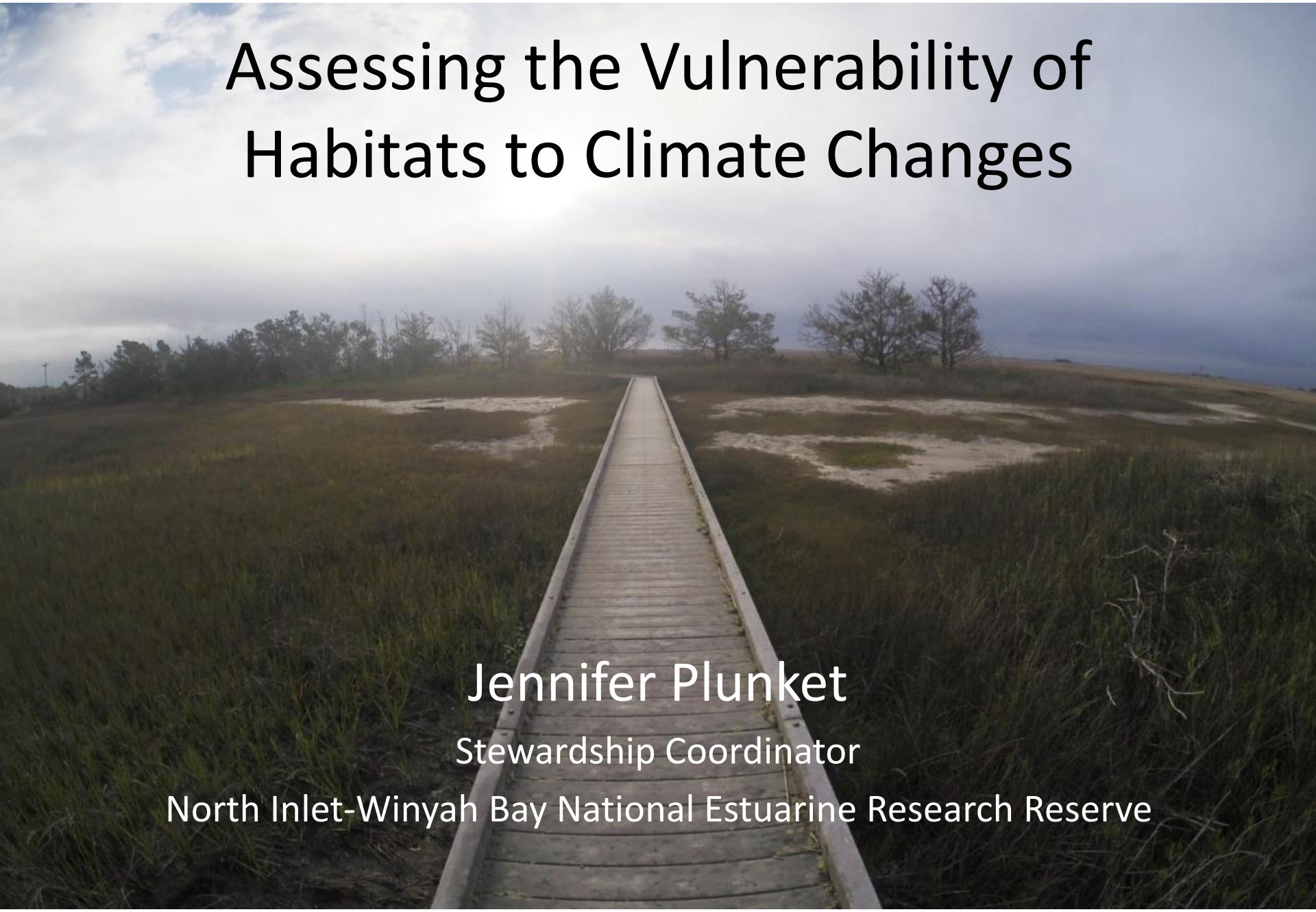
Assessing the Vulnerability of Habitats to Climate Changes

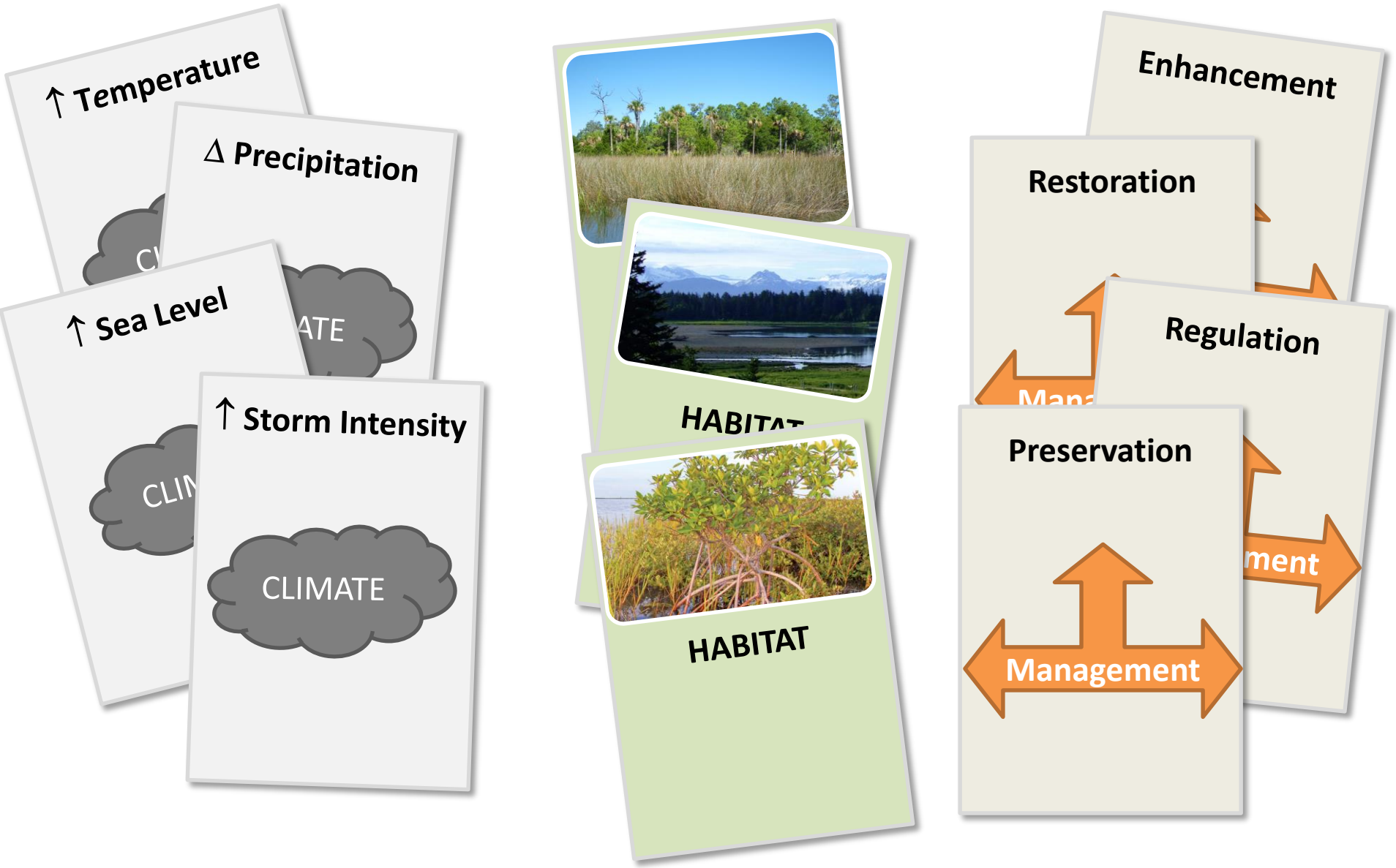


Jennifer Plunket

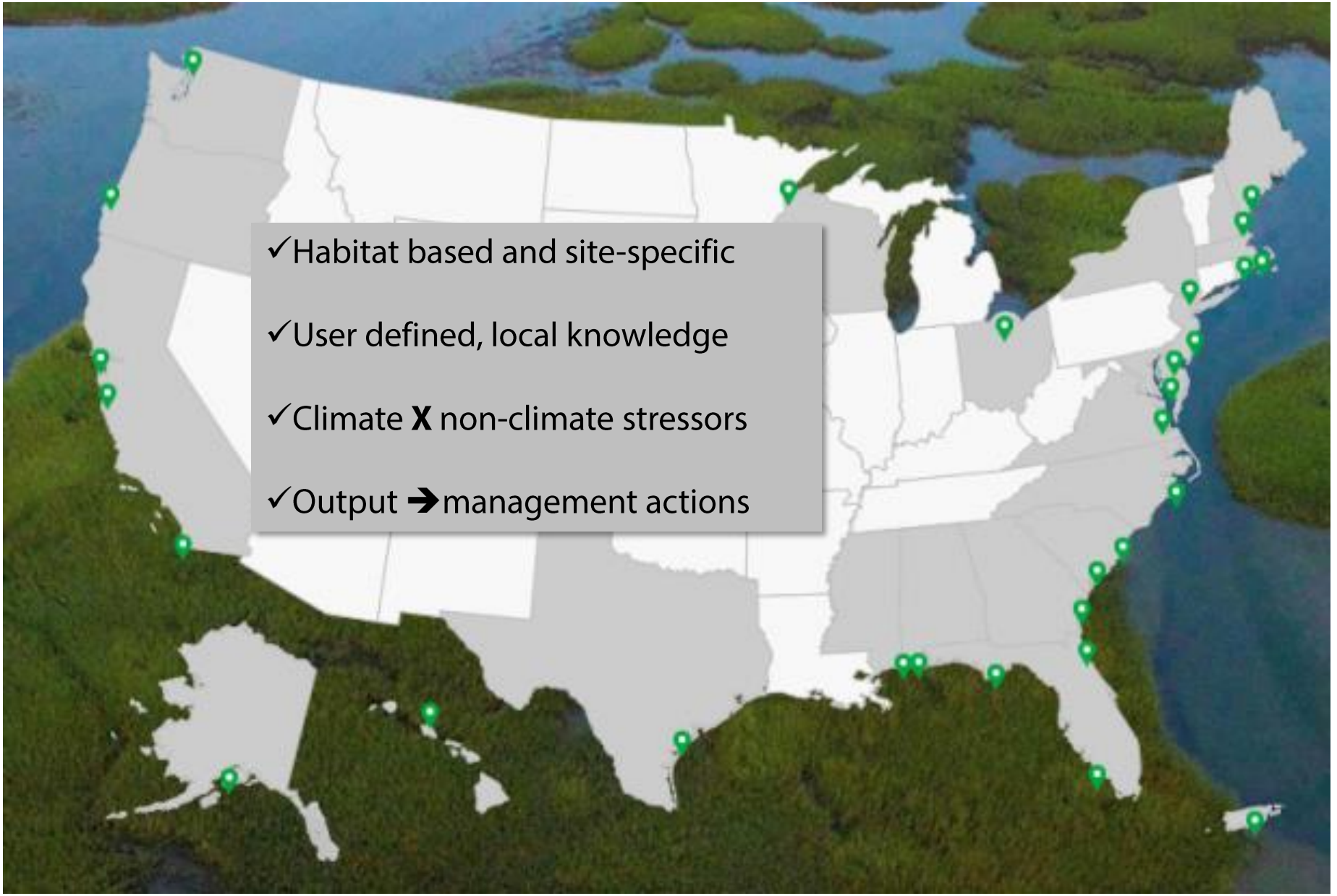
Stewardship Coordinator

North Inlet-Winyah Bay National Estuarine Research Reserve

Choices for Resilience



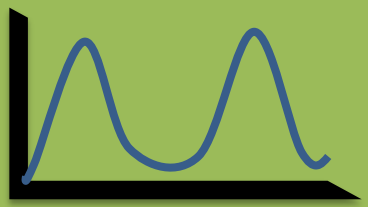
Assessing Vulnerability at Reserves



Vulnerability Assessment Framework

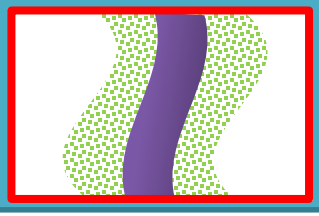
Exposure:

Heavy precipitation events



Sensitivity:

Un-buffered stream edge



Potential Impact:

Erosion, water quality issues

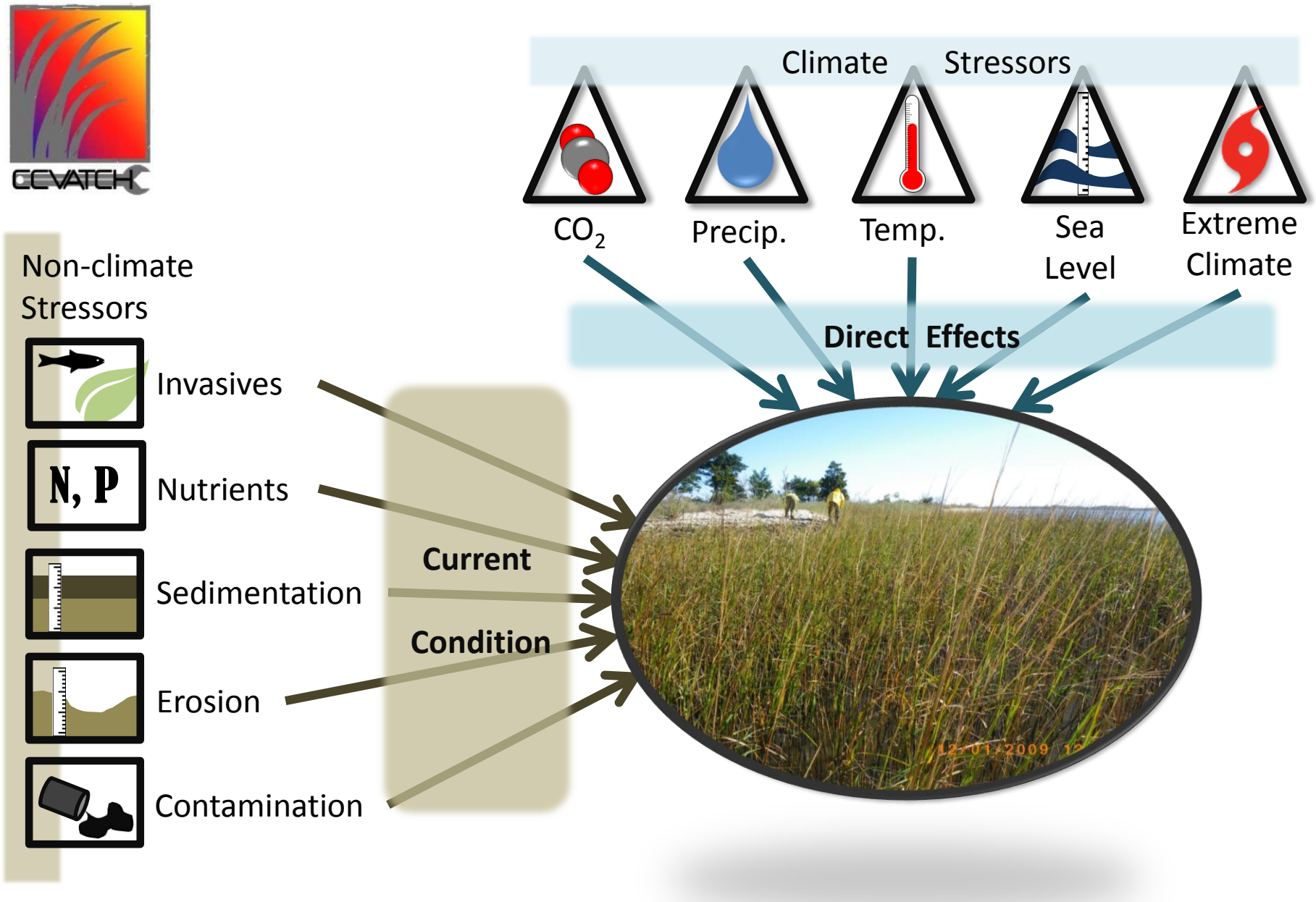
Adaptive Capacity:

Vegetated buffer

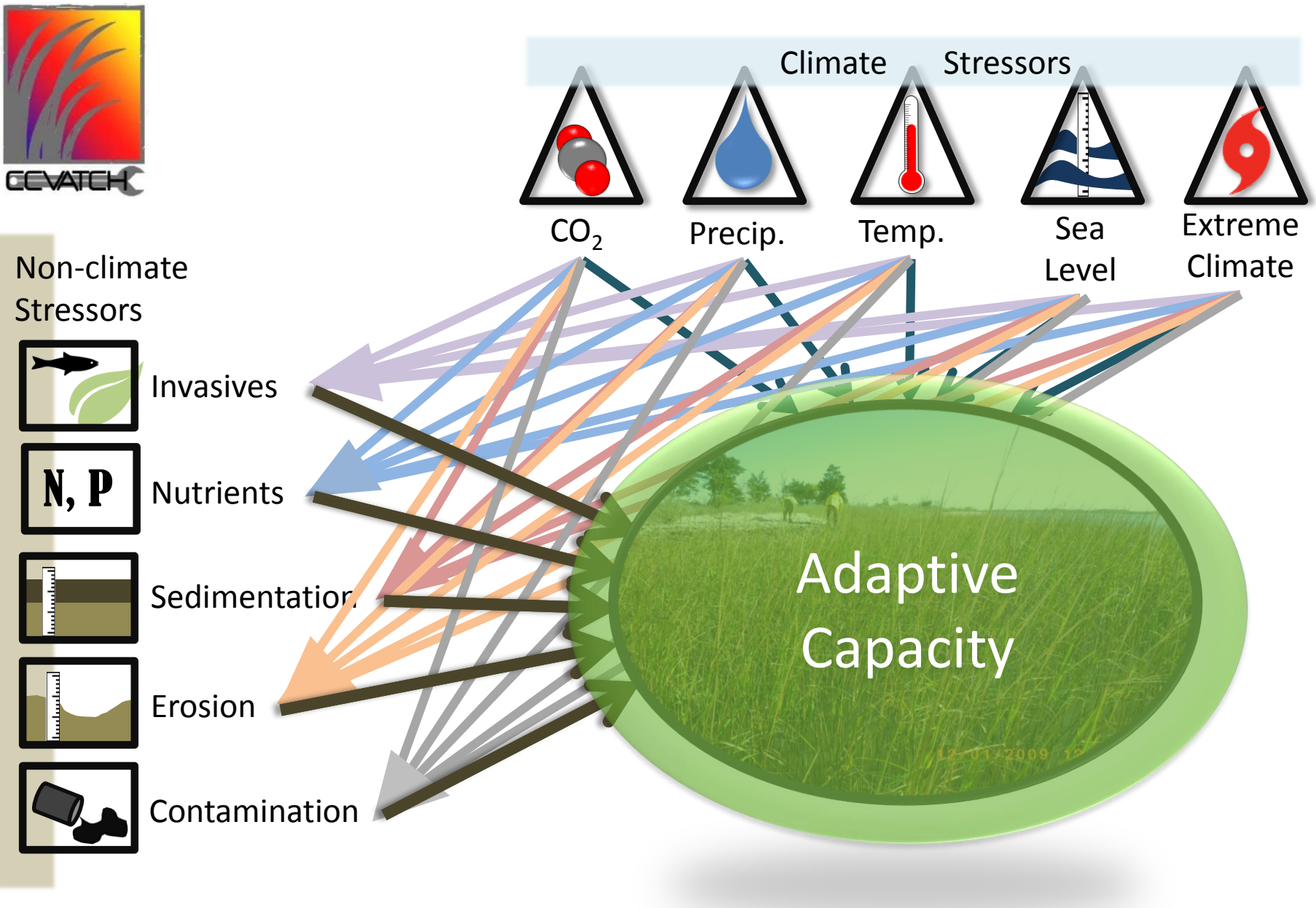
VULNERABILITY:

Complete loss of habitat → **Fully functional habitat**

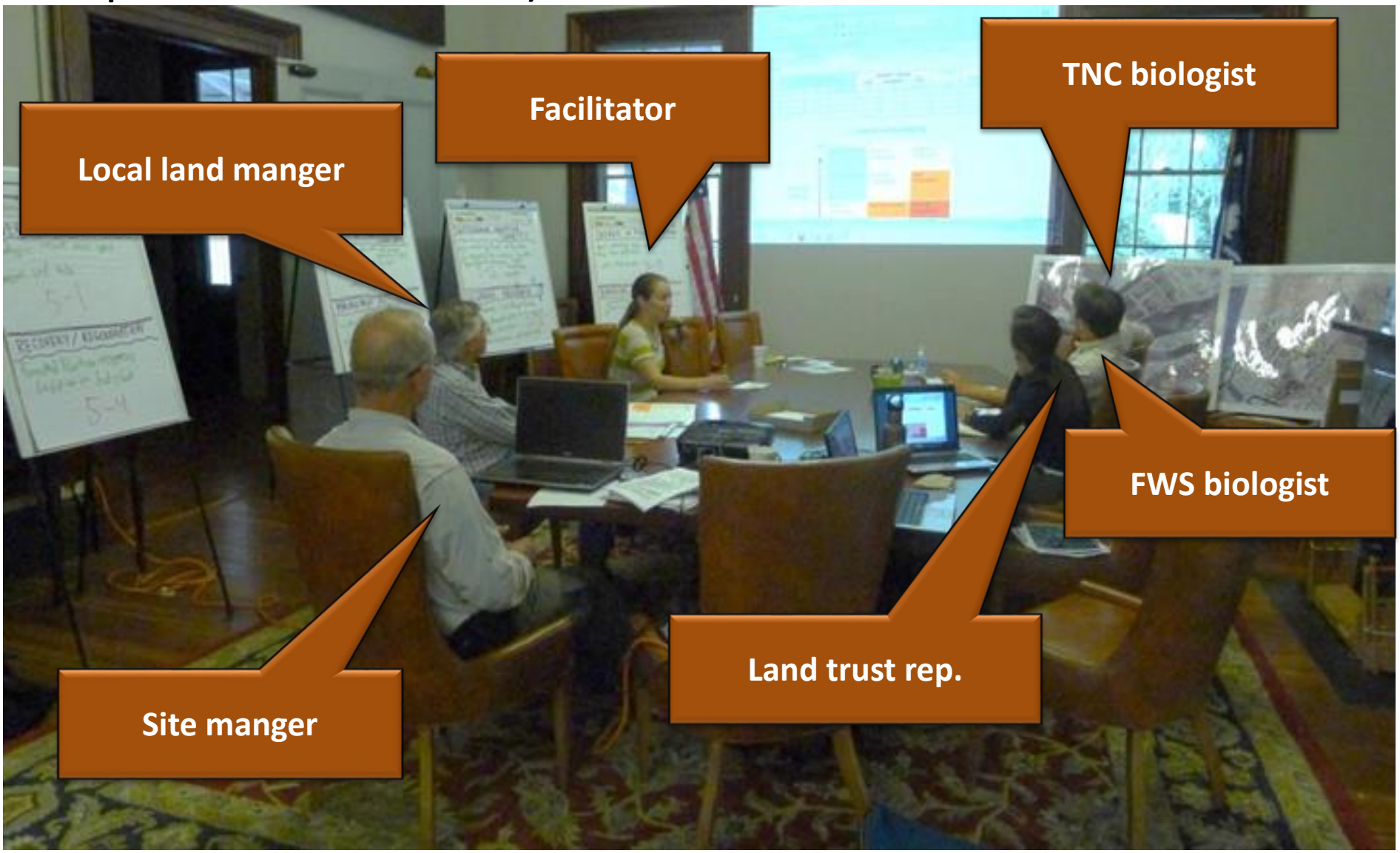
Exposure and Sensitivity



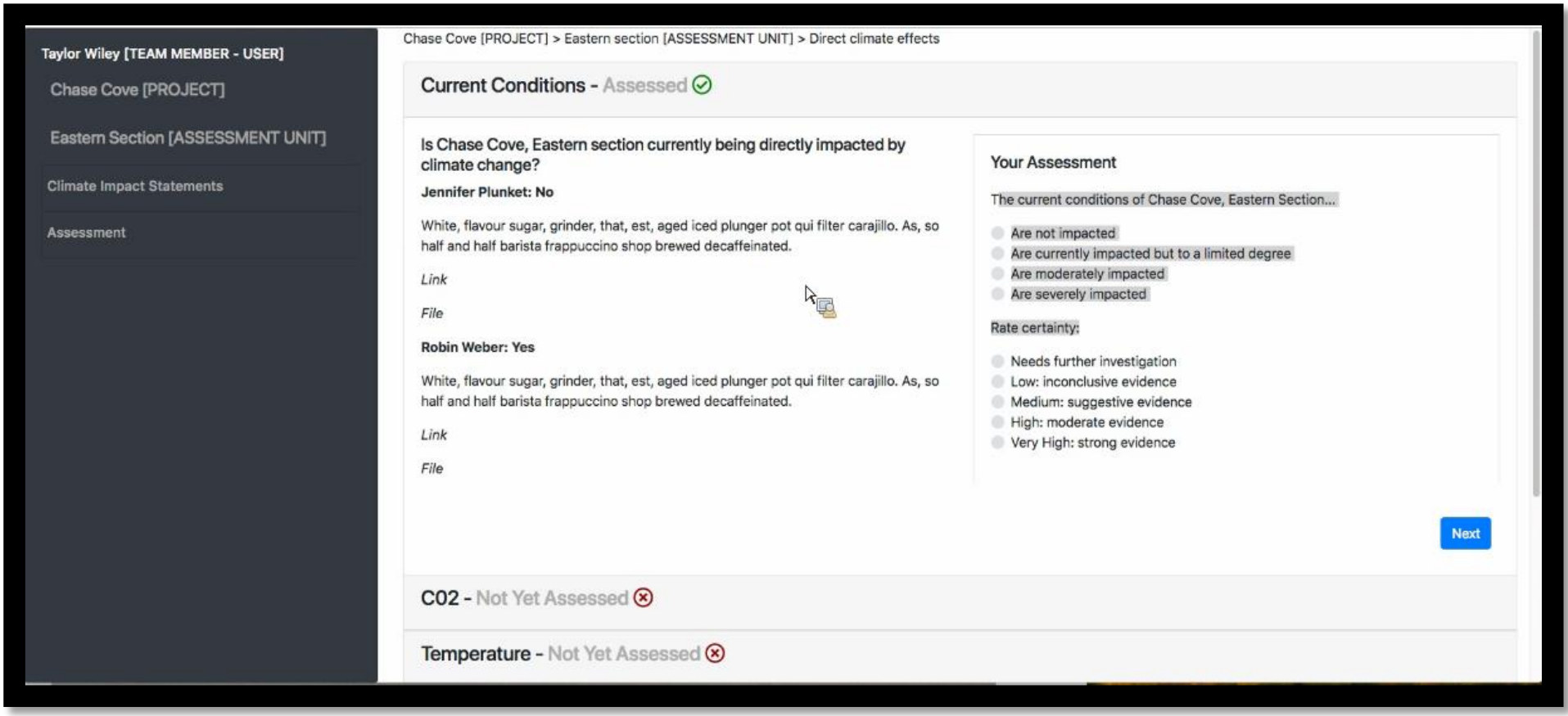
Exposure and Sensitivity Interact



CCVATCH process: Expert Elicitation (People who know the place and research)



CCVATCH process: Future Web Tool

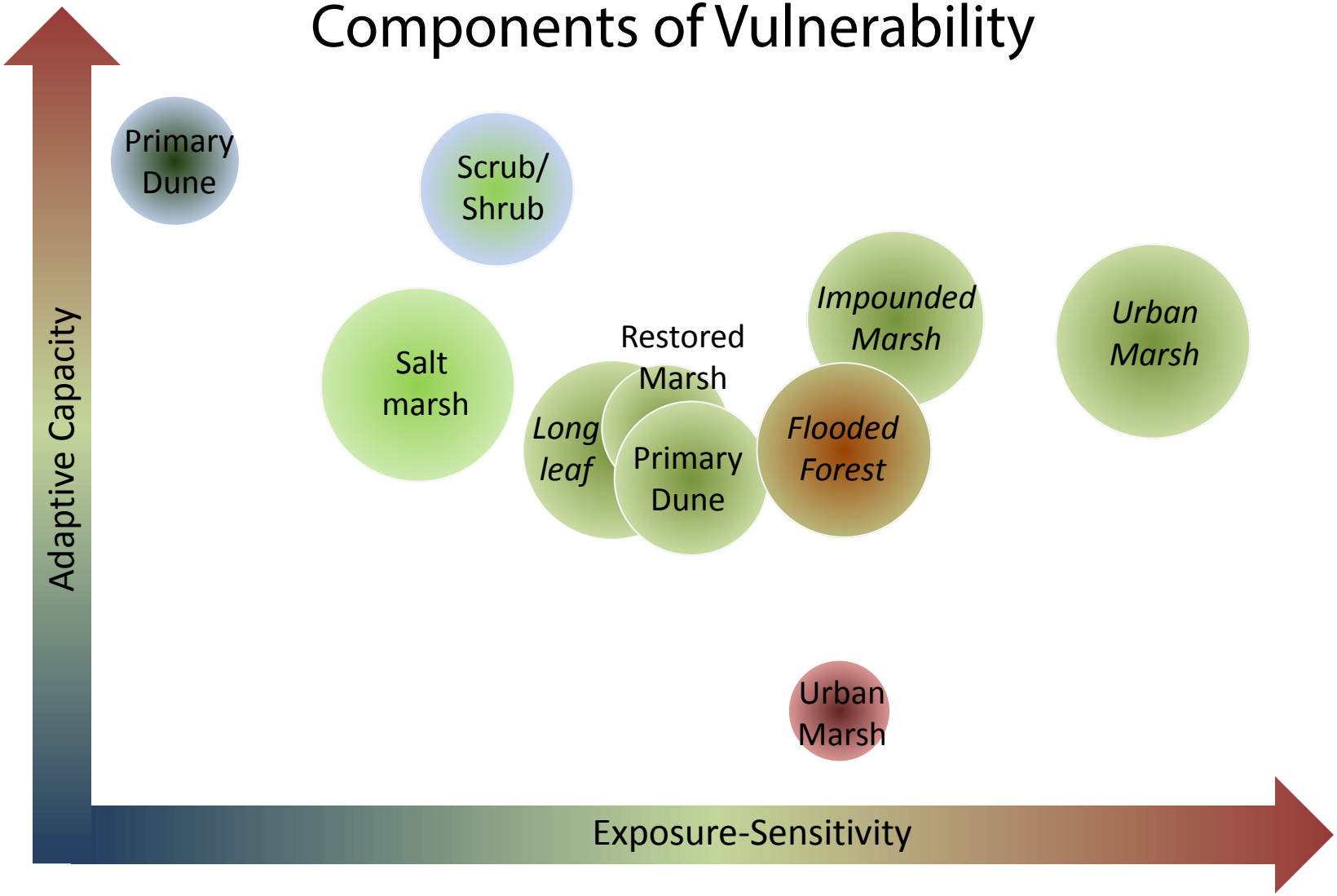


ccvatch.com

Evaluation Metrics

- Current condition of the habitat
- Direct effects of climate on the habitat
- Severity/likelihood of impact of climate on each stressor
- Potential for adaptive capacity
- Certainty score

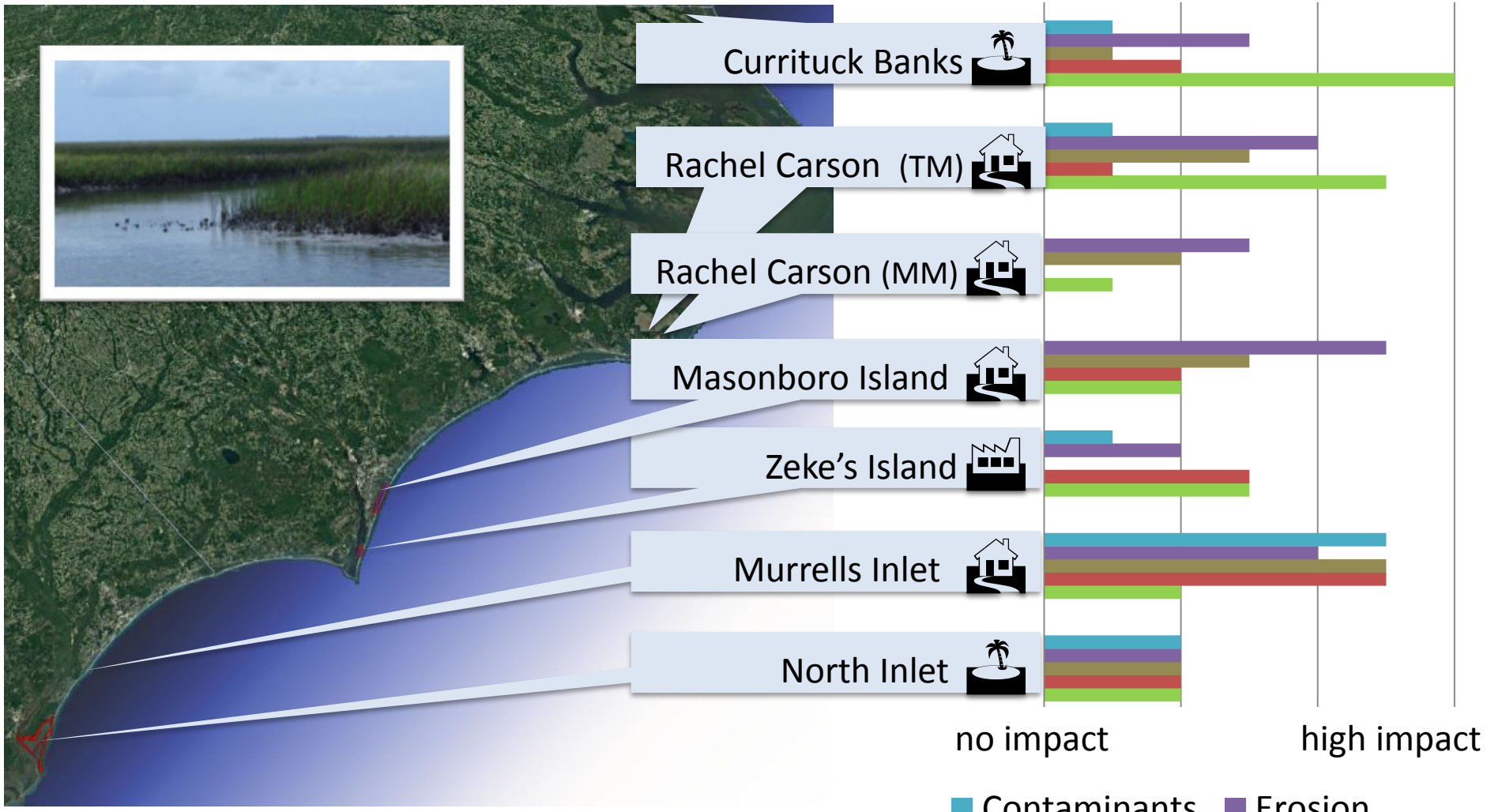
2015 Pilot Project Outcomes



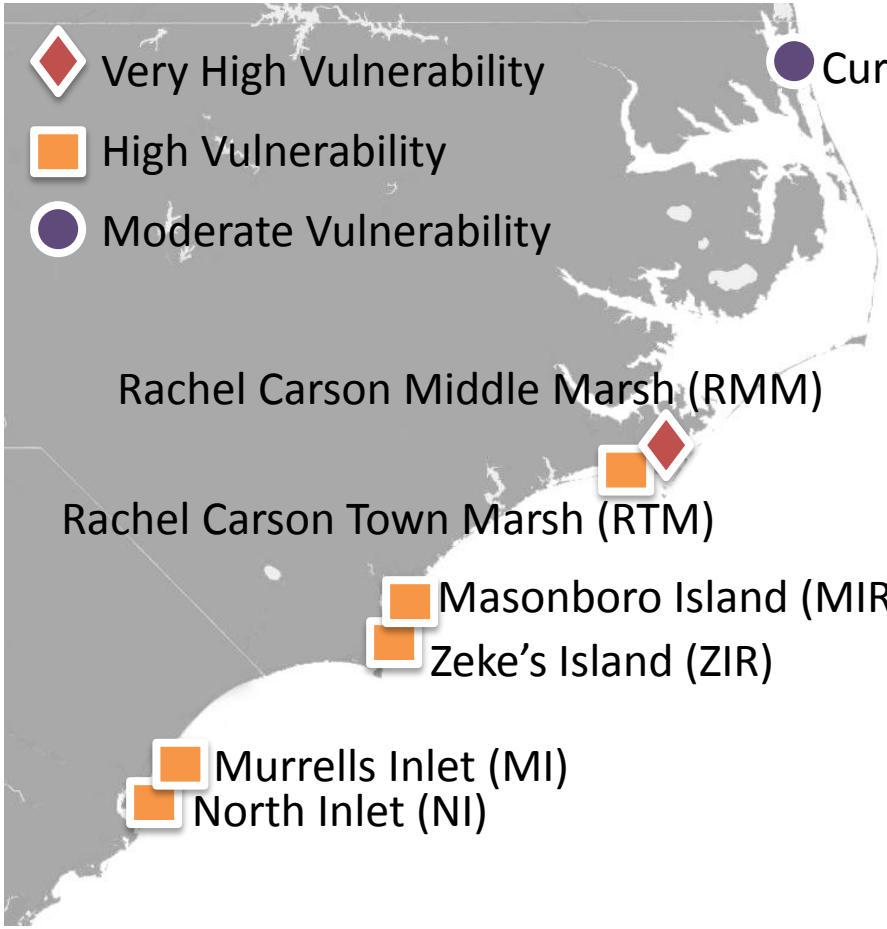
Virginia Sites , *South Carolina Sites*

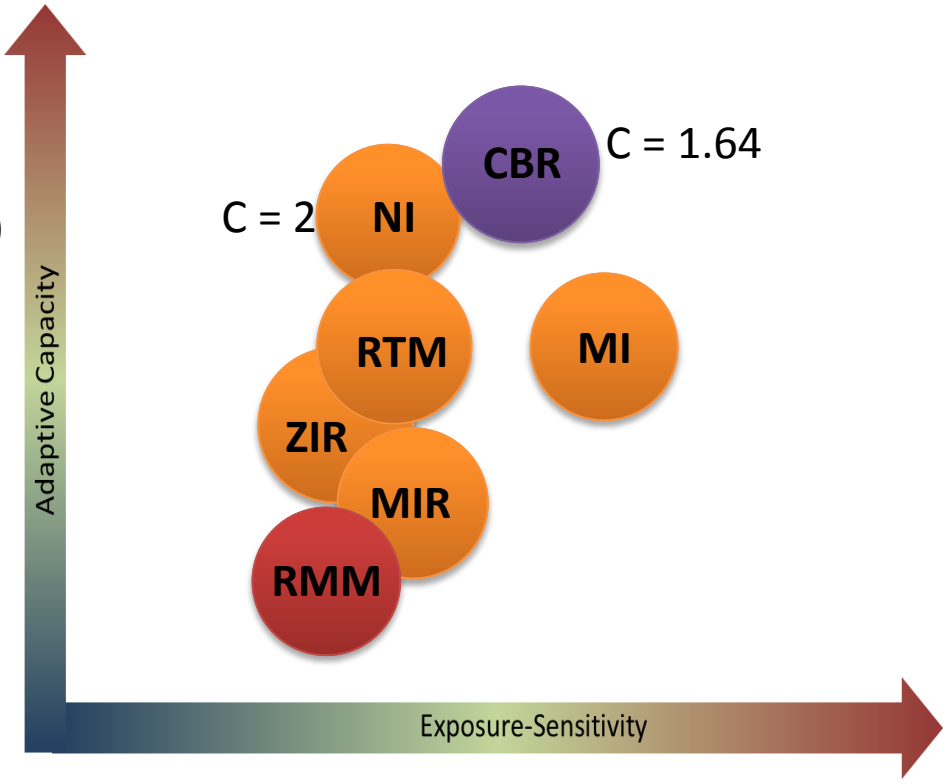
Size of circle = 4(maximum certainty)- certainty score

Southeastern Emergent Marsh Assessment

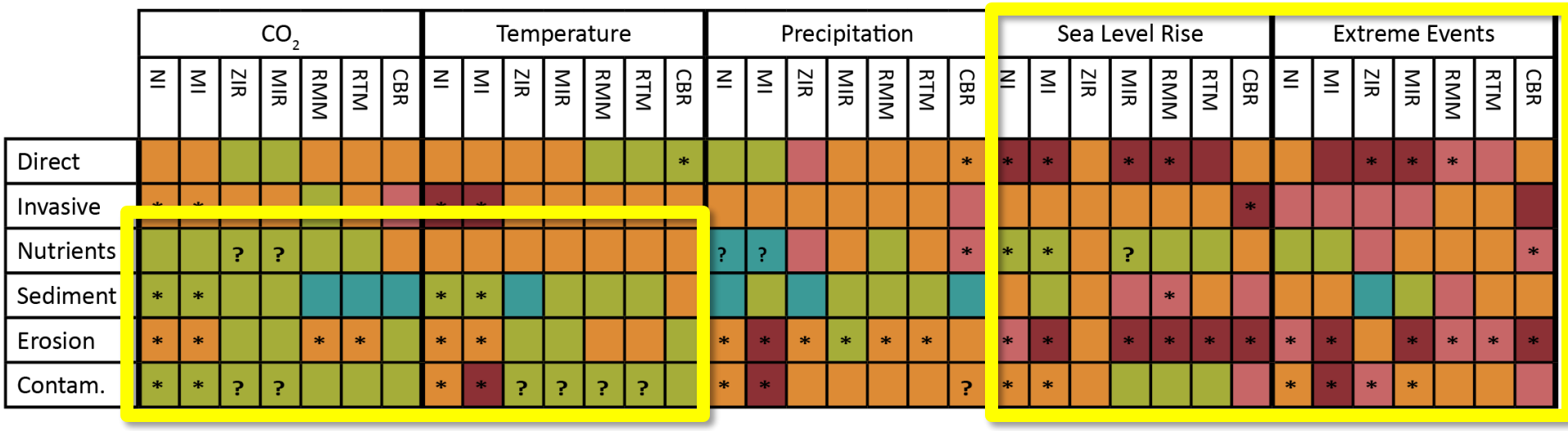


Southeast Site Overall Vulnerability





Sensitivity-Exposure Scores



>5 **Habitat persistence, extent or functionality will be severely impacted**

3 to 4 **Habitat persistence, extent or functionality will be moderately limited**

1 to 2 **Habitat will be negatively impacted with some potential loss of functionality**

0 **No anticipated change in habitat extent or function**

< 0 **Habitat my benefit by alleviation of a non-climate stressor**

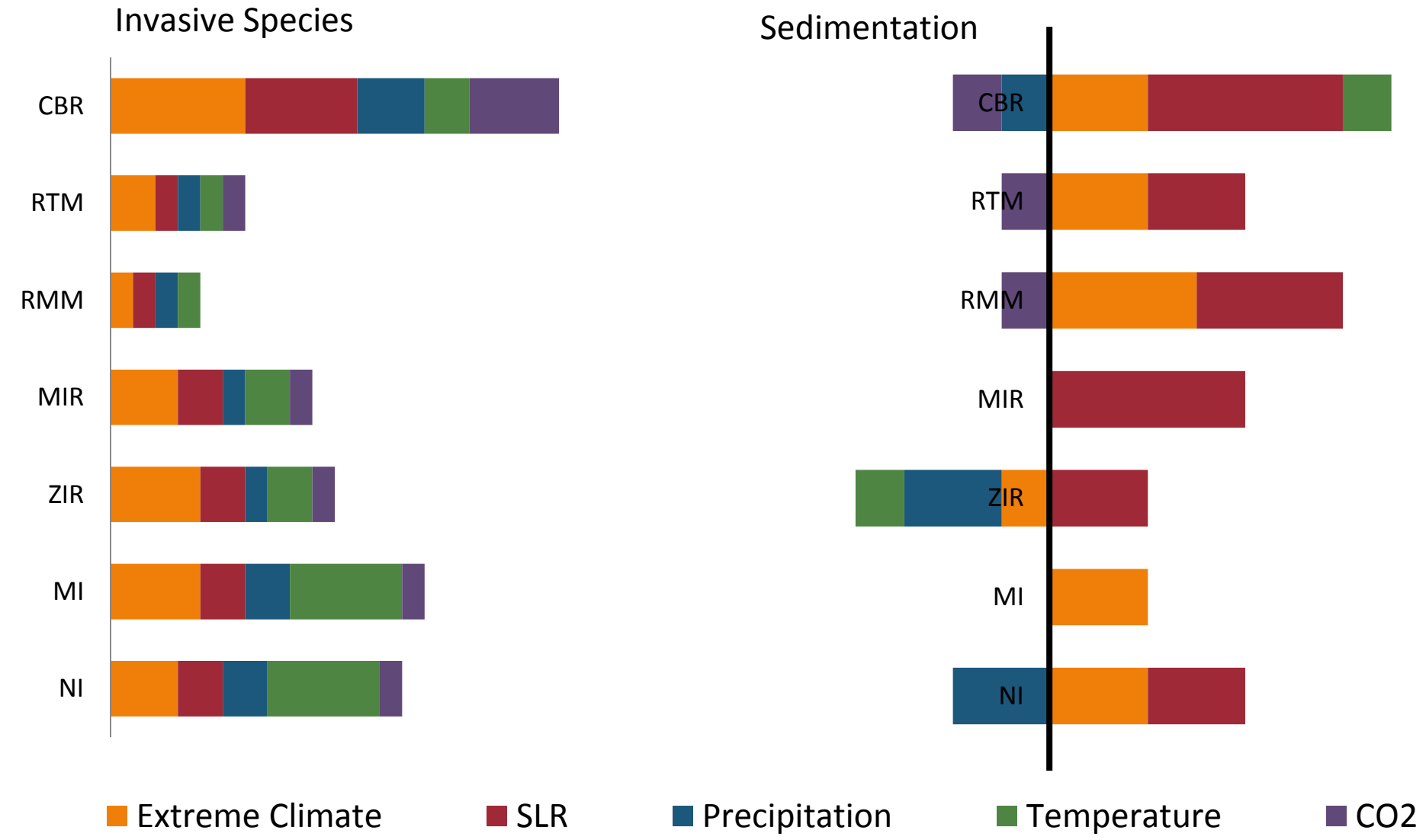
Certainty Scores

* High — Moderate evidence (several sources, some consistency, methods vary and/or documentation limited, etc.), medium consensus, general information can be applied to local habitats

? None — No direct or anecdotal evidence is available to support the score, topic needs further investigation

Inputs to Vulnerability

(are site specific)

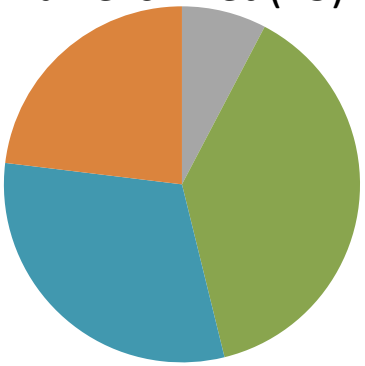


Adaptive capacity

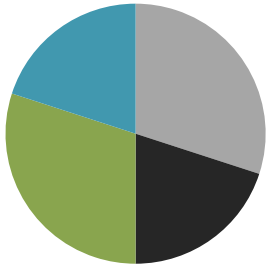
- Habitat is un-fragmented
- Few barriers to migration
- High recovery rate
- Diversity of species
- Management options exist
- Positive response likely

North Inlet (18)

Murrells Inlet (13)

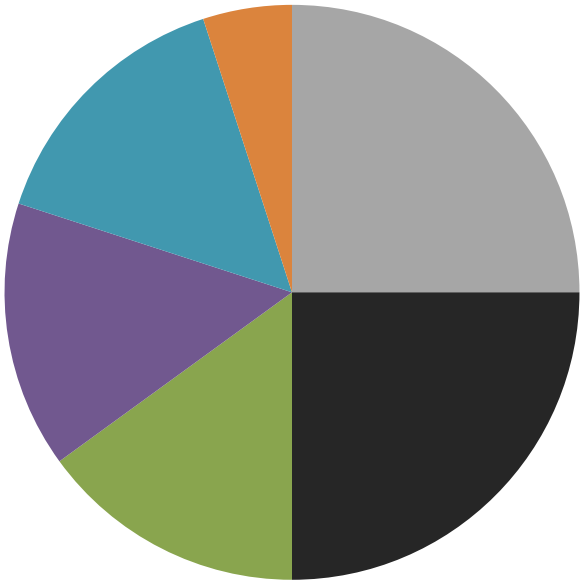


Zeke's Island (10)

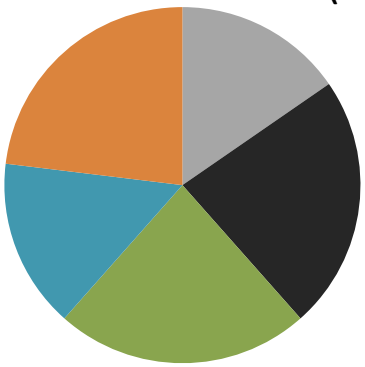


RC Middle Marsh (4)

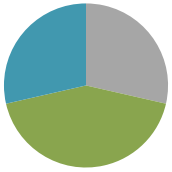
Currituck Banks (20)



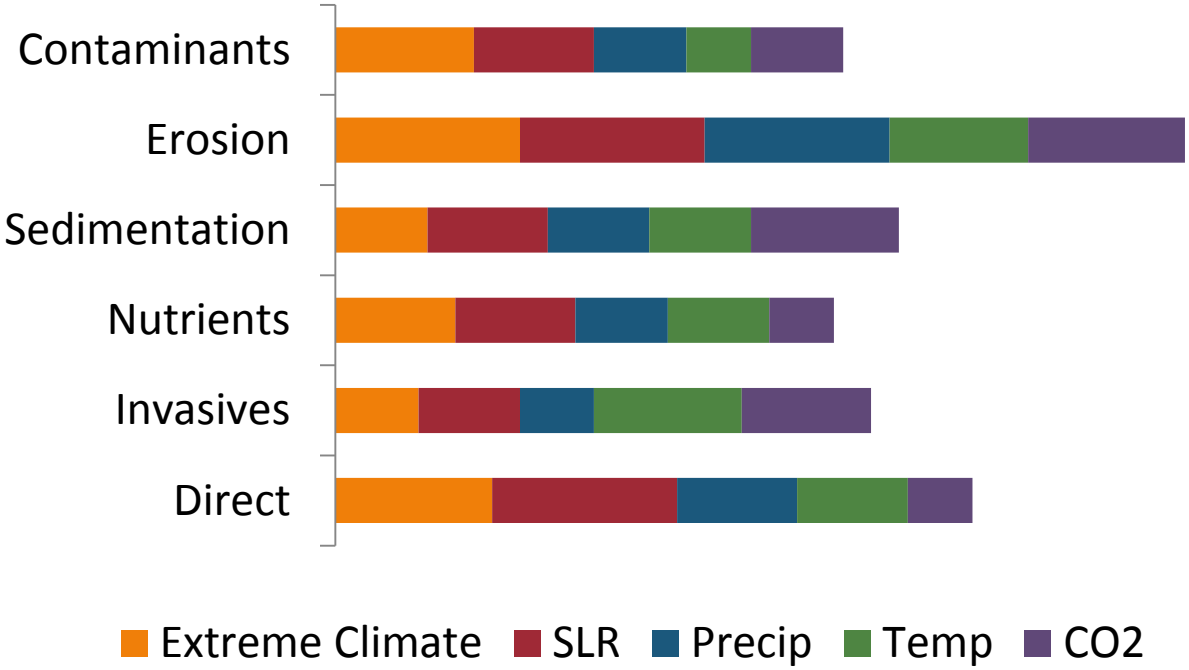
RC Town Marsh (13)



Masonboro Island (7)



Certainty



Certainty ≤ 1

? Temperature → Contaminants
? CO_2 → Direct
→ Nutrients

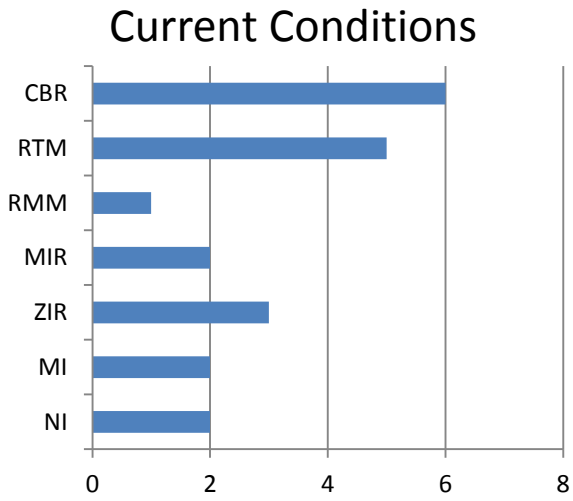
Certainty ≤ 1.5

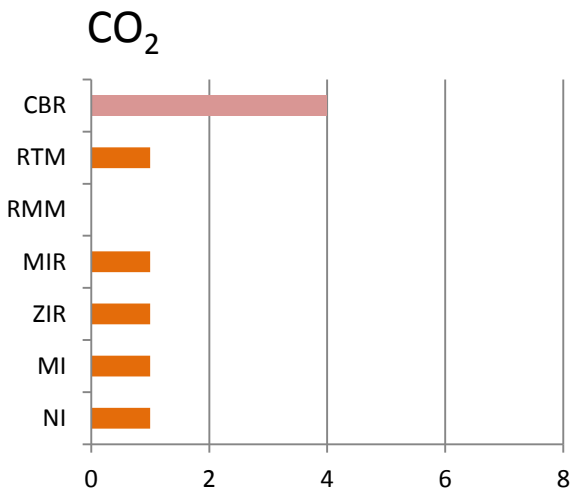
? Extreme → Invasive species
→ Sedimentation
? Precipitation → Invasive species
→Nutrients
→Contaminants
? CO_2 → Contaminants

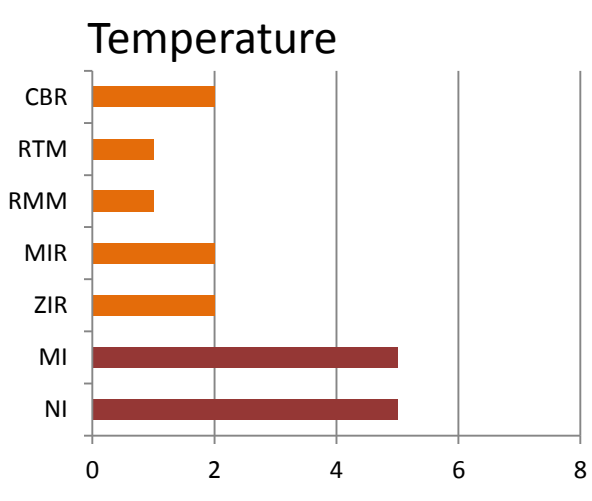
Evaluation to Adaptation

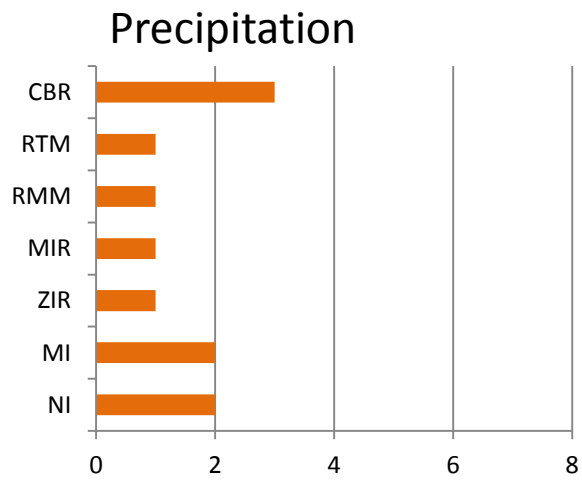
Anticipated Vulnerability	Mitigation/Adaptation Strategies
Direct Effects of Sea Level Rise	• Education to reduce CO_2 emissions • Sediment deposition (thin-layer) • Establish inland migration spaces
Sea Level Rise and Erosion	• Living shorelines • Beach nourishment
Extreme Events and Erosion	• Create (local) response plans
Extreme Events and Contaminants	• Source identification • Information on potential effects • Create/Update response plans
Extreme Events and Invasive Species Temperature and Invasive Species	• Early detection through monitoring • Source identification • Remove existing invasive species

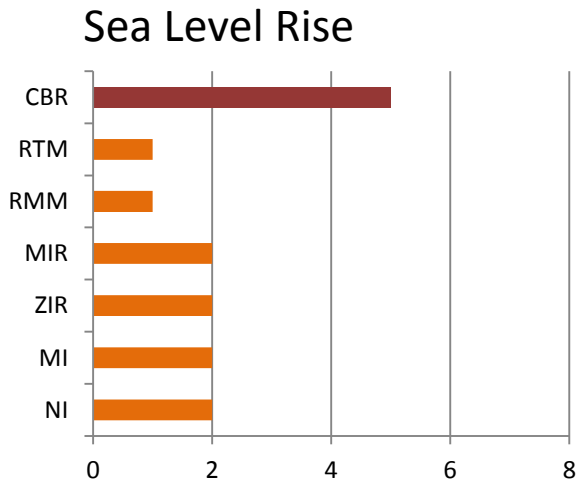
Invasive Species and Exposure

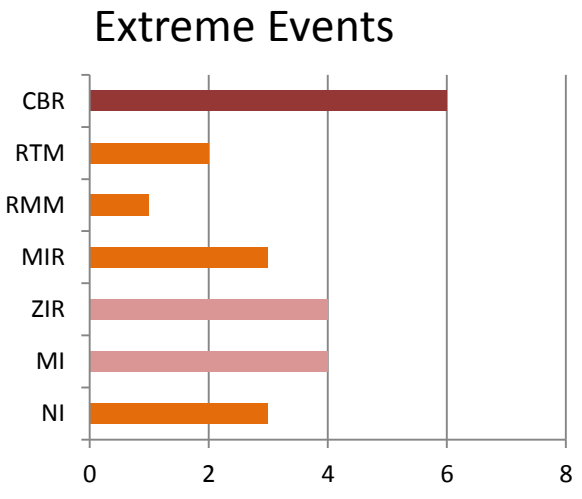






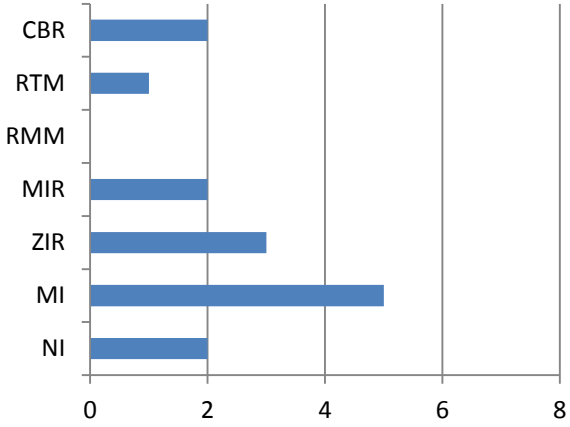




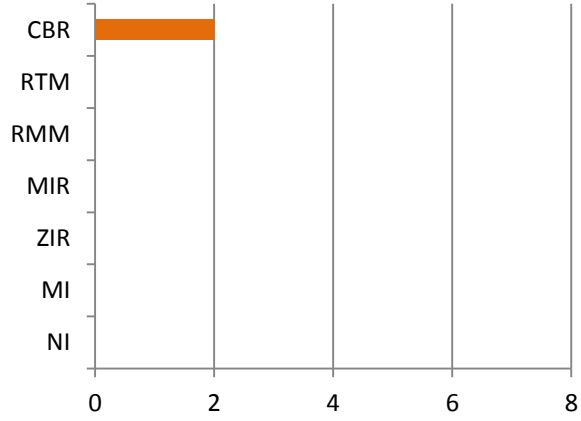


Nutrients and Exposure

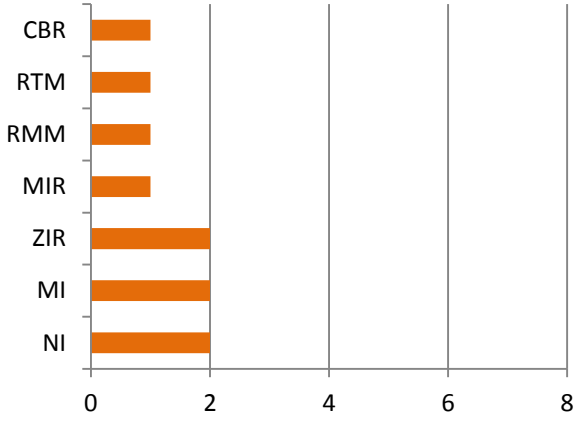
Current Conditions



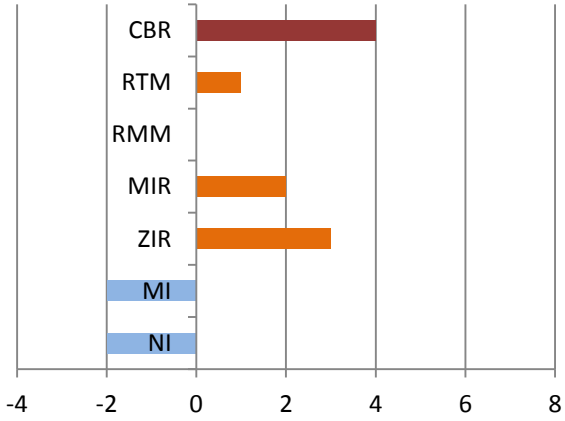
CO_2



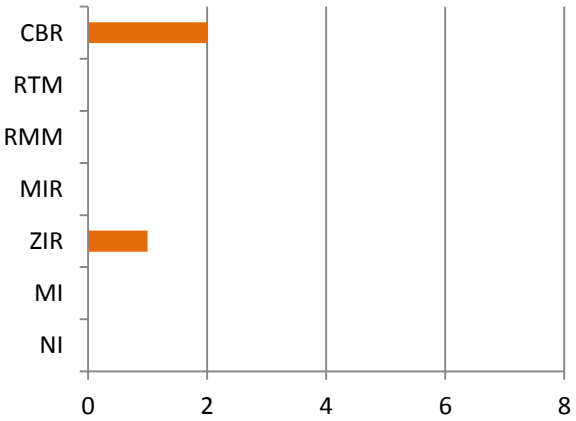
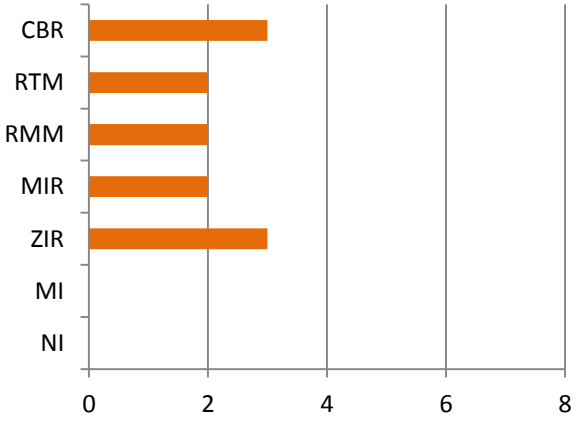
Temperature



Precipitation



Sea Level Rise



Extreme Events