

Step 3: Planning

Planning to prepare for and respond to changes that we are already experiencing or are likely to experience

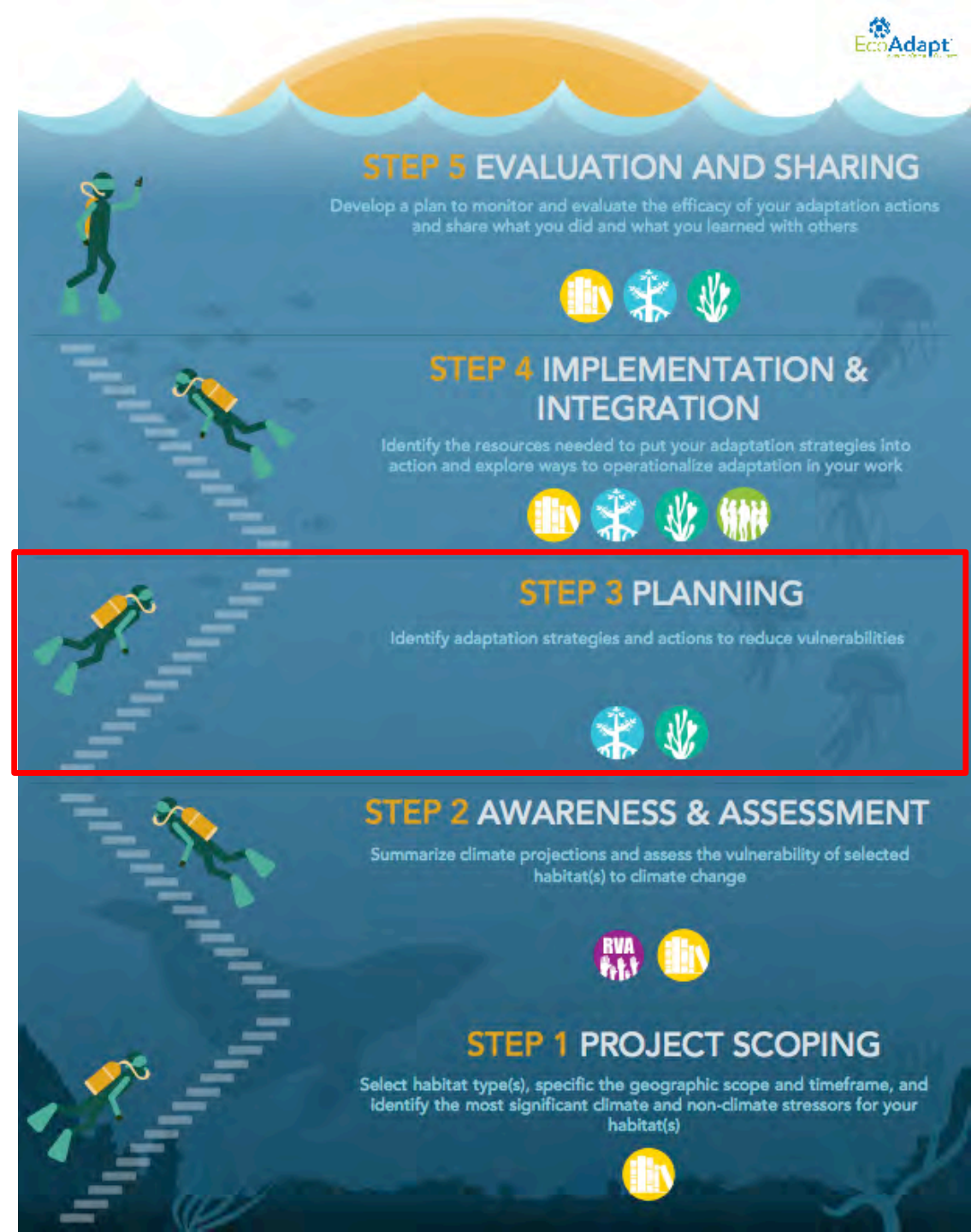


Adaptation refers to adjustments in natural or human systems in response to changing climate conditions.

Step 3: Planning

Learning Objectives

- Introduce adaptation planning concepts and terms.
- Understand how to move from assessment to planning - what do you do with the findings from the vulnerability assessment?
- Understand how to develop adaptation strategies and actions using the Climate Adaptation Toolkit.





Planning

Adaptation strategies are more general responses that aim to reduce the negative effects or take advantage of the opportunities provided by climate change

Reduce or modify armoring that exacerbates erosion

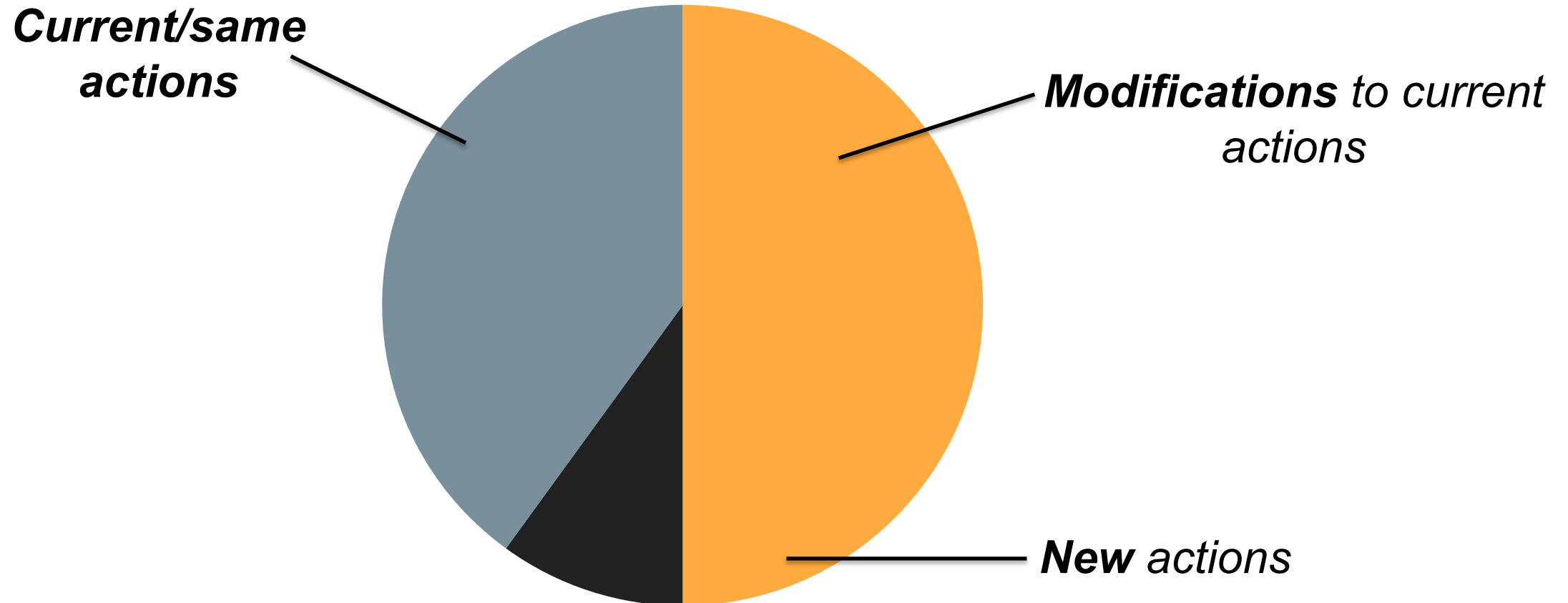
Adaptation actions are more specific tactics that consider ecological and site conditions and context

Replace armoring with nature-based solutions such as natural material to create sloped, transitional habitat (e.g., native oyster reef)

Decision Making in a Changing Climate



Adaptation reflects the **intentional** integration of climate change even if actions are not always different



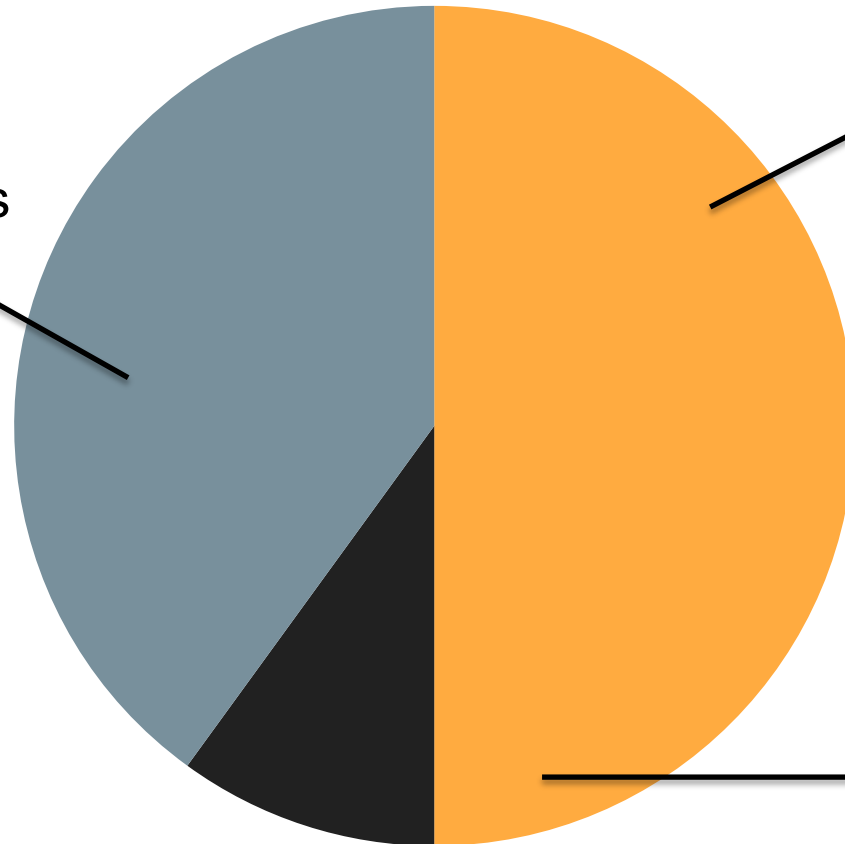
Adaptation Strategies and Actions



Near-term world: adaptation actions may not look that different from current management actions

Current/same actions

- Remove invasive plants from intact remnant habitats



Modifications to current actions

- Plant and seed with native species adapted to future conditions (e.g., drought-tolerant; individuals from southern end of range)

New actions

- Downscale infrastructure as precursor to retreat

Adaptation Approaches



**RESISTANCE/
RESILIENCE**

**ACCEPT/
NO ACTION**

**RESPONSE/
DIRECT**



**Managing for
Persistence**

Still recognizable as same system

**Managing for
Change**

System fundamentally changed

Resistance



Strategies or actions that maintain current conditions by limiting change

- Resource and/or management-intensive



Examples:

- Building a sea wall or berm in response to sea level rise
- Preventing the spread of invasive species
- Utilizing beach nourishment in areas where habitat retreat is not an option

Resilience

Strategies or actions that accommodate some change but enable a return to a prior desired condition

- Management-intensive in the near-term; increasing resources needed to maintain desired condition



Examples:

- Restoring coastal wetlands to buffer storm surge
- Removing or modifying structures that affect longshore sediment transport
- Reducing nutrient loading and sedimentation



Accept Change/No Action



Examples:

- Allow newly arriving species to persist
- Allow transition from one habitat type to another
- Monitor climate changes and impacts and resource conditions and trends

Response/Direct



Strategies or actions that intentionally facilitate change and adaptively respond to new conditions

- Variable intensity (e.g., may require more resources up front, or gradual changes to put into practice)



Examples:

- Facilitating managed retreat of infrastructure and human communities
- Proactively creating new places for habitat to migrate





Knowledge

Strategies or actions to gather information about climate changes, impacts, and/or management efficacy

- Near- to long-term approach
- May be a precursor to implementing a Resistance, Resilience, or Response approach



Examples:

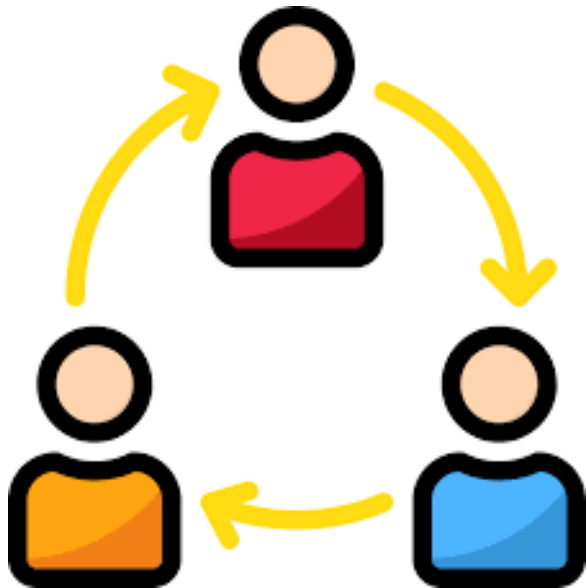
- Identifying and mapping areas vulnerable to sea level rise and areas of possible habitat migration
- Monitoring sites where coastal retreat has already begun to determine whether to manage sites more actively based on desired conditions

Collaboration



Strategies or actions that focus on coordinating management efforts and/or capacity across organizational, jurisdictional, or political boundaries

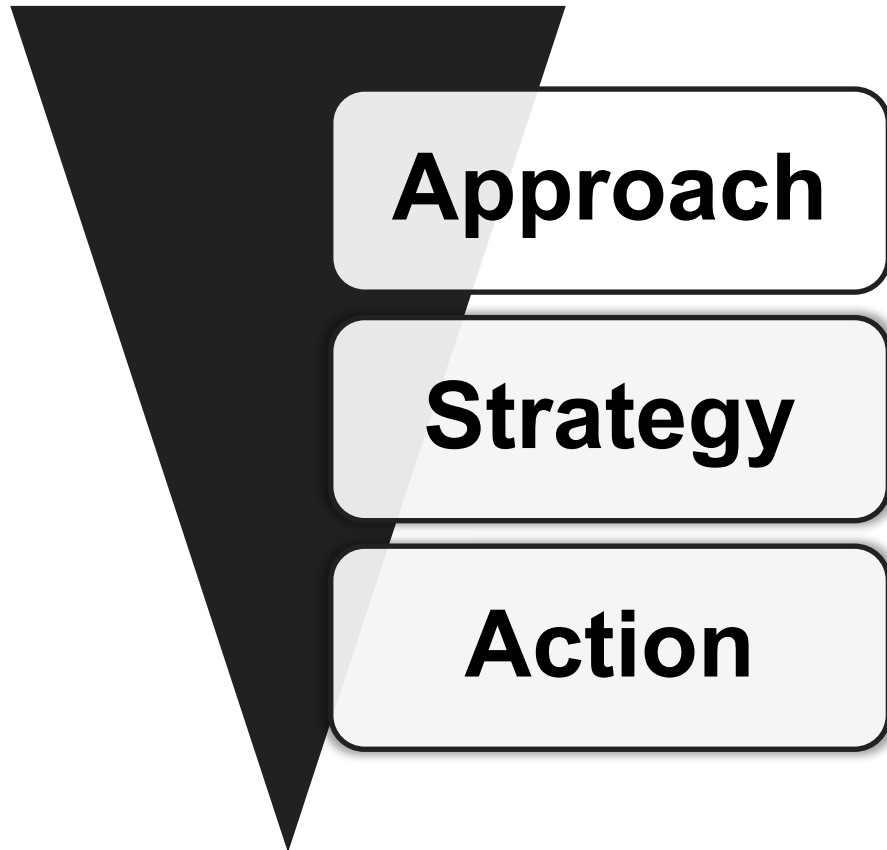
- Near- to long-term approach



Examples:

- Identifying and/or developing cooperative management and land acquisition opportunities to proactively address habitat loss due to sea level rise
- Building support for coastal habitat protection by conducting public education and outreach about climate risks and management responses

Adaptation Approaches, Strategies, Actions



RESISTANCE

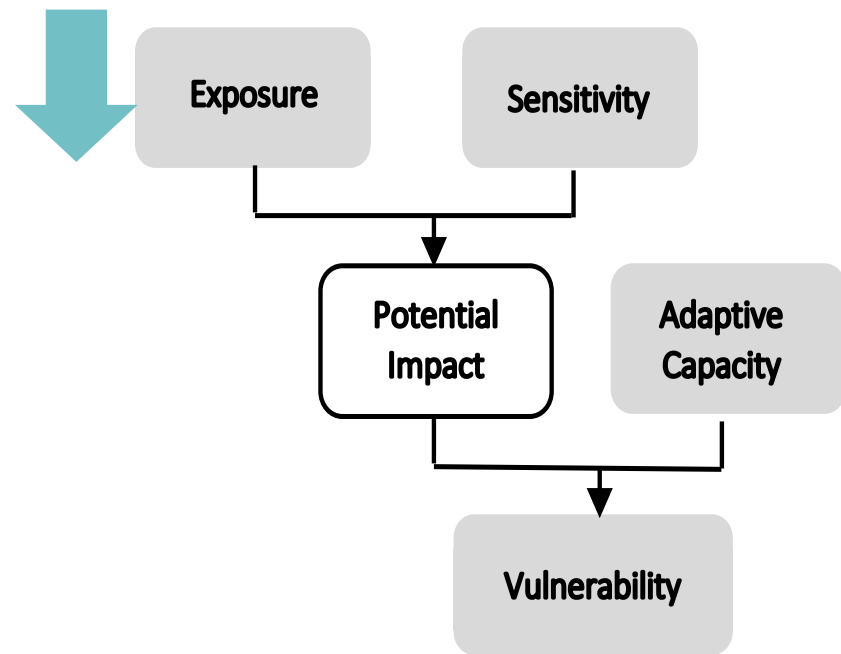


Prevent the spread of invasive species



Remove invasive plants from intact remnant habitats

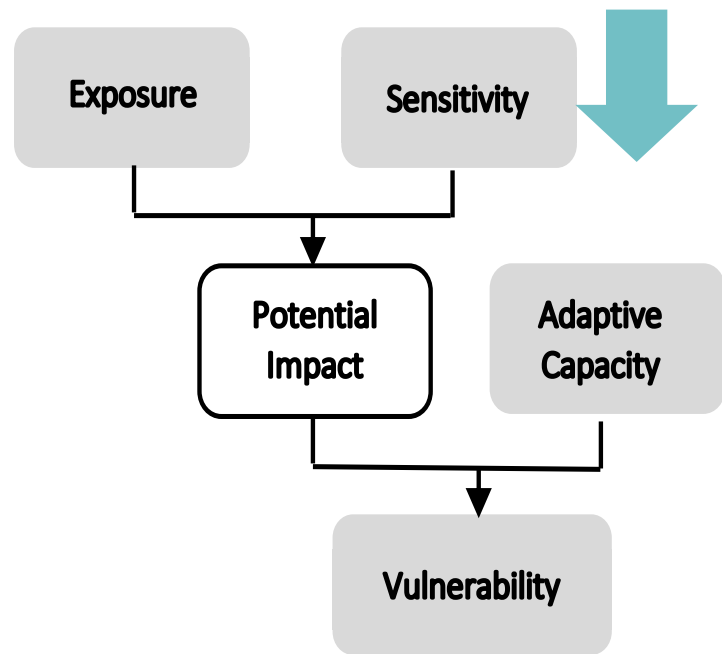
Using Vulnerability Assessment Results to Identify Adaptation Options



REDUCE EXPOSURE/LIKELIHOOD

- Protect resources from flooding damage (e.g., setbacks, retreat/relocation, living shorelines)
- Install tide gates to reduce risk of saltwater intrusion
- Elevate structures/habitats

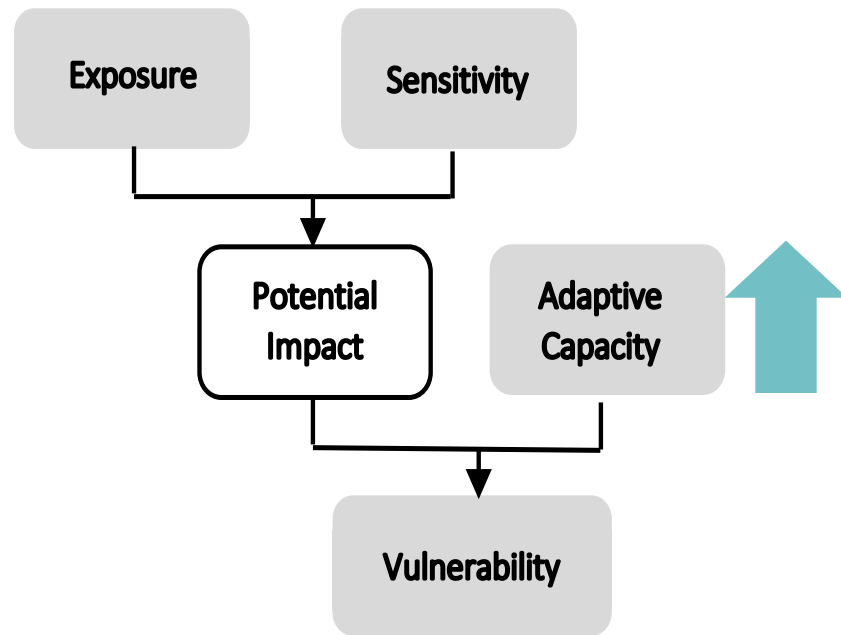
Using Vulnerability Assessment Results to Identify Adaptation Options



REDUCE SENSITIVITY/ CONSEQUENCE

- Remove invasive species
- Reduce pollutants that increase sensitivity of resource to climate stressors
- Utilize temporary closures during bleaching events to reduce additional stress on corals

Using Vulnerability Assessment Results to Identify Adaptation Options



INCREASE ADAPTIVE CAPACITY

- Facilitate species range shifts by removing barriers to migration
- Develop genetic banks for species restoration
- Adjust timing or route of access for recreation opportunities



Greater Farallones National Marine Sanctuary



Sea Level Rise, ↑ Coastal Erosion, Δ Hydrology, ↓ pH, DO

Most vulnerable habitats: Land-sea interface

- Beaches/dunes, estuaries, rocky intertidal

Primary concerns: flooding & inundation, habitat integrity

Coastal armoring and invasive species exacerbate climate impacts



Greater Farallones National Marine Sanctuary



Adaptation options:

- Rapidly remove invasive species when detected in beach and dune habitats (*reduce consequence/sensitivity*)
- Restore subtidal kelp forests to attenuate waves and buffer from enhanced storm activity (*reduce likelihood/exposure*)
- Let go of pocket beaches that cannot retreat or be logistically nourished (*increase adaptive capacity*)



Resistance/Resilience



Accept/No Action

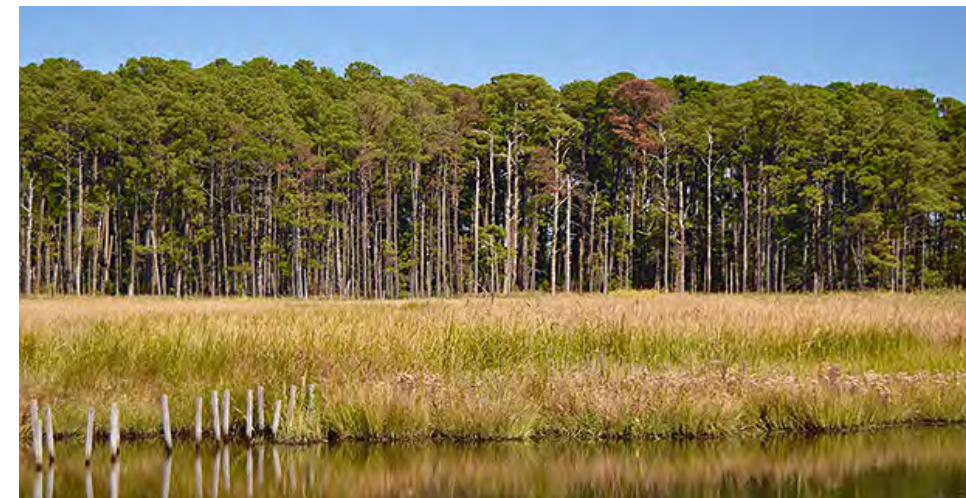
Blackwater National Wildlife Refuge

The Challenge

- Sea level rise is happening faster here than the rest of the Atlantic Coast, in part because the land has been sinking
- New tidal marsh is forming, but is not keeping pace with losses

Feasibility Analysis

- Evaluated site value and condition
- Selected primary and secondary tidal marsh migration “corridors”
 - Those areas where SLR, land use and ownership patterns, future development plans, and marsh bird presence indicate the greatest potential for high quality tidal marsh to relocate



Blackwater National Wildlife Refuge



Actions

- Improving current tidal marsh health and productivity: sediment enhancement and revegetation, controlling invasive plants (*reduce sensitivity/consequence*)
- Converting targeted transitional areas into tidal marsh: eliminate dead and dying trees, plant transitional species (*increase adaptive capacity*)
- On adjacent private lands, facilitating tidal marsh migration by extending the head of a tidal creek (*increase adaptive capacity*)



Resistance/Resilience



Response/Direct



Planning: MPA Toolkit



Adaptation Actions Table

Overview

About

Using the Toolkit

Tools ▾

Experts

Adaptation Actions Table

Adaptation Actions Search

Foundational Resources

Rapid Vulnerability Assessments



Adaptation Actions Table

In the table below, information is organized by habitats/locations and potential climate stressors with supporting case studies, tools and resources. You can browse the table or use the search function to find suggested actions/options that can address specific climate stressors and impacts for a habitat or location. Terms are meant to align with and support the use of the North American Marine Protected Area Rapid Vulnerability Assessment Tool.

Letter codes in parentheses after entries indicate resource focus or stages in the Adaptation Ladder of Engagement.

Resource focus: Habitat/ecosystem (H), Species population (S), Infrastructure (I), Cultural (C), Policy (P), Other (O)

Adaptation Ladder of Engagement: 1.) Awareness (AW), 2.) Assessment (AS), 3.) Planning (PL), 4.) Implementation (IP), 5.) Integration (IT), 6.) Evaluation (EV), 7.) Sharing (SH)

Planning: MPA Toolkit



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Show 10 entries

Search:

Habitats/Locations	Climate Stressors & Impacts	Actions/Options	Case Studies	Tools & Resources
Beach/Dune	<p>Stressors:</p> <ul style="list-style-type: none"> -Sea level rise -Storm severity/frequency -Wave action <p>Impacts:</p> <ul style="list-style-type: none"> -Increasing flooding -Erosion and shoreline change 	<p>Anticipate and facilitate inland/upland migration (e.g., buffers, setbacks, open space/conservation easements, land acquisition, remove/modify barriers)</p>	<p>Coastal Zone Management for SLR in Malibu, California: City's land-use implementation plan requires setbacks and other measures for all new development. (I) (IP)</p> <p>State and counties adopting shoreline setback rules due to SLR in Hawaii. (I) (IP)</p> <p>Responding to Climate Change in New York State: Suggestion of using rolling easements to move structures out of flood-prone areas. (I) (PL)</p>	<p>Adaptation Toolkit: Sea level rise and coastal land use: Explores 18 different land-use tools that can be used to preemptively respond to the threats posed by sea-level. (I)</p> <p>Case Studies of Natural Shoreline Infrastructure in Coastal California: Reviews natural infrastructure approaches to adapt to SLR in California using a series of case studies. (H,I)</p> <p>Puget Sound Feeder Bluffs: Coastal erosion as a sediment source and its implications for shoreline management (H,I)</p>

Planning: MPA Toolkit



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Planning: MPA Toolkit



Overview	About	Using the Toolkit	Tools ▾	Experts
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Search

Apply

- Adaptation Actions Table
- Adaptation Actions Search**
- Foundational Resources
- Rapid Vulnerability Assessment

DOCUMENT

Identifying potential marine climate change refugia: A case study in Canada's Pacific marine ecosystems

CASE STUDY

Recognizing Coral Adaptations to Environmental Stressors, National Park of American Samoa

DOCUMENT

Climate Change Adaptation Planning Manual For Coastal Alaskans and Marine-Dependent Communities

Source Type

- Document (108)
- Tool (29)
- Case Study (24)**

Scale of Project

- Community / Local (24)
- National / Federal (22)
- Regional / Subnational (19)

Planning: MPA Toolkit



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Foundational Resources

The Toolkit provides a wealth of documents, case studies, guides and tools to inform your adaptation work, which can be overwhelming when starting out. Here are resources the project team considers great starting places. These resources are also foundational to every step of the Adaptation Ladder of Engagement. The list is curated and does not necessarily represent the full portfolio of what is available. It is a list of foundational resources upon which to build your adaptation work or provide a more comprehensive, high-level view of adaptation from start to finish.

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