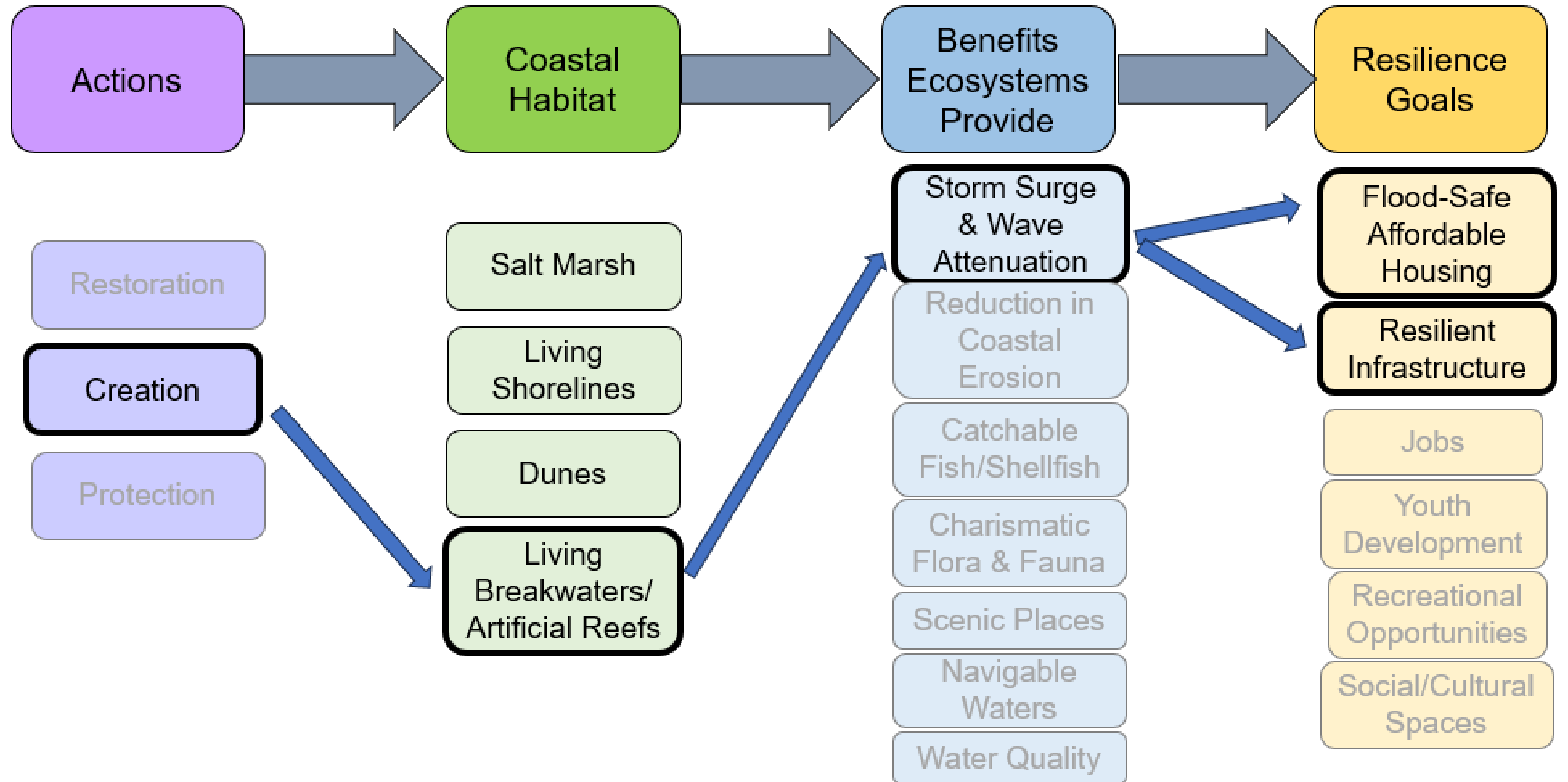


*How might Nature-based Strategies contribute to these goals?*

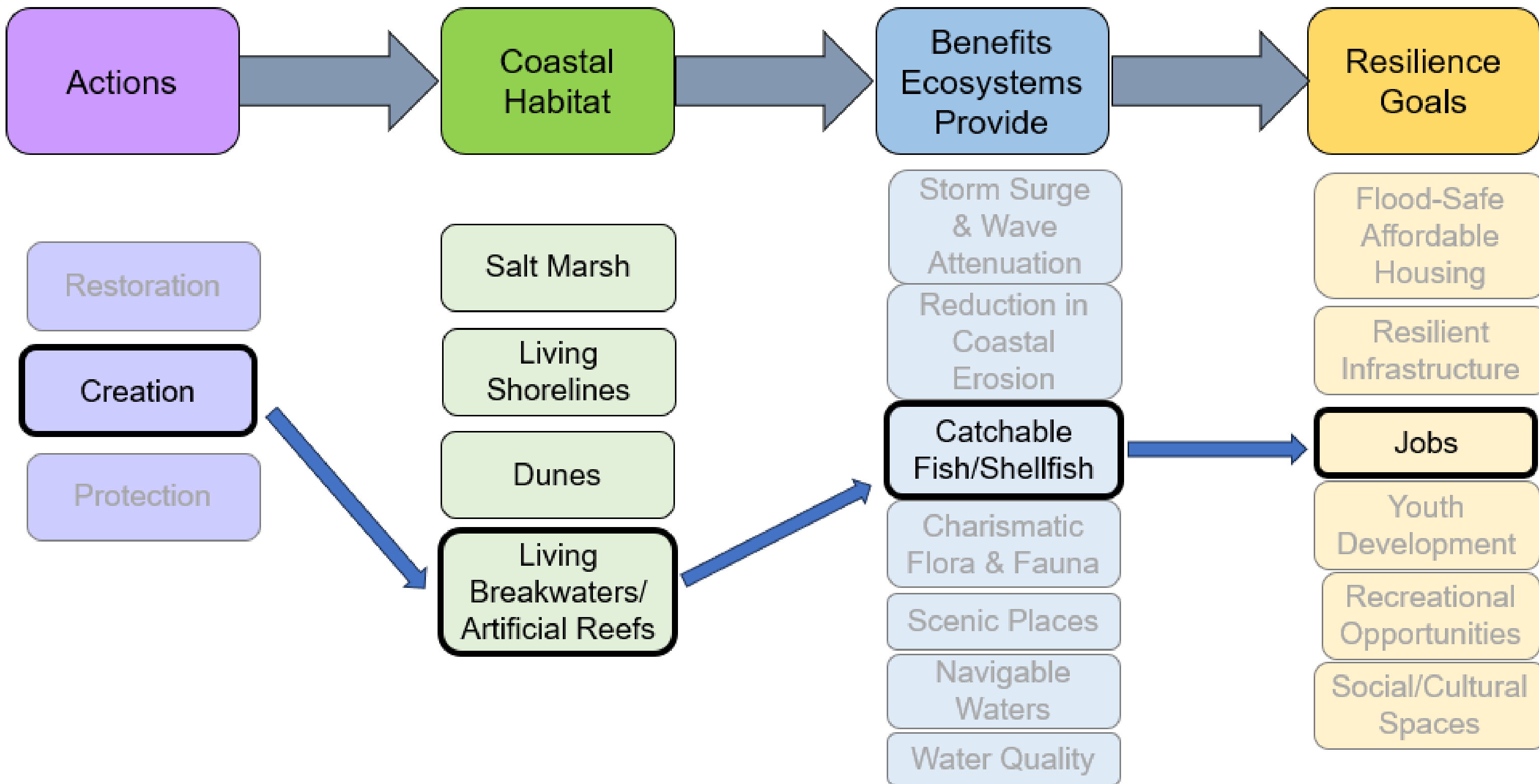




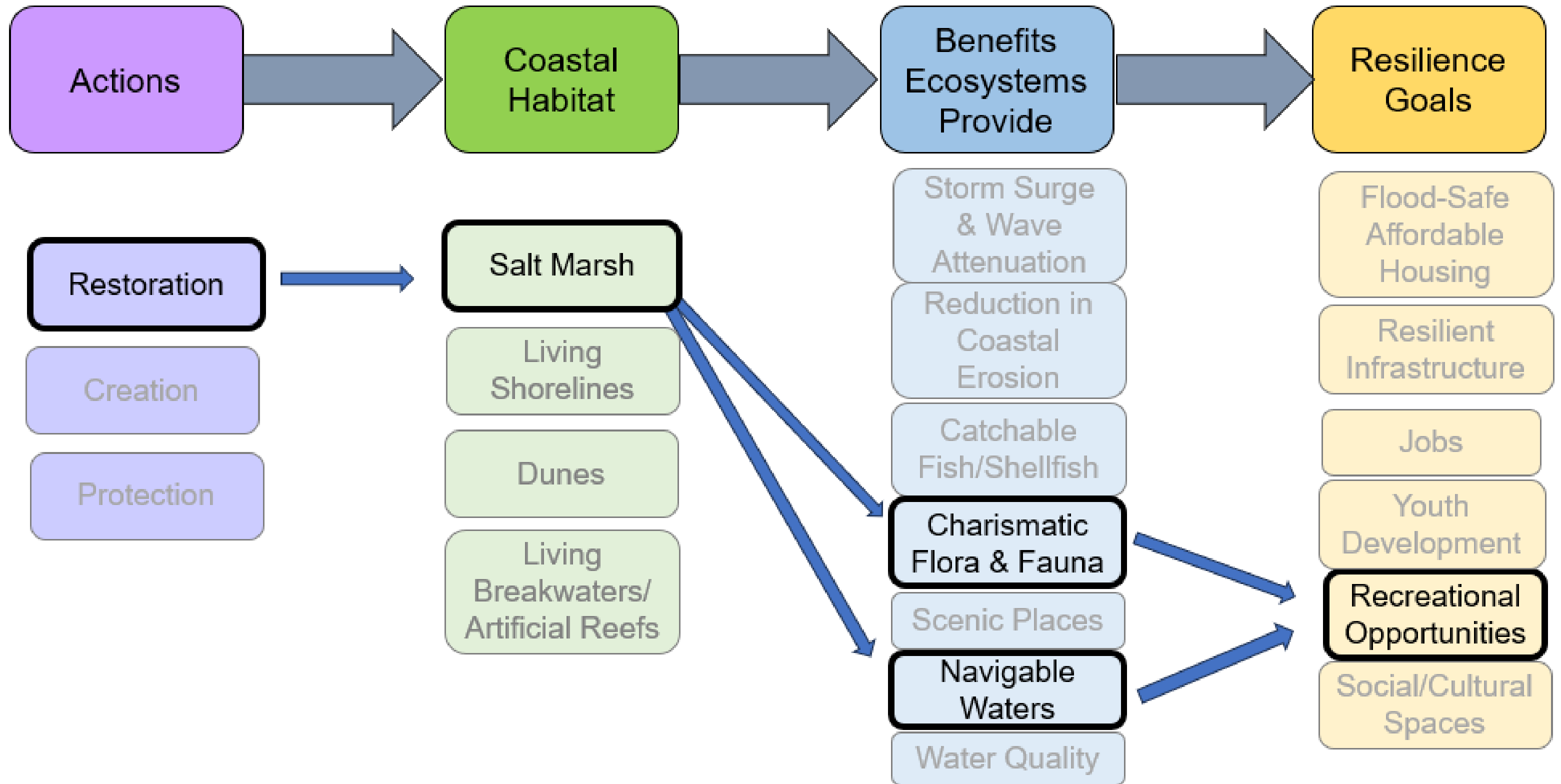
















# Community-Identified Co-Benefits

- Storm protection
  - Flood protection
  - Erosion prevention
- Support seafood industry
  - Habitat for fish, crabs, oysters (commercial fishing species)
  - Water access and navigability
  - Improve water quality for seafood species to grow and flourish
- Enhance recreation and tourism
  - Maintain and protect natural beauty
  - Preserve historical and cultural resources
  - Community access to natural open spaces like kayak trails
  - Habitat for animals (birdwatching, recreational fishing, duck hunting)
  - Improve water quality for boating, beaches and swimming





# Thank you!

## Questions?

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- Supported by Tetra Tech





# Activity Break

1. How might the NBS affect the community's use of these spaces (positively or negatively)?
  - Add sticky notes to each map
  
2. How might the NBS contribute to Crisfield's quality of life?  
E.g. Businesses, recreation, tourism, health, etc.?
  - Write down ideas on paper



# Additional questions or comments?

## Let us know!

