

Monitoring Adaptation Progress: From Assessing Climate Impacts to Evaluating Implementation Success



Agenda

- Session goals overview
- Introduction to adaptation M&E
- Case study examples
- What is “success” in adaptation?
- How can we best measure success in our adaptation efforts?



Session Goals

- Create a platform for engagement around adaptation M&E
- Scoping:
 - What is known
 - What needs to be explored
 - How to fill gaps
- Discuss ideas to support the evaluation of climate-informed strategies
- Explore the opportunities and challenges to developing M&E frameworks for adaptation



Session Goals

I will monitor and evaluate my adaptation project.
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Mission: To create a robust future in the face of climate change

How? Providing support, training, and assistance to make planning and management less vulnerable.



Key need to incorporate climate change into near-, medium-, and long-term planning

- Minimize risk of wasting time, money, and effort
- Maximize likelihood of success



"A society grows great when old men plant trees whose shade they know they shall never sit in." Greek Proverb





State of Adaptation Program

finding out how people are fishing

Climate Adaptation Knowledge Exchange

(CAKE; www.cakex.org)

connecting fishermen



Awareness to Action

teaching others to fish

National Adaptation Forum

gathering at fish market



Photos: Jonny Armstrong

State of Adaptation



- Survey/interview practitioners and assess adaptation efforts
- Develop case studies
- Synthesize trends, opportunities, and challenges
- Connect people to case studies, synthesis reports, and other resources to share lessons learned and build the adaptation field through CAKE and NAF



"[This effort] provides an opportunity to share local knowledge to address climate change."

~ Gregory J. DuCote, Louisiana Department of Natural Resources

"The field is young. Case studies provide concrete examples of what works & doesn't."

~ Noah Matson, Defenders of Wildlife

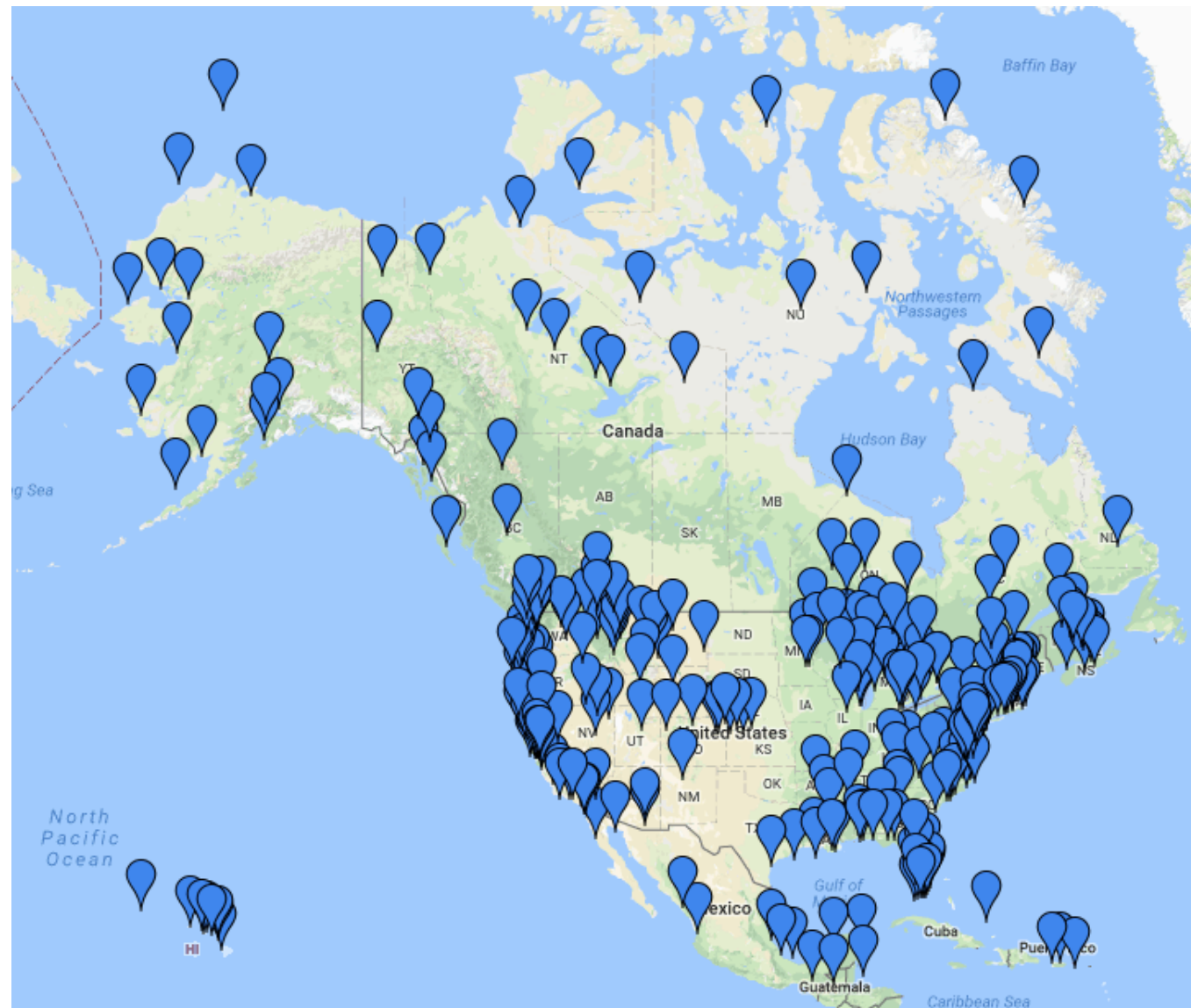
Mapping the State of Adaptation Since 2009

➤ 4,000+ interviews and surveys

- Marine/coastal North America (2009-2011)
- Great Lakes (2011-2012)
- Western U.S./ Canada (2011-present)
- Marine fisheries (2013 – 2016)
- Southeast U.S. & Caribbean (2013 – 2016)

➤ 450+ case studies, cited in

- U.S. Dept. of State
- NCA
- NFWPAS
- United Nations
- World Bank, etc.!



Adaptation Process

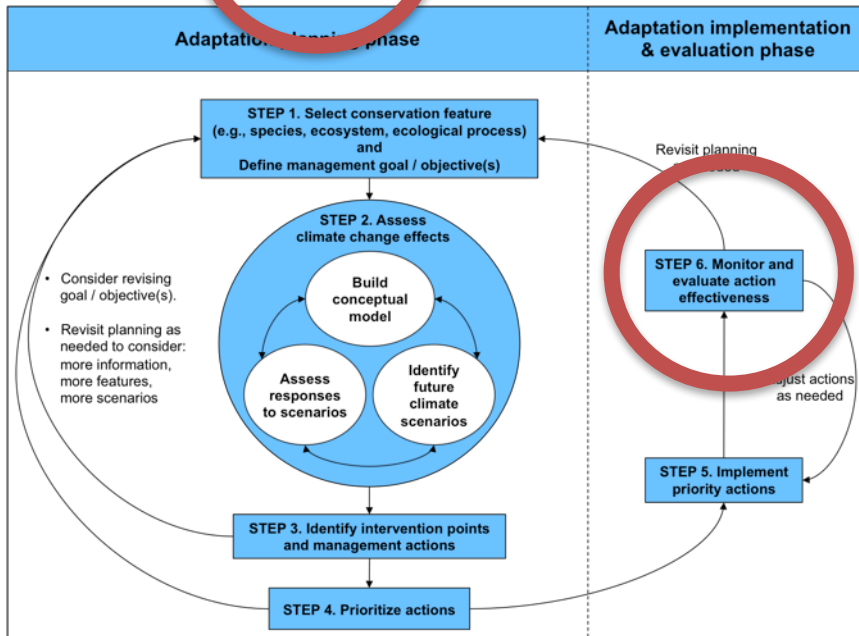
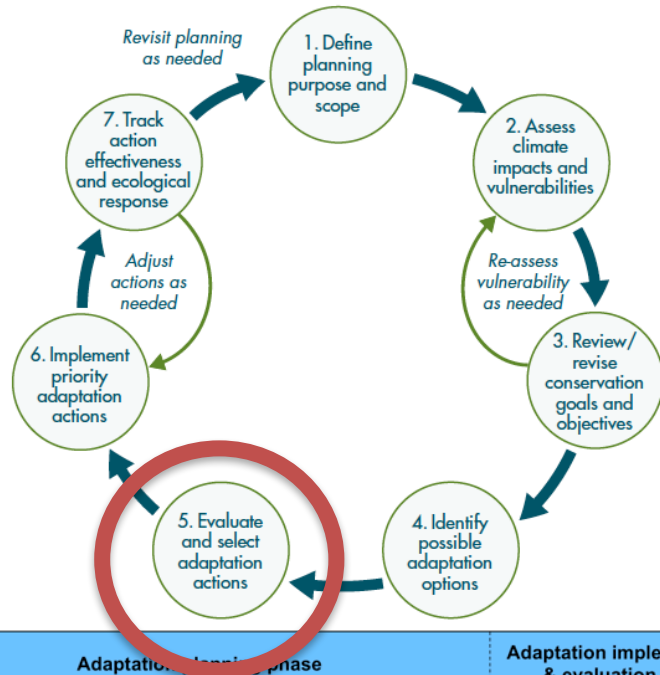


EXHIBIT I. USAID'S CLIMATE-RESILIENT DEVELOPMENT FRAMEWORK



Establishes development context and focus

Identifies:

- Priority development goals and key inputs to achieving them
- Climate and non-climate stressors
- Needs and opportunities



Enhances understanding about vulnerability

- Defines vulnerability assessment questions
- Selects methods
- Assesses vulnerability
- Provides actionable information



Identifies, evaluates, and selects adaptation options

- Identifies adaptation options
- Selects evaluation criteria
- Evaluates adaptation options
- Selects an adaptation option or portfolio of options



Puts adaptation into practice

- Builds on established implementation and management practices
- Adopts a flexible approach to account for continuing change
- Incorporates climate information into baseline values and indicators



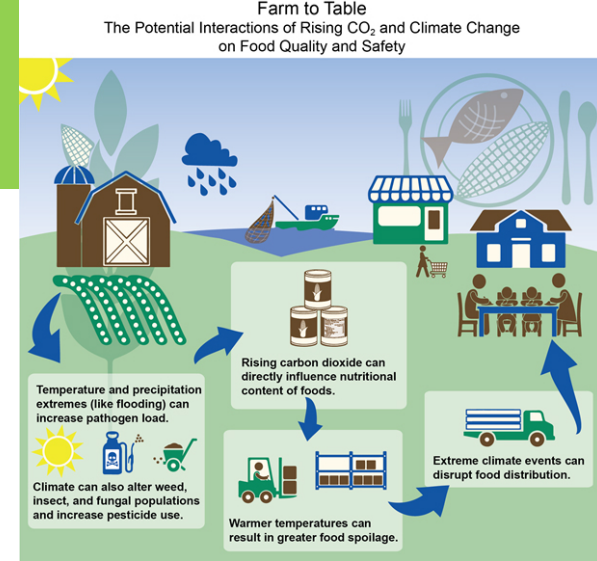
Tracks performance and impact

- Builds on established evaluation practices
- Measures performance
- Evaluates impacts of actions on vulnerability
- Informs adjustments to adaptation strategies



M&E: What is it good for?

- Demonstrate correlations between climatic changes and environmental and socioeconomic impacts
- Provide early warning signals that may indicate a need for management interventions
- Highlight intended and unintended outcomes
- Evaluate the *effectiveness*, *efficiency*, *equity*, and *sustainability* of adaptation strategies and actions

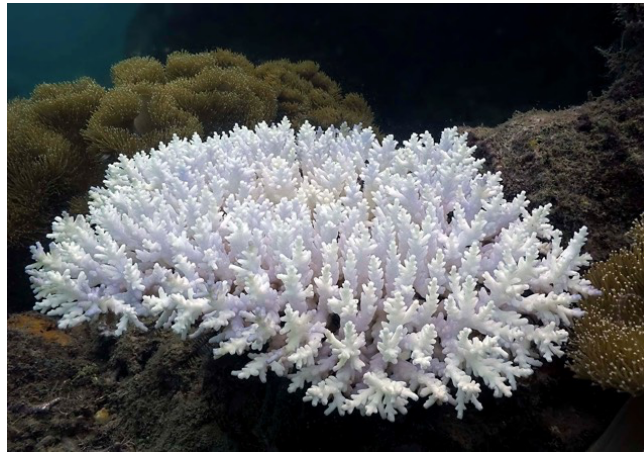
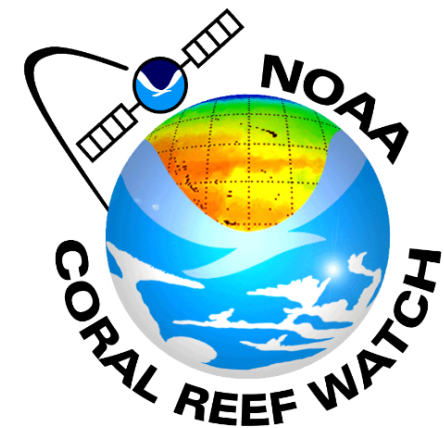


Types of M&E in Climate Adaptation

1. Monitoring and assessing the effects of climate change
2. Evaluating how climate change affects a management/planning goal
3. Prioritizing and deciding between adaptation options
4. Determining if implemented actions are working



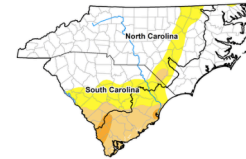
1) Monitoring and assessing the effects of climate change



U.S. Drought Monitor - Coastal Carolinas DEWS

As of April 24, 2018

Author: Brad Rippey, U.S. Department of Agriculture



Drought Conditions (Percent Area)

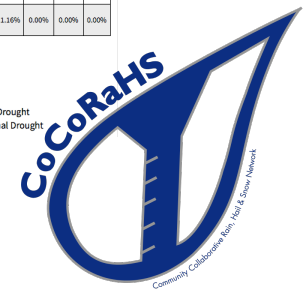
Week	None	D0-D4	D1-D4	D2-D4	D3-D4	D4
Current 4/24/2018	54.80%	45.20%	32.91%	5.77%	0.00%	0.00%
Last Week 4/17/2018	52.16%	47.84%	42.77%	30.83%	0.00%	0.00%
Three Months Ago 1/23/2018	56.58%	43.42%	0.01%	0.00%	0.00%	0.00%
Start of Calendar Year 1/02/2018	29.12%	70.88%	0.03%	0.00%	0.00%	0.00%
One Year Ago 4/25/2017	59.55%	40.45%	11.16%	0.00%	0.00%	0.00%

Drought Intensities

None: No Drought
D0: Abnormally Dry

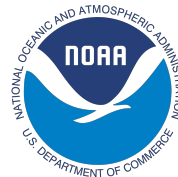
D1: Moderate Drought
D2: Severe Drought

D3: Extreme Drought
D4: Exceptional Drought



NPCREP

North Pacific Climate Regimes and Ecosystem Productivity

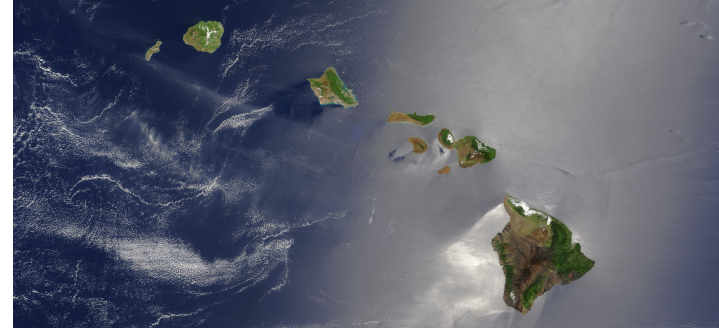


Inuit Sea Ice Use and Occupancy Project

Sea Ice Knowledge and Use (SIKU)

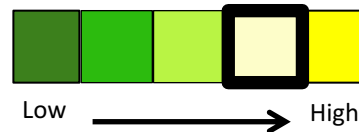


2) Evaluating how climate change affects a management/planning goal

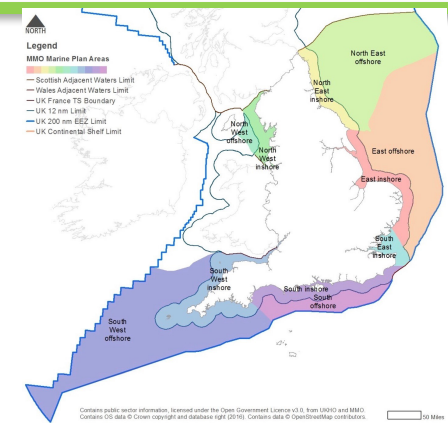


Kaua'i Flood & Erosion Control

MODERATE-HIGH



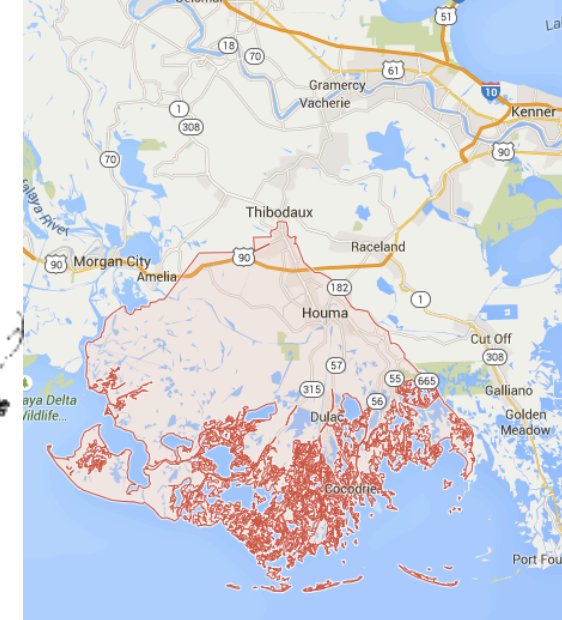
Evaluate effects of proposed projects on GHG emissions and carbon cycling processes – consider direct, indirect, or cumulative effects



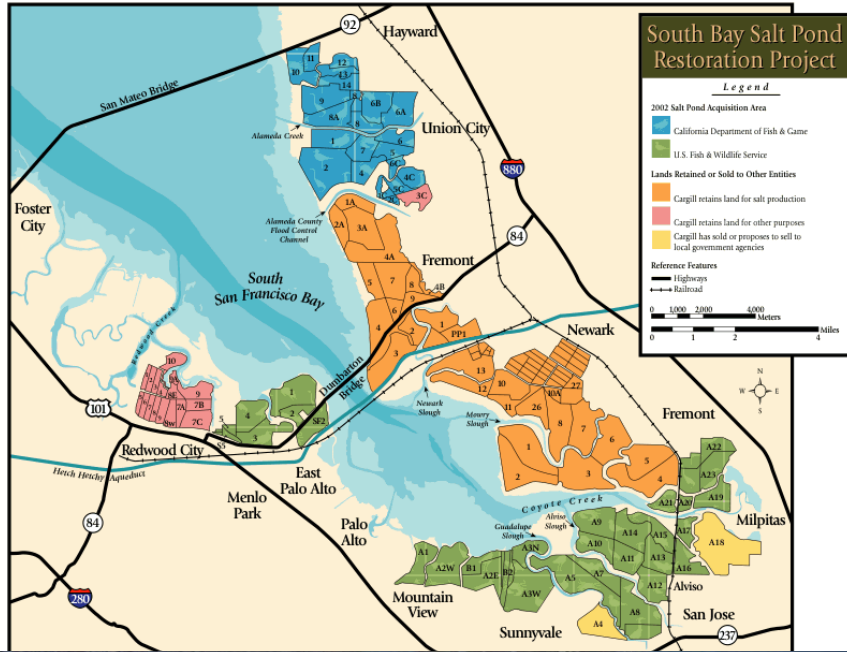
3) Prioritizing and deciding between adaptation options



Criteria	Relevance
Importance	How important are the predicted climate change impacts addressed by this adaptation option? Are they likely to affect unique or valuable species, ecological functions, or other natural resources? What is at stake if we do nothing?
Urgency	What are the costs of delaying action? Is it likely to cost more to implement later rather than now? Will we lose species, resources, or options by delaying action? Are the consequences of not acting now irreversible?
Co-Benefits	Are there benefits to this action beyond the adaptation objective? Will the total benefits exceed the cost of implementation? Are costs and benefits equitably distributed?
Feasibility	How feasible is the proposed action given existing laws, regulations, policies and the political climate? How technically feasible is it? Is there an opportunity to adapt existing strategy/actions, or will entirely new initiatives be needed?
Robustness	What is the likelihood that the proposed action will be effective across the range of future scenarios? Does it allow for adaptive management?
Cost	How costly will this proposed action be in terms of time, money or other resources? Is there opportunity to adapt existing strategy/actions?
Others	<ul style="list-style-type: none"> ■ Consistency with national laws/policies; ■ Equity; ■ Impact on greenhouse gas emissions; ■ Economic efficiency; ■ Technical feasibility; ■ Scale specificity.



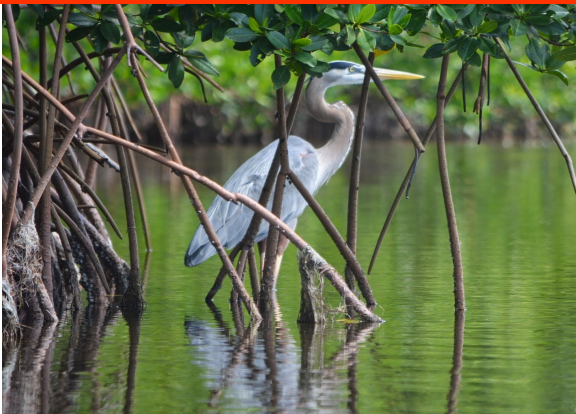
4) Determining if your adaptation strategies are working



Managing coastal habitats at Alligator River National Wildlife Refuge



Sea Level Rise, Δ Hydrology, Saltwater intrusion, Erosion



Actions

1. Create oyster reefs

- ✓ Dissipate wave energy
- ✓ Reduce shoreline erosion potential



2. Install water control structures equipped with flashboard risers and tide gates

- ✓ Restore hydrologic regime
- ✓ Prevent saltwater intrusion

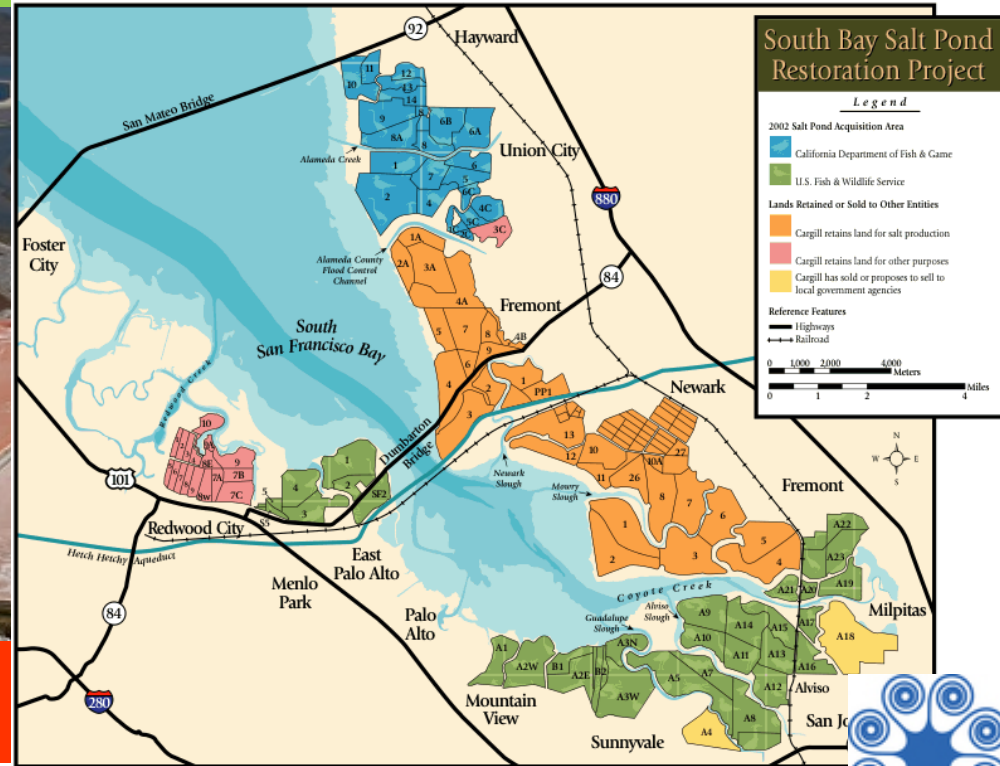


3. Plant salt- and flood-tolerant vegetation

- ✓ Enhance shoreline stability
- ✓ Combat expected biodiversity and habitat loss from sea level rise and flooding



Restoring coastal areas to reduce vulnerability



SLR, flooding, erosion

www.southbayrestoration.org



Jamie Bettaso (USFWS)

Restoration to:

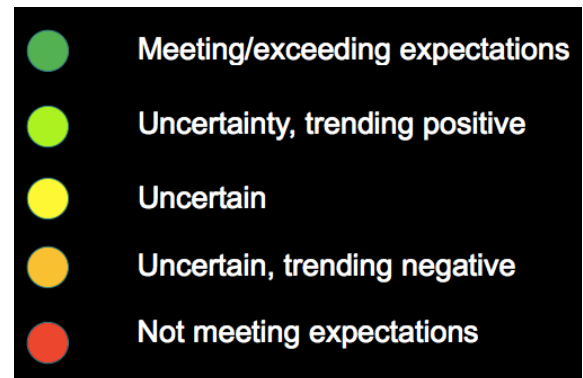
- Enhance habitats
- Maintain/improve flood protection
- Protect/improve water and sediment quality
- Manage the spread of invasive species



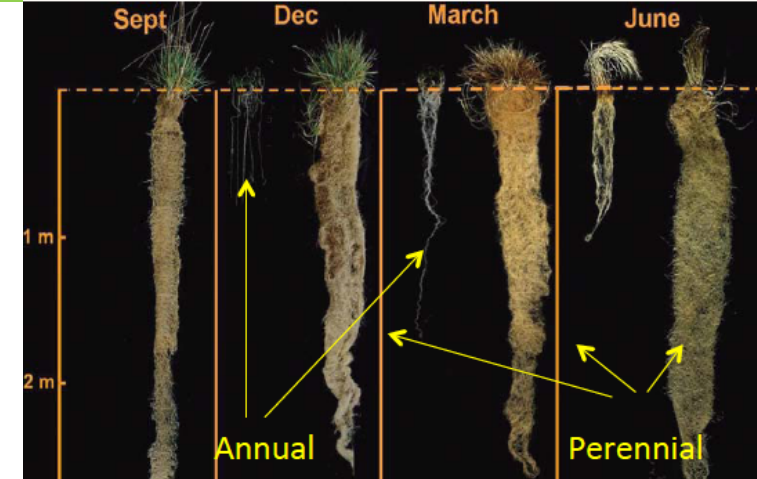
Actions

Adaptive management approach:

- Restoration implemented in phases; lessons learned from each phase are used to inform future phases to determine final habitat configuration
- Monitoring and management triggers



Climate-informed planning at TomKat Ranch



Altered Precipitation Patterns, ↑ Drought

Actions

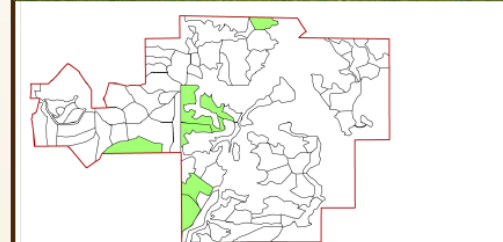
- Increasing cover of native perennial grasses
- Measuring carbon storage of management practices
- Reducing need for supplemental animal feed
- Increasing locally grown food
- Undertaking water budget assessment



Continuous Grazing



Planned Grazing



Native Perennial Grass Distribution 2011

□ Pasture with no perennial grass found



Native Perennial Grass Distribution 2013

■ Pasture with at least one perennial grass found

Group Discussion #1

- What are the elements of “effective” adaptation?
 - What elements need to be considered in constructing an M&E framework for adaptation?
1. Monitoring and assessing the effects of climate change
 2. Evaluating how climate change affects a management or planning goal
 3. Prioritizing and deciding between adaptation options
 4. Determining if implemented actions are working



Monitoring and assessing the effects of climate change

- Use best available science
- Identify time periods and reference points (e.g., 2040, 2070, 2100) and the reference period for comparison (e.g., 1950-2000 average conditions)
- Use multiple emissions scenarios
- Validated models
- Confidence levels associated with projections
- Trend(s) in climate impact(s) (e.g., increasing, decreasing)
- Observations and projections, extremes and anomalies



Evaluating how climate change affects a management or planning goal

- Consideration of *all* three aspects of vulnerability – exposure, sensitivity, adaptive capacity
- Evaluate likelihood and consequence of impact
- Confidence levels associated with rankings
- Useable by and/or comparable to other similar assessments
- Use expert knowledge



Prioritizing and deciding between adaptation options

- Meets defined goals and anticipated outcomes
- Non-siloed approach
- Based on evidence
- Co-benefits and tradeoffs
- Cost-effectiveness
- Uncertainty explicitly considered
- Address multiple timeframes
- Clear link to climate vulnerability
- Number of climate impacts and significance addressed per option
- Avoid maladaptation
- Feasibility – social and technical
- Equity
- Administrative and funding capacity



Determining if implemented actions are working

- Clear progress on actions
- Vulnerability/risks reduced
- Adaptive capacity increased (e.g., technological options, availability of resources, social capital, public awareness)
- Actions are mainstreamed/institutionalized
- Increased stakeholder support for adaptation



Climate Adaptation Indicators Framework for the City of Boston

1. Conduct Literature Review
2. Identify Sectors in Boston Impacted by Climate Change
3. Develop Comprehensive List of Potential Adaptation Indicators
4. Develop Climate Change Adaptation Indicators Framework for Boston



Characteristics/Criteria

- Linked to Boston's articulated climate change adaptation priorities (e.g., reducing vulnerability, coordination between government agencies, emergency response, establishing policy definitions)
- Focused on changing conditions, adaptive and flexible
- Top level or overarching indicators that capture a number of important adaptation topics
- Aim to complement the mitigation goals outlined in the Boston CAP to decrease the rate and extent of climate change (e.g., decrease greenhouse gases, urban forestry)
- Include process and outcome indicators



Top-Level Targets or Themes

1. Institutional Planning, Capacity and Coordination
2. Climate Science and Information
3. Public/Stakeholder Engagement and Awareness
4. Public Health and Safety
5. Natural Resources and Coastal Infrastructure
6. Public/Private Buildings and Utilities



Public Health and Safety

Indicator: The degree to which Boston residents are vulnerable to climate-related health risks and have access to needed services and amenities.

Description: Includes climate-related deaths (heat)/illnesses/diseases. Access to critical services (health centers). Vulnerability of critical service facilities. Capacity for emergency response.

Sub-indicators/metrics:

- Access to critical services reliable during extreme events
- Links between emergency resources and vulnerable populations
- % of emergency shelters in vulnerable areas of the city
- Development of a comprehensive food security plan for use during emergency events



Natural Resources and Coastal Infrastructure

Indicator: The degree to which natural ecosystems and other infrastructure in Greater Boston are able to withstand impacts of climate change and related events.

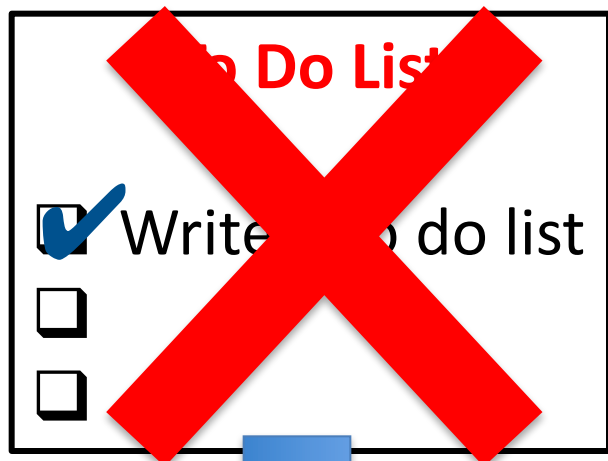
Description: Parks, trees, and green infrastructure are prioritized to help reduce the urban heat island effect. Parks, trees and open space are prepared to withstand climate change and related events. Protective infrastructure (e.g., ecosystem components and coastal infrastructure - dikes, levees and sea walls) exist and are adequate to protect against climate-related events and risks.

Sub-indicators/metrics:

- Amount and type of land cover preserved as open space
- Extent and condition of natural systems
- Number of riparian or natural buffers in capital projects and development



Where do I start?



- What is the goal of your effort?
- What do you need to know versus what is nice to know?
- What does success/failure mean in our context?
- How are we doing and where can we improve?
- What will be measured and how?
- Who will be involved?
- How will this information be used?
- What are key intervention triggers?



Identify Options to Monitor Climate Impacts and Evaluate Success

- Step 1. Identify your **goal/strategy**.
- Step 2. Identify **actions** in order to meet your adaptation goal.
- Step 3. For each action, identify short- and long-term desired **outcomes**. If you were successful in your adaptation effort, what would that look like?
- Step 4. For each outcome, identify specific **metrics** to measure in order to determine if the desired outcome(s) is happening or has happened.
- Step 5. For each metric, identify how you would measure change. What **tools or methods** of measurement would you use? What data sources would you look to?
- Step 6. Identify opportunities for **collaboration** with other agencies, organizations, or individuals in order to successfully measure change.
- Step 7. Identify new information and/or resources that may **trigger** the need to revisit a specific action and/or strategy in order to make necessary modifications.

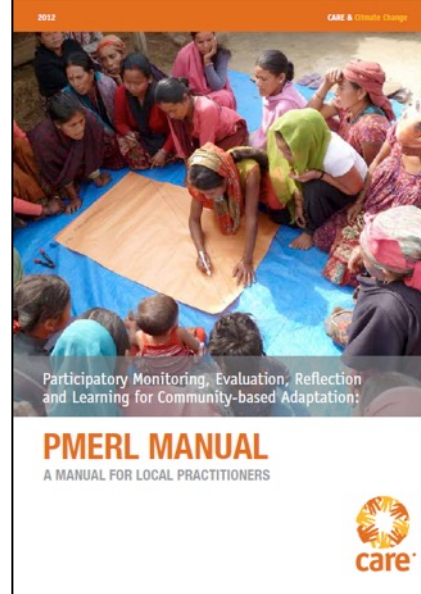
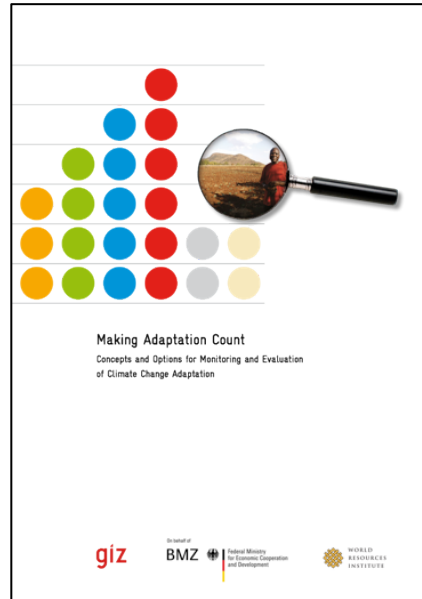
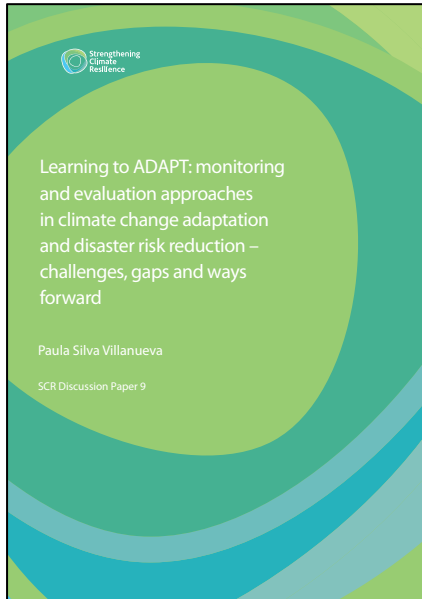
<div> <div>1. Adaptation Strategy</div> <div>Create/maintain open space to provide multiple climate adaptation and mitigation benefits</div> </div>		
2. Adaptation Actions	Specific Action (1)	Specific Action (2)
	Increase tree and vegetation cover	Increase permeable surface area
3. Desired Outcomes (short and long-term)	Reduced urban heat island effect – provide shading and cooling	Reduced surface water runoff and flood risk
4. Metrics to measure outcomes	Amount and type of land cover % of trees planted % change in land surface temperature	% and spatial distribution of pervious vs. impervious surfaces
5. Tools/methods to measure metrics	Survey	GIS mapping, NOAA Impervious Surface Analysis Tool
6. Collaboration	Volunteers/citizen scientists, Land cover/use change data	Land use planners
7. Management triggers	Increased urban development counteracting ability to alleviate the UHI effect	Greater certainty in precipitation projections



Your Turn!

- Step 1. Identify your **goal/strategy**.
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Emerging Guidance



Submit a project!

<http://bit.ly/AdaptationProject>

Take the survey!

<http://bit.ly/AdaptationMonitoring>



EcoAdapt M&E Projects

- Monitoring Climate Effects in Temperate Marine Protected Areas
- Available Science Assessment Projects
- Climate Adaptation Indicators Framework for Boston
- Climate Adaptation Strategies in Coastal U.S. Cities: Barriers and Bridges for Monitoring and Evaluation
- Evaluation and Assessment of the Climate Action Plan for the Florida Reef System
- Developing Metrics to Inform Climate Action in Central Puget Sound
- Decision Support Tools to Help Natural Resource Managers Evaluate and Prioritize Adaptation Options

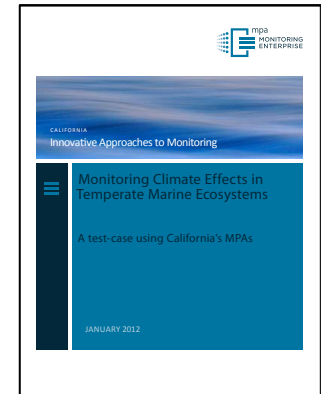


Table 5. Summary of interview findings

	Alaska & Arctic	Northeast	Pacific Islands	Southeast & Caribbean	Southwest	Northwest
	Alaska, Alaska	New York, New York	Kauai County, Hawaii	SE Compact, Florida	Chula Vista, California	Seattle, Washington
CCA M&E for Mitigation	✓ Some tracking ✓ Significant tracking	✓	✓	✓	✓	✓
CCA M&E considered	✓ Discussed ✓ Is a future goal	✓		✓	✓	✓
CCA M&E plans exist	✓ Plans created ✓ Plans implemented					
CCA M&E is happening	✓ Implementation ✓ Effectiveness	✓		✓	✓	✓
Materials used in planning/implementing adaptation and/or M&E	Boulder, CO CAP *				Freese 2009	
Major CCA M&E drivers	Mayor's Interest in Climate Change	Vulnerability	Vulnerability	Political, Vulnerability	Approached by San Diego Foundation	Vulnerability

*This information was learned in a review of the plan, not through the interview



Key Considerations for your M&E work

- Identify a clear purpose(s)
 - Manifestation of climatic changes
 - Effects of changes on your goal
 - Selecting actions for implementation
 - Effectiveness of actions
- Consider context
 - Learning
 - Accountability
- Evaluate *effectiveness, efficiency, equity, and sustainability* of adaptation strategies and actions
- Identify opportunities for collaboration
- Consider timescales
- Designate ownership (top down, bottom up)
- Pay attention to unintended consequences/effects on other sectors



Opportunities for Engagement

Read/Request State of Adaptation surveys and synthesis products!

Join CAKE and submit your content!

CAKEx.org

Join us April 23-25 for the 4th National Adaptation Forum!

Madison, Wisconsin

Contact!

Rachel M. Gregg, Rachel@EcoAdapt.org



Questions?

Adaptation examples available at CAKEx.org

