

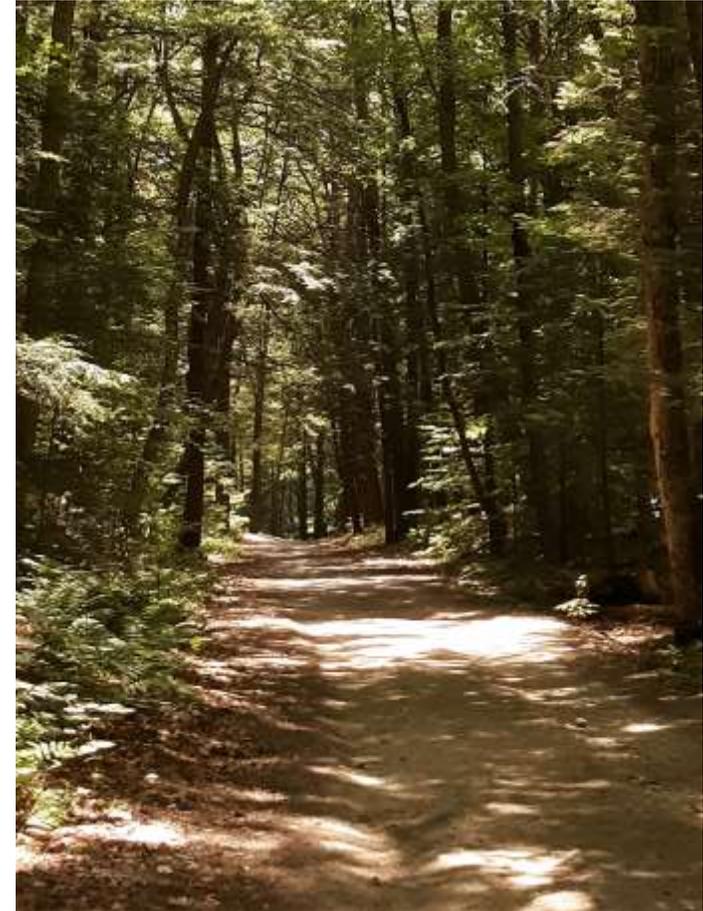
# Training in developing targeted adaptation indicators and metrics

Susi Moser, Ph.D.



# Overview of Training

- **Introduction to toolkit**
- **Exercise 1** – Orientation, finding your place to start
- **Q&A period 1**
- **Overview of indicator development/use process**
- **Exercise 2** – Digging deeper, finding what you need
- **Q&A period 2**
- **Resources**



Introduction of the  
*Resilience Metrics*  
Toolkit



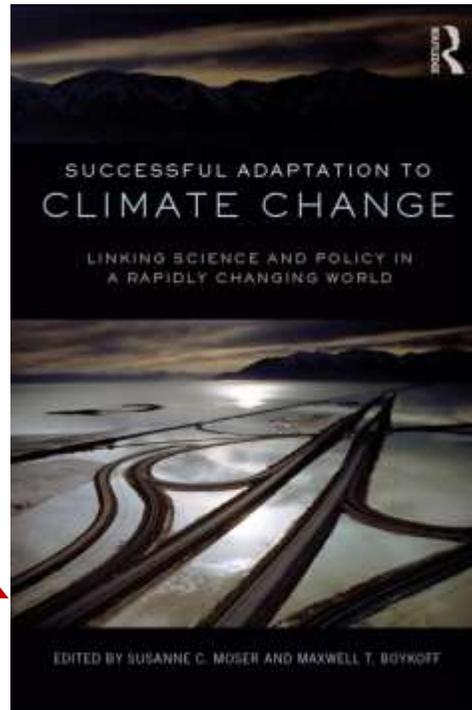
# The Resilience Toolkit: Drawing on 4 Projects over 10 Years

## Identifying the Key Dimensions of Adaptation Success



Book:

What do we know about  
successful adaptation?



SAIM Project with 5 Reserves:  
Indicators & Metrics

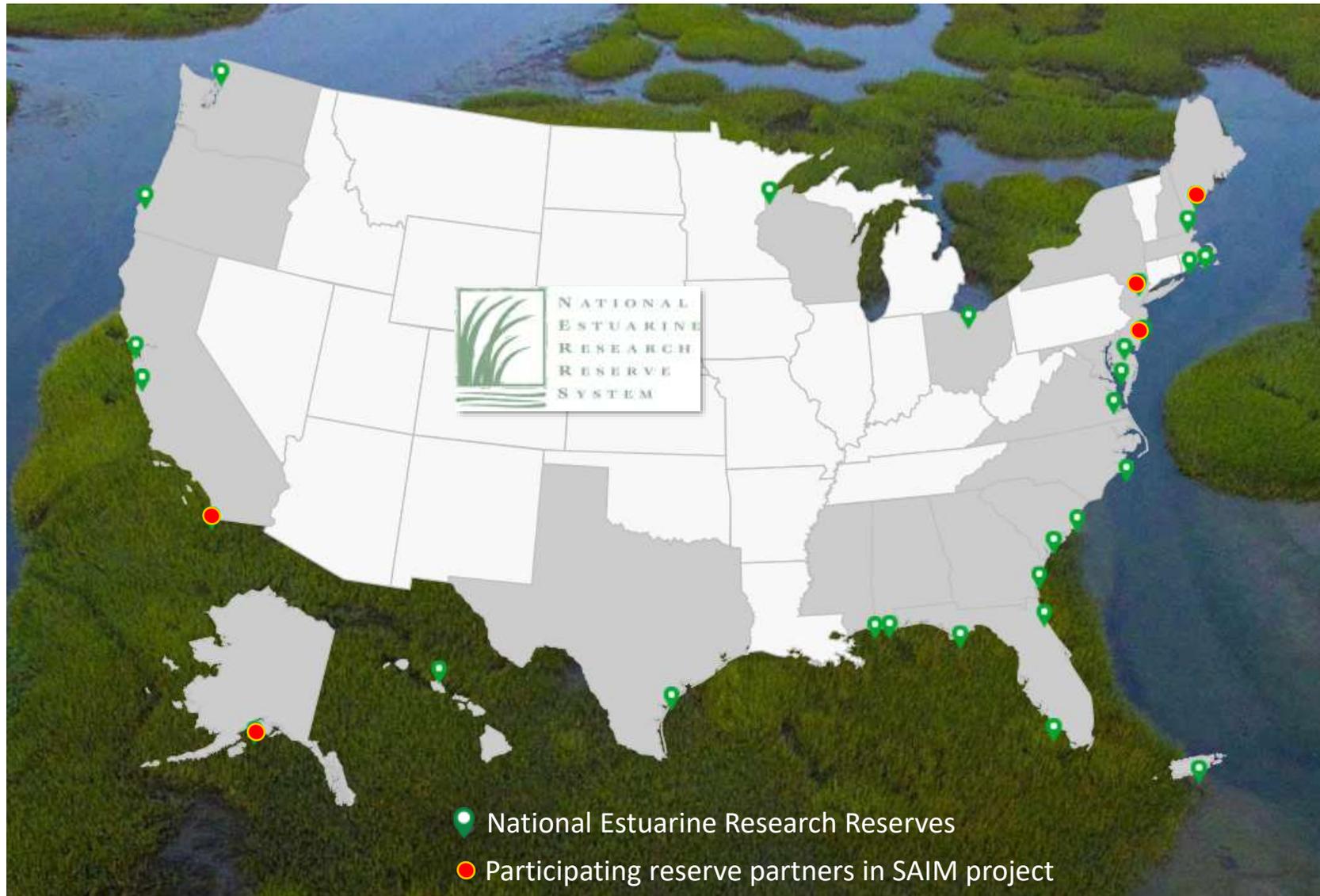


- Wells
- Hudson
- Jacques Cousteau
- Tijuana River
- Kachemak Bay

Catalyst project:  
Toolkit Development



# INDICATORS FROM THE BOTTOM UP: *Working with National Estuarine Research Reserve System*



Wells



Hudson River



Jacques Cousteau



Tijuana River



Kachemak Bay

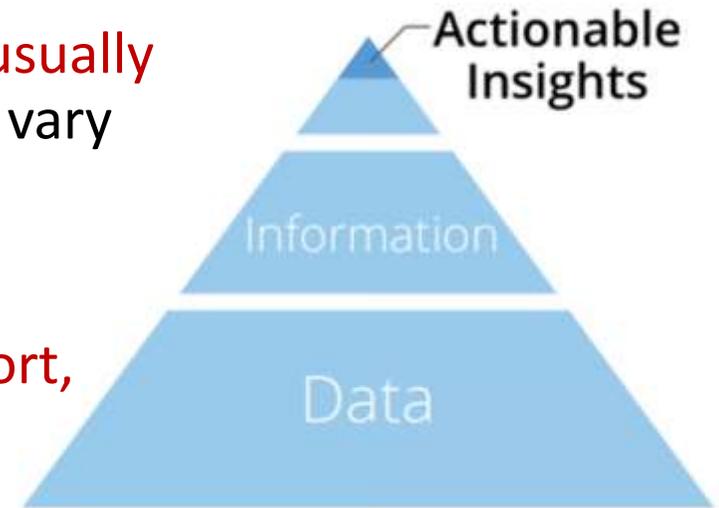
# 10 Lessons Learned from Practice

1. Searching for indicators and metrics is a **difficult, time-intensive, value-laden, not apolitical conversation** (but see #10)
2. There is a tendency to focus only on **inventories of adaptation actions** while neglecting outcomes and other dimensions
3. **Existing incentives and structures for tracking, evaluation may be a productive starting point** (e.g., CRS, existing reporting), but often not enough
4. **Capacity limitations (money, time, know-how, data, institutional context) are very real** but there are ways to minimize effort and cost
5. Identifying “good” indicators depends on having a clear **vision of success, being cognizant of the audience who needs/wants them, and deliberate about how they will be used.**



# 10 Lessons Learned (cont.)

6. Of the large universe of possible indicators, only **a small set of purpose-driven, decision-relevant and meaningful indicators usually matter**.....but which set of indicators meets those criteria will vary greatly across users, contexts & capacities.
7. To be usable, adaptation indicators & metrics must embrace learning from **actionable information, effective decision support, evaluation science & practice, scenario planning, etc.**
8. **Indicators are not a panacea** (bec. we can't measure everything that is important; we can't act on everything we can measure; we don't know all that we maybe should measure). Thus, use judiciously.
9. **Don't bother with indicators and metrics unless you think hard about how to make it happen.**
10. **Careful development of indicators makes adaptation better.**



# Goals of Toolkit

- **Integrate, share and embody insights and lessons learned from all prior projects**
- **Provide lots of tools, job aids and resources to make it as easy as possible**
  - Assume various levels of expertise/experience
  - Entry from many different angles
  - Provide resources, case studies, indicator examples
- **Highlight work of NERRS but make toolkit applicable to all contexts (coastal and non-coastal)**

## INPUT INTO DESIGN

- Professional sharing sessions at NERRS Annual Meeting
- Sessions with NERRS CTPCs
- Social Coast Forum 2018
- National Adaptation Forum 2018
- RAE 2018
- Feedback on beta version (NERRS Annual Meeting, Social Coast Forum 2020, RISA teams, etc.)





- MAIN MENU**
- + Getting Started
  - + Adaptation & Resilience
  - + Indicators & Metrics
  - + Applications
  - + Resources
  - + About

## Welcome to Resilience Metrics!

Welcome to *Resilience In the Face of Climate Change: Envisioning Success - Measuring Progress!*

The information, tools, and resources offered here aim to be helpful to those who have embarked on the journey of addressing the challenges related to extreme climatic and weather events and changing environmental conditions.

If you are interested in preparedness, adaptation, and resilience-building for a changing climate, you are in the right place.

If you are wondering what "adaptation success" looks like and how you might track your progress toward it, we offer ways to think about that and tools to help you find tailored answers.

**Our focus is on defining and tracking adaptation success and progress.**

For those interested in other adaptation-related topics and challenges, we point to related sites and tools along the way.

If you are ready to jump directly into working with indicators, click on the relevant icons. If you're not sure where to begin or find what you need, check out this [list of diagnostic questions](#), start at the [Getting Started](#) page or take our [diagnostic quiz](#) to find your entry point.

If you are ready to jump in on the work of developing and using indicators and metrics, you can directly go here:

- [Bounding and Assessing Context](#)
- [Visioning Success](#)
- [Exploring & Identifying Indicators](#)
- [Selecting Indicators & Identifying Metrics](#)
- [Tracking Indicators & Metrics](#)
- [Using Indicators & Metrics](#)

# What You'll Find

- **Basic introduction/overview**

- Adaptation and resilience
- Adaptation success
- Evaluation
- Indicators and metrics

- **Resources**

- Our own work
  - Facilitation Guides, Job Aids, Case examples, Publications, Webinars, sample lists of indicators
- Others' work
  - Publications, Websites, Data sources



Photo: chanellife.com.au

- **Examples of what developing indicators and metrics looks like**

- Coastal regions (Maine, New Jersey, New York, S. California, Alaska)

- **Testimonials**

- **Background information**

- **Contact information to get/give help**

### MAIN MENU

- + [Getting Started](#)
- + [Adaptation & Resilience](#)
- + [Indicators & Metrics](#)
- + [Applications](#)
- + [Resources](#)
- + [About](#)

## Resources

The resources listed here constitute a work in progress. We will add to the resources list as we develop or find additional useful resources for the purpose of defining adaptation success, measuring progress toward desired outcomes, and evaluating the effectiveness of efforts undertaken.

The resources are organized by type, topic, sector, region, and origin. They are linked to other places within this toolkit to support the various steps involved in visioning success, identifying and selecting indicators, tracking and using them in the ongoing work of adaptation.

This toolkit is geared toward equipping users with tools they can apply in and adjust to their own, specific contexts. What will users find?

- Facilitation guides for particular activities that accompany the steps in the process of developing and using indicators and metrics
- Tools, worksheets or other job aids to support indicator development and use.
- Data sources to measure baselines and progress over time
- Case examples
- Published papers, reports, factsheets and other documents on the topics discussed in this toolkit
- Relevant webinars and presentations related to successful adaptation
- Related or relevant websites and others' work on indicators and metrics

Displaying 1 - 20 of 349

Search

**Report**  
**[A Comparative Overview of Resilience Measurement Frameworks](#)**  
This paper explores the theory and practice of measuring resilience in the context of climate change and natural hazards. The authors examined 17 sets of resilience indicators from international resilience frameworks in order to identify commonalities and differences.

### RESOURCE TYPE

- Journal Article (112)
- Data Source (50)
- Report (47)
- Website (41)
- Job Aid (34)
- Facilitation Tool (19)
- Presentation (13)
- Case Example (8)
- Webinar & Brief (6)

### TOPIC

- Adaptation (71)
- Indicator Development, Selection, Use, and Specific Examples (53)
- Monitoring and Evaluation (M&E) (33)

### TOPIC

- Adaptation (194)
- Indicator Development, Selection, Use, and Specific Examples (141)
- Monitoring and Evaluation (M&E) (72)

### SECTOR

- Coasts and Estuaries (36)
- Community Resilience and Social Equity (33)
- Disaster Resilience and Preparedness (30)
- Human Health and Well-being (28)
- Ecosystems and Land Use (27)
- Urban (25)
- Water (23)
- Infrastructure and Environment (19)
- Agriculture and Livelihoods (18)
- Forests and Other Land Management (15)
- Oceans and Fisheries (14)
- Energy (13)
- Tourism (12)

### REGION

- West Coast (39)
- Northeast (34)
- International (33)
- Gulf of Mexico (31)
- Mid-Atlantic (31)
- Pacific Islands (31)
- Southeast (30)
- Great Lakes (29)
- Mountain West (26)

### ORIGIN

- Others' Work (122)
- Our Work (14)

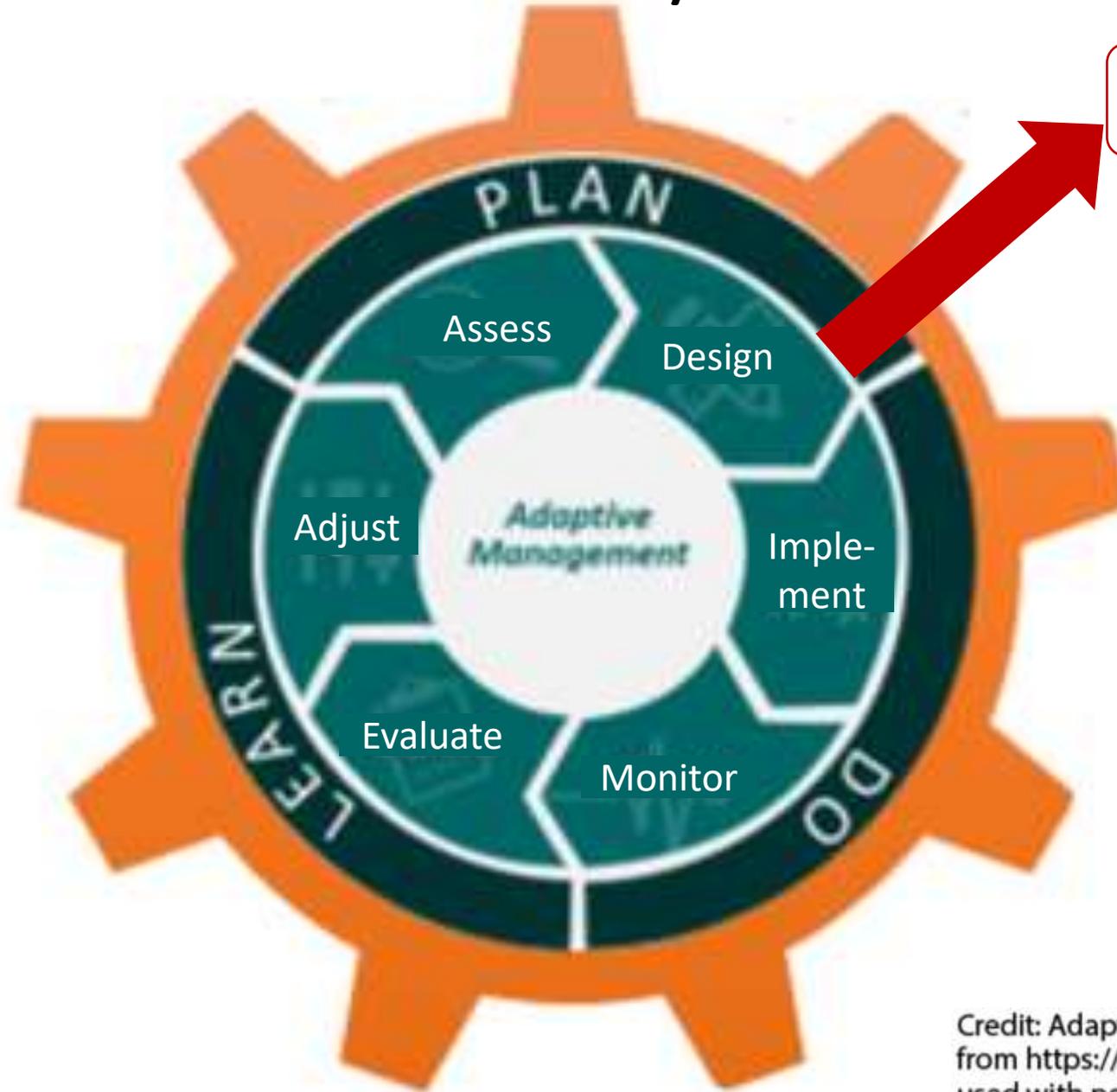
Will add resources over time. Updates ca. every 3-6 months

# “No Wrong Door” Design: Where to start? What to find where?

1. Explore via **drop-down menus** (and **hyperlinks** throughout text)
2. Navigate by **always-present side menu**
3. Use **“Getting started”** page
4. Jump right to indicator development/use via **indicator icons**
5. Click on various **overview Job Aids**:
  - Diagnostic Questions (simplified version of interactive diagnostic tool)
  - 2-page overview of tools, job aids, and case studies available on this site
6. Search the **Resources page**: by topic, sector, type of resources, key words
7. Search any page using the **Search bar**
8. Dip in **randomly and discover**
9. Brief **“orientation video”** (to come)
10. Work through **interactive tool (“Quiz”)**



# Start From Wherever You/Your Partners Are



Credit: Adaptive Cycle graphic from <https://essa.com/approach/>, used with permission.



# Interactive Diagnostic Tool

- GETTING STARTED ▾
- ADAPTATION & RESILIENCE ▾
- INDICATORS & METRICS ▾
- APPLICATIONS
- RESOURCES
- ABOUT ▾

**MAIN MENU**

- + Getting Started
  - > Introduction
  - > Quiz
  - > The Need for a Common Understanding
  - > Terminology
  - > Climate Adaptation Basics
  - > Getting Help
  - > Offering Help
- + Adaptation & Resilience
- + Indicators & Metrics
- + Applications
- + Resources
- + About

## Quiz

Use this quiz to figure out where you stand in regard to adaptation, resilience-building and indicator development. We'll set you on the right path.

1. Bound and assess context
2. Vision success
3. Explore and identify indicators
4. Select indicators and identify metrics
5. Monitor indicators
6. Use indicators

We have done some visioning of what our adaptation efforts are meant to achieve.  
[? Help to achieve this](#)

We have clearly defined adaptation goals.  
[? Help to achieve this](#)

All involved share the goals we are working towards.  
[? Help to achieve this](#)

Stakeholders agree on what would constitute "success" or at least progress.  
[? Help to achieve this](#)

 Based on your response, we recommend you start at **Visioning Success.**

Previous Next

Engaging Stake-and Rightsholders

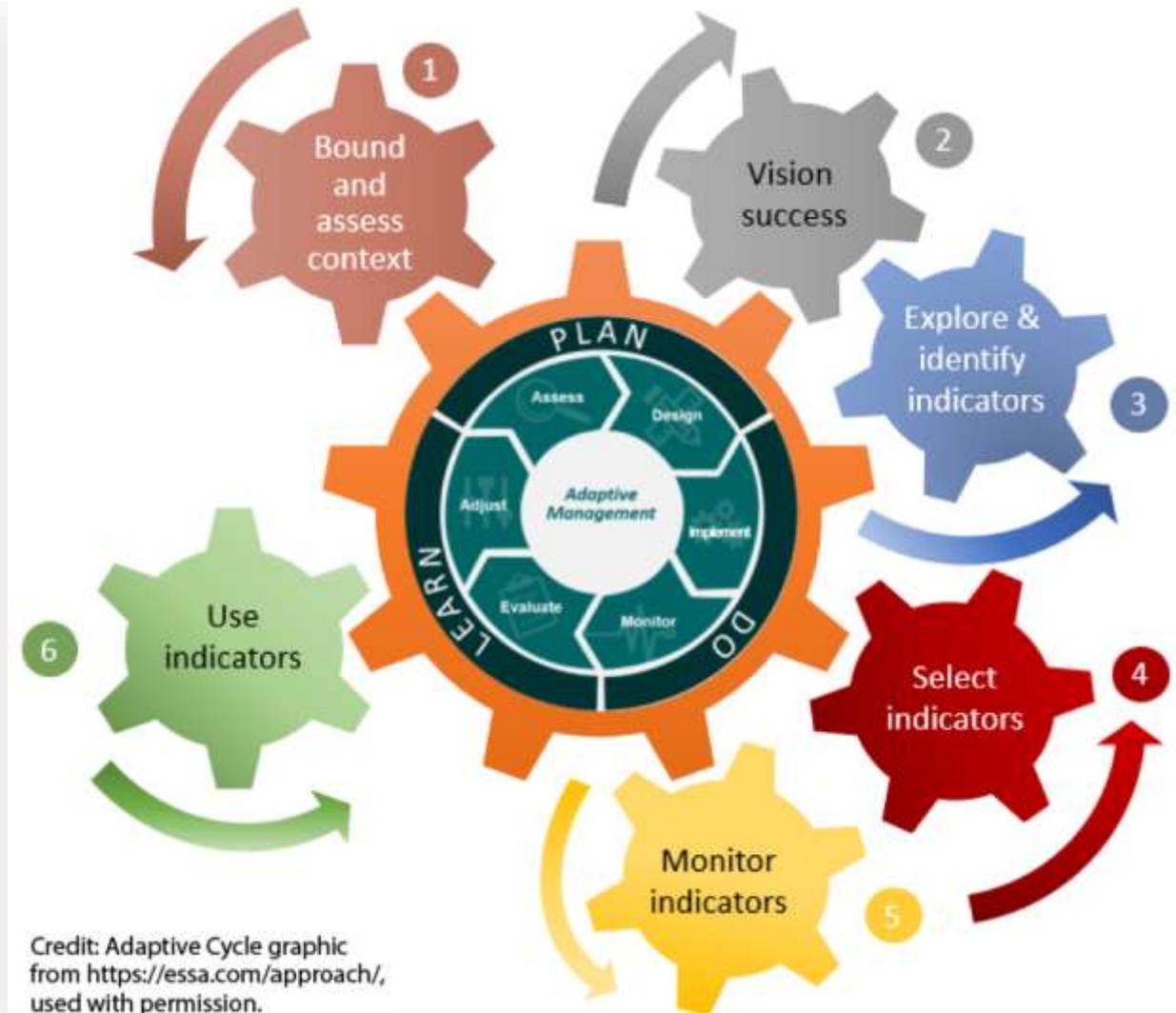
ion Indicators in Day-to-Day Management  
g Success to Tracking Progress  
Indicator Tracking Systems for Adaptation  
r Safe Than Sorry" Workshop Series  
icity to Track Indicators and Metrics

Engagement

# Work in Break-out Groups

15 minutes total

- In each group, briefly introduce yourself and share what you are working on, from where you are coming to questions of:
  - Adaptation/resilience
  - Adaptation success and progress
  - Indicators and metrics
- Go to interactive quiz: <https://resiliencemetrics.org/quiz>
  - Navigate to what may be useful to you, in your process
  - Explore the resources that come up at the step where you are at
  - Discuss together how they may be useful to you, wherever you're at



# Whole-Group Debrief and Q&A



- What are the places from which people come to the issue of indicators/metrics?
- What did you find that was helpful?
- Any challenges?

# Indicator Development & Use



View Edit Revisions**MAIN MENU**

- + Getting Started
- + Adaptation & Resilience
- + Indicators & Metrics**
  - › Introduction
  - › Bounding and Assessing Context
  - › Visioning Success
  - › Exploring & Identifying Indicators
  - › Selecting Indicators & Metrics
  - › Monitoring Indicators & Metrics
  - › Using Indicators & Metrics
- + Applications
- + Resources
- + About

## Indicators & Metrics

Users of this site come from a variety of professions and have a wide range of backgrounds, training, practices, resources, and industry standards. Please use the tools offered here to complement your context-specific resources, approaches and processes. We hope they help you build your capacity.

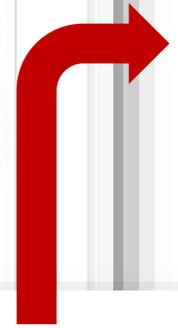
• [Overview of tools, job aids, and case studies available here](#)

Whether you are a...

- Planner
- Natural resources manager
- Engineer
- Business supply-chain manager



"I recently began new collaborative research about building a more resilient..."



Step-by-step explanation and guidance through the process

Do-it-yourself facilitation tools, job aids, resources

### *Six Key Steps in the Process of Indicator Development & Use*

The purpose and key considerations for each step in the process of indicator development and use are described below. Users can read them all in sequence or click on the relevant links of interest for their current work:

- [Bounding and Assessing Context](#)
- [Visioning Success](#)
- [Exploring & Identifying Indicators & Metrics](#)
- [Selecting Indicators & Metrics](#)
- [Monitoring Indicators & Metrics](#)
- [Using Indicators & Metrics](#)

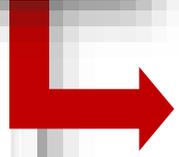


Case examples: How we did it

that exist.

- **Planning:** This phase includes developing goals and specific objectives, as well as determining alternative ways to reach those goals.
- **Implementation:** This phase includes making decisions, obtaining financial, political, and public support, and implementing the plan.

Research Scientist  
Climate Assessment for the Southwest



Lists of indicators

# Resilience Indicators & Metrics for What?

## • Goal 1: Tracking the performance of the adapting entity

- Is Agency A doing what it said it would do in its adaptation plan?
- Is Politician B doing what she promised when she ran for office on climate resilience?
- Is Country C delivering on its pledge to pay \$x billion for adaptation projects

**Performance** (whether?) •  
Input and Action-focused

## • Goal 2: Tracking the effectiveness of adaptation strategies

- Is the natural buffer working as designed/expected?
- Was the setback sufficient to protect against expected storms?
- Are disadvantaged communities receiving any benefits from x,y,z program?
- Has public engagement improved?
- Are we better prepared now?

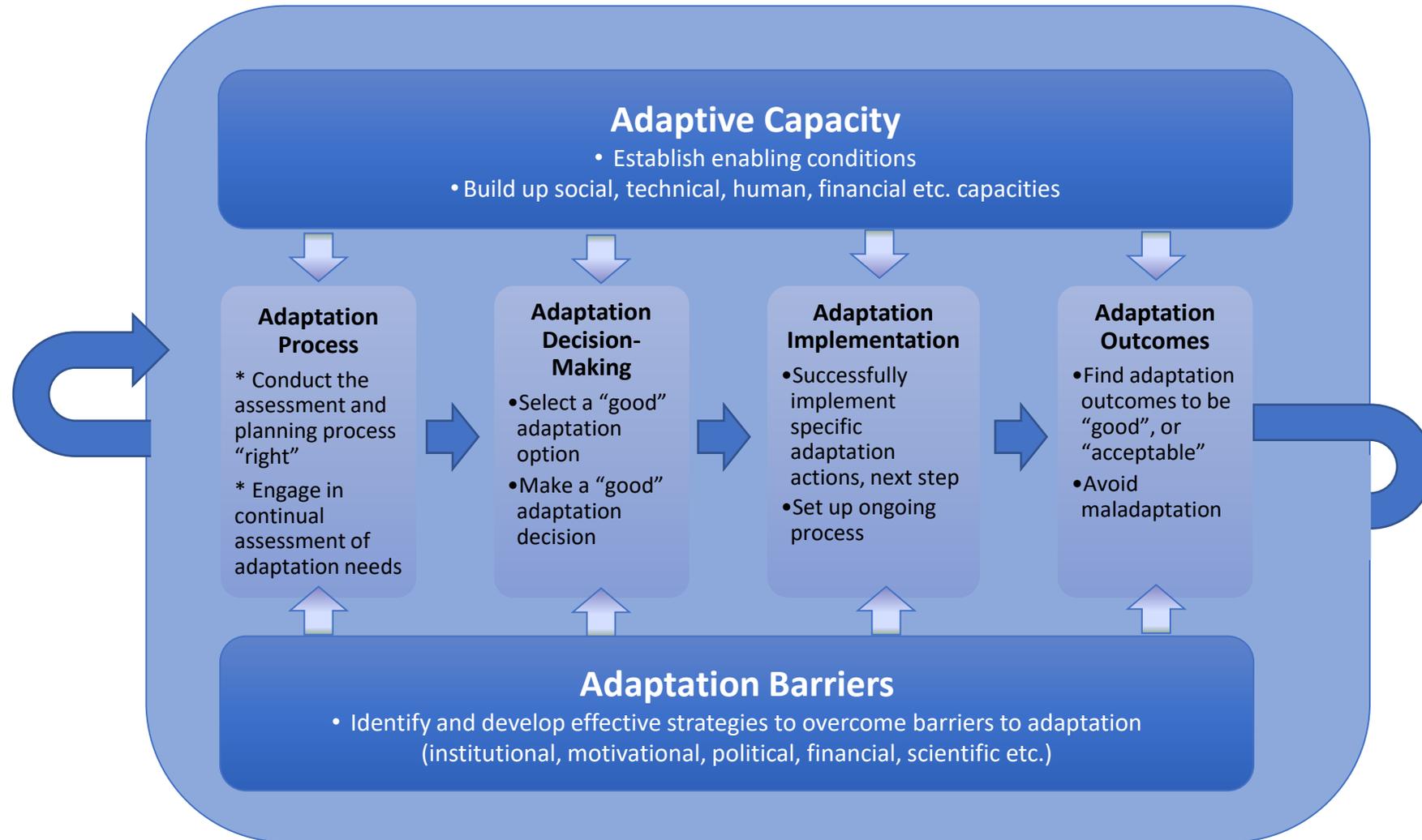
**Effectiveness** (how well?) • Process,  
Action, Output and Outcome-focused

## • Goal 3: Tracking the extent of adaptation finance and actions

- Do communities have access to the funding, capacity, assistance they need?
- Are we doing enough?
- Are we focusing on all key risks/vulnerability hotspots?
- Are we ready for the unexpected, cascading disasters, and/or compounding crises?

**Adequacy** (how much?) • Barriers,  
Input, Capacity, Outcome-focused

# Six Key Dimensions of Adaptation Success



Source: Moser et al. (forthcoming)

# Two Key Definitions

## Indicators

- Qualities, traits, or states of a system that suggest ("indicate") or hint at something one is interested in. Here, in the effectiveness, progress, or success of adaptation.
- Example:
  - Find an indicator for a “good” or “successful” adaptation decision-making process.
  - “Transparency”
    - Process is open and accessible
    - Stakeholders can know how decision-makers come to decisions
  - Crucial for building trust

## Metrics

- A variable that can be measured (if quantifiable) or otherwise tracked (if qualitative) that represents the indicator.
- Example:
  - Find a way to measure “transparency”
  - *Qualitative metric*: Availability of relevant documents/information at free and accessible websites (yes/no/partially)
  - *Quantitative metric*: Proportion of people who perceive a process as transparent (% of surveyed group)

There is typically more than one indicator for the item of interest.

There is typically more than one metric per indicator.

There is – as yet – no list of “preferred” or “best” indicators and metrics for adaptation.



This job aid was created to serve as a reference for individuals interested in indicators and metrics to help communities define and track progress on their climate adaptation goals. Additional background and resources are available on the website: [www.ResilienceMetrics.org](http://www.ResilienceMetrics.org). This website was developed in partnership with the National Estuarine Research Reserve System with funding from NOAA.

## Job Aid: Sample Indicators and Metrics of Adaptation Success and Progress: Social Aspects

This list constitutes a sample of possible indicators and metrics that point to climate adaptation success and/or progress. It is derived from work with communities in Maine, New York, New Jersey, California and Alaska. For a larger list of indicators and possible metrics brainstormed by these communities, look for a searchable Excel spreadsheet in the Resources section of [www.resiliencemetrics.org](http://www.resiliencemetrics.org), called "SAIM Project\_Indicator Brainstorm.xlsx" (status January 2020). Indicators can be searched by adaptation strategy, location, sector, or the six dimensions of adaptation success described at [www.resiliencemetrics.org](http://www.resiliencemetrics.org). This list is not refined, ranked or vetted by any scientific or governance entity although some indicators are in use. The list is solely offered to support other users' creative thinking and brainstorming of indicators/metrics that suit their unique situations.

Strategy	Indicator	Metrics	Dimension of Success						
Build capacity of stakeholders to carry out specific adaptation-related tasks	Adaptive capacity	Degree of learning (self-assessed, post training survey); intention to use learned knowledge/skills (expressed; post-training survey); frequency of training commensurate with rate of staff turn-over		x					
Improve pace and completeness of disaster recovery	Availability of sufficient emergency shelters	# and type of shelters used/not needed for speedy recovery (e.g., use of schools can delay recovery); # of shelter spaces			x			x	
Raise awareness about flood risks and response options	Awareness of flood response options	% of HH that received information on how to build resilience; attendance of public meetings on adaptation planning; # of surveyed residents who are aware of risks and response options		x				x	
Increase community disaster preparedness	Community preparedness	# of participants in emergency preparedness trainings		x				x	
Maintain adaptation efforts (even after/in absence of another extreme event)	Complacency (or absence of)	Stable/declining # of actively maintained flood insurance policies; declining outreach efforts; downgraded priority of adaptation actions (rankings on agenda of city council)			x			x	
Develop adaptation strategies for Reserves/ ecosystems that are sensitive to cultural preservation needs/ access by Native Americans	Culture-sensitive adaptation planning	Cultural group interested in working with ecological group (yes // no // emerging); significant archeological sites are being protected; # of adaptation design meetings attended by Cultural Resources specialist; cultural resources stewardship program developed (yes // no // in progress)	x		x			x	x

View

Edit

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Revisions

## MAIN MENU

+ Getting Started

+ Adaptation &amp; Resilience

+ Indicators &amp; Metrics

+ Applications

▸ Introduction

▸ NERRS' Work on  
Successful Adaptation

+ Resources

+ About

# Applications

## Indicator Development & Use in the Real World

This website offers indicator development tools and lessons learned that stem from specific, real-world examples of adaptation. Researchers and practitioners worked closely in thinking about adaptation success and progress and developing locally relevant indicators and metrics. If you wish to learn more about each of these case examples, you will find the following for each:

- Facilitation agendas
- Workshop agendas
- Facilitation slides
- Workshop hand-outs (if applicable)
- A brief write-up of the case study
- Facilitation tools and job aids developed from that case
- Contact information for local leads

As we collaborate with others in other geographies and sectors over time, we will add those examples here, so you can continue to learn from these applications of adaptation indicator development and use.

For case examples of working with various reserves of the National Estuarine Research Reserve System, click [here](#).



"I really recommend diving into the Resilience Metrics website! Whether you are just starting to deal with climate adaptation, or are a seasoned pro, you'll find useful resources to help you with your work in this area."

Dan Brumbaugh  
Coastal Training Program  
Coordinator  
Elkhorn Slough NERR

# Why Think About Adaptation Success?

## - Why Measure Progress?

**Overarching: Responsibility for safeguarding people, economy, infrastructure, cultural assets, environment**

### 1. Communication and public engagement

- Communicating hope and desirable goal to work towards
- Defining a common vision among diverse stakeholders

### 2. Deliberate planning and decision-making

- Setting clear goals, aligning means and ends (internal consistency)
- Best fit with other policy goals (external consistency)

### 3. Justification of adaptation expenditures

### 4. Accountability/good governance

### 5. Support for learning and adaptive management



# In Break-out Group



## 3 Tasks:

1. Share and become clear with others in your group what your goal is, what exactly you want to measure/track over time (5 mins).
2. Go to the Indicators & Metrics page:  
<https://resiliencemetrics.org/indicators-metrics> and click on “Selecting”. Then read the section on “Importance of and Need for Indicators” (~5 min).
3. Brainstorm ONE indicator each for what you want to measure and discuss with each other why it would be important/why it’s needed (~5 min).

**15 minutes total**



# Challenges in Measuring Success



- **Methodological**

- No standard set of indicators/criteria
- Context-specificity
- Cause-and-effect relationship extremely difficult to establish
- Input metrics alone are inadequate
- Outcome indicators alone are insufficient (time delays)
- Need to look at distributional effects
- High-quality data, data gaps
- Double-counting
- Need for multiple approaches to triangulate

- **Conceptual**

- Lack of agreement on adaptation, finance, capacity building
- Different understanding/use of key terms (e.g., performance, effectiveness, adequacy, success)

- **Empirical/practical**

- Lack of adaptation databases, use of M&E
- Capacity constraints
- Frequency of monitoring
- Lack of funding

- **Political**

- Values informing “success” are inevitably subjective and contested
- Limited disclosure of M&E results
- Political sensitivities
- Selection/manipulation of results
- Handling of trade-offs
- Professional image of “succeeding” or “failing”

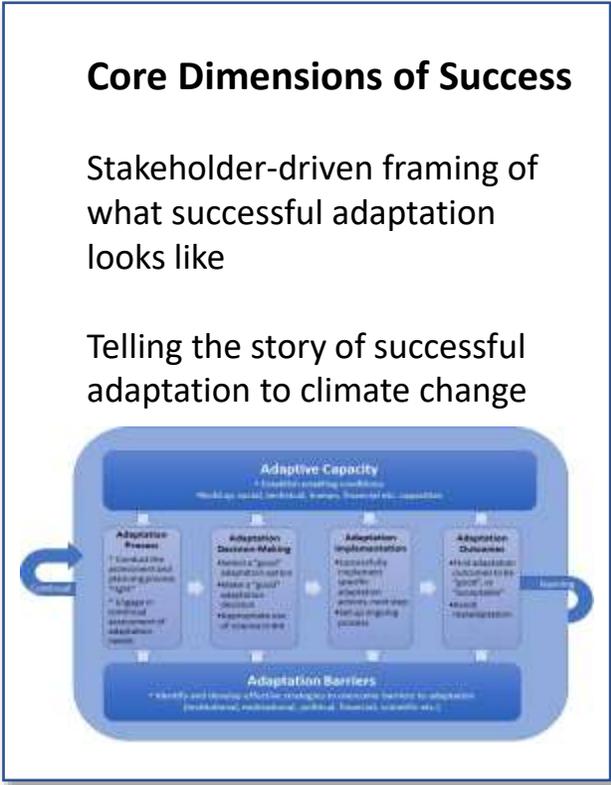
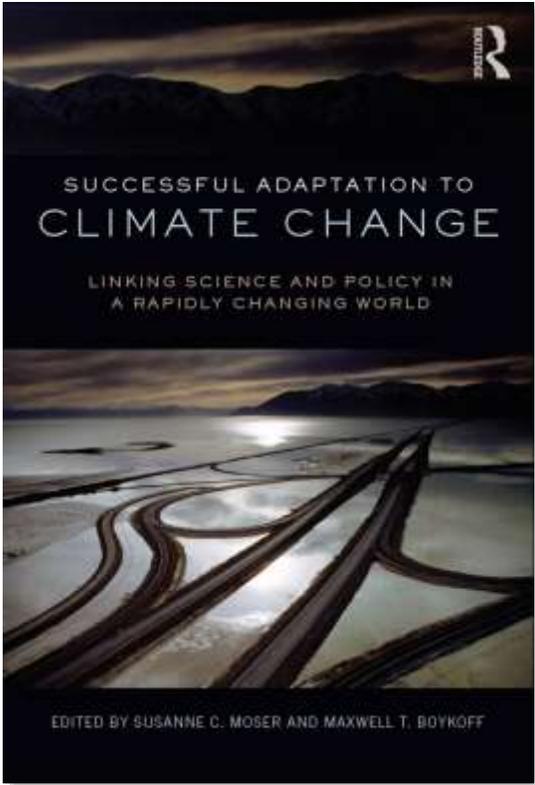
# In closing: A few cautionary notes

1. Indicators can be important signals, but they're not the only thing to watch
2. "We need indicators" may be the latest version of "we need more information" (but then not using it)
3. Indicators may give misleading certainty, obfuscating the need to deal with uncertainty and to do the hard work of becoming adaptive



# Some Resources: Outputs to Date

## More in the Works...



### SUCCESSFUL ADAPTATION INDICATORS & METRICS

A special focus area of the National Exposure Research Reserve  
Systems Science Collaborative

Status: January 2017

**PROJECT OVERVIEW**

How do we know whether adaptation to climate variability and change is working, and whether the adaptive actions taken are good, useful, and effective? For how long, and to whom, does adaptation "work"? And because the adaptive benefits of climate change adaptation may not be apparent for many years and environmental conditions continue to change, how do we assess progress? This project aims to assist the National Exposure Research Reserve System and the institutions they serve to address these challenging questions.

In the face of escalating impacts from climate change, the question of adaptation success is increasingly a practical and moral imperative. Policymakers and decision-makers at the local (and the state/provincial) level need a proven, rigorous, and transparent system to assess the long-term utility, progress, equity, and sustainability of their investments. Yet, the science of climate adaptation is still in its infancy.

Using highly innovative approaches to track a tailored process to each site, the project seeks to: a) synthesize science with individual realities and their stakeholders to explore (1) what adaptation a society means in different locations; (2) what the relevant measures are that need to be considered in evaluating success; and (3) how a participatory approach can be used to track progress toward a common vision and assist local managers to succeed in providing the various valuable societal benefits, not only and beyond the immediate to the face of climate change, sought gained from each effort and then compared and shared among the sites for larger lessons.

*"If we want resiliency, we need to decide together what's important to us."*  
*(Indigenous Participation Action 2012)*

**OBJECTIVES OF THE SAIM PROJECT**

- OVERARCHING HERRS FOCUSED OBJECTIVE: HELP RESERVE S**
  - Define "success" for each site's progress
  - Develop world, impactful indicators and metrics to track progress (using adaptation pathways)
  - Learn from other reserves (using a multi-site, living/advice approach)
- OVERARCHING BROADER OBJECTIVE: CONTRIBUTE TO SCIENTIFIC AND POLICY DEBATES**
  - Share lessons with regional partners, other reserves, coastal residents and managers faced with similar challenges
  - Contribute to national indicators systems

Environmental Science & Policy

Journal of Environmental Science & Policy

Volume 61, Part B, October 2016, Pages 100–110

### Evaluation that counts: A review of climate change adaptation indicators & metrics using lessons from effective evaluation and science-practice interaction

James C. Arnot<sup>a,\*</sup>, Susanna C. Moser<sup>b,c</sup>, Kirsten A. Goodrich<sup>d</sup>

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**ARTICLE INFO**

**ABSTRACT**

Local planning efforts to meet climate change adaptation needs require a range of indicators and metrics (I&M) to evaluate adaptation progress. This article reviews the existing literature on I&M for climate change adaptation, and identifies key lessons for practice. The authors argue that I&M should be used to track progress, not to evaluate success. The authors argue that I&M should be used to track progress, not to evaluate success. The authors argue that I&M should be used to track progress, not to evaluate success.

**1. Introduction**

Climate change adaptation (hereafter simply "adaptation") is a process of adjusting to the actual or expected climate change and its effects. It is a process of adjusting to the actual or expected climate change and its effects. It is a process of adjusting to the actual or expected climate change and its effects.

Arnot, Moser, & Goodrich 2016  
Environmental Science & Policy

The basics... some theory ..... A practice-driven framework ..... Learning how to develop I&M ..... What are "good" indicators?...

# Thank you!



For additional comments, thoughts, questions, please contact me at:

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