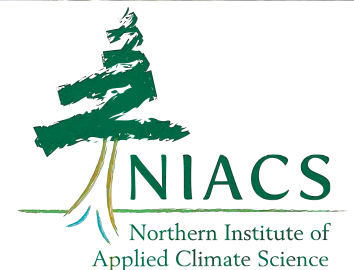


# Climate Change Adaptation & Durango's Community Forest Workshop

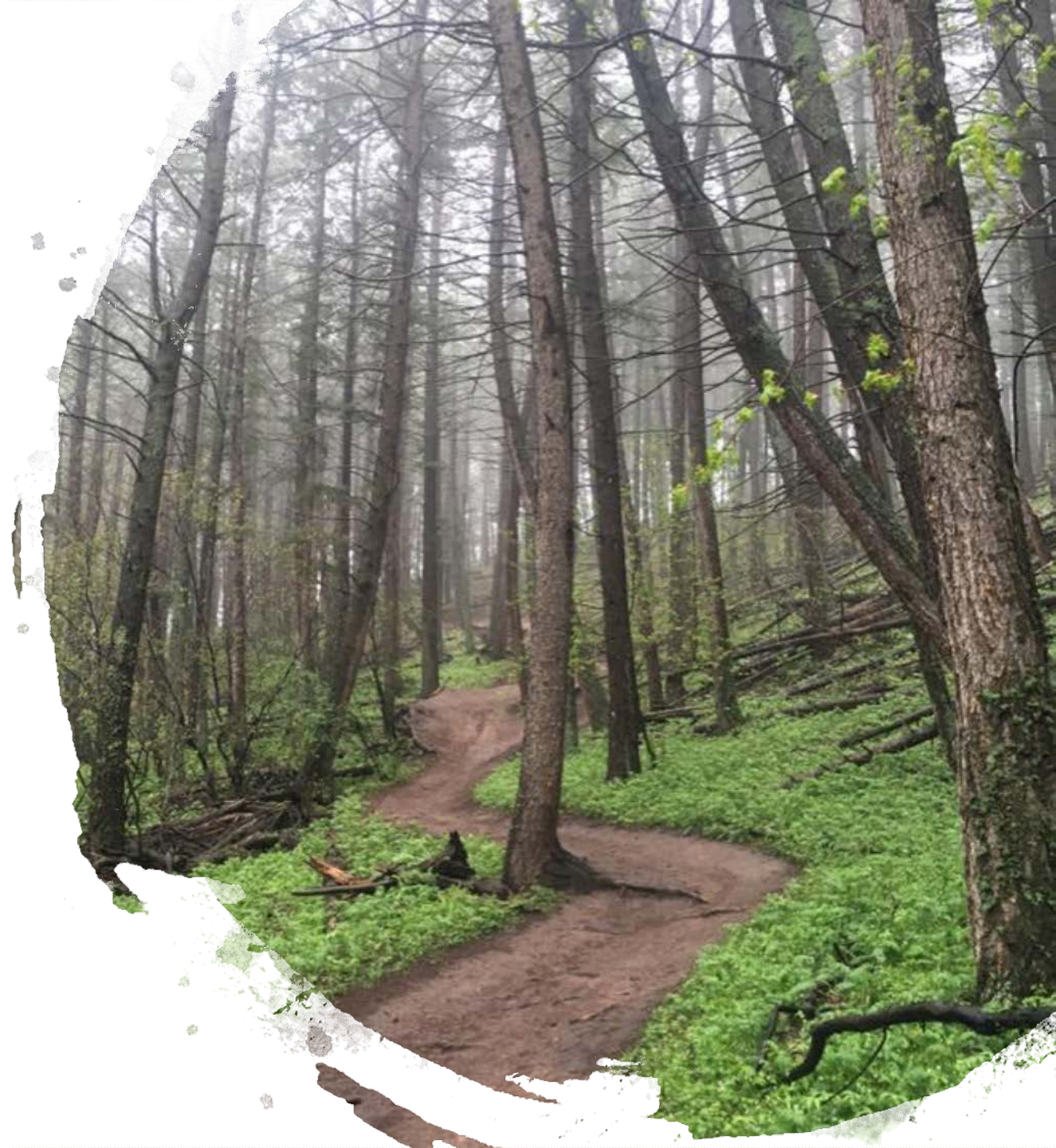
December 2, 2019

Durango Public Library, Durango, CO



# Workshop Goals

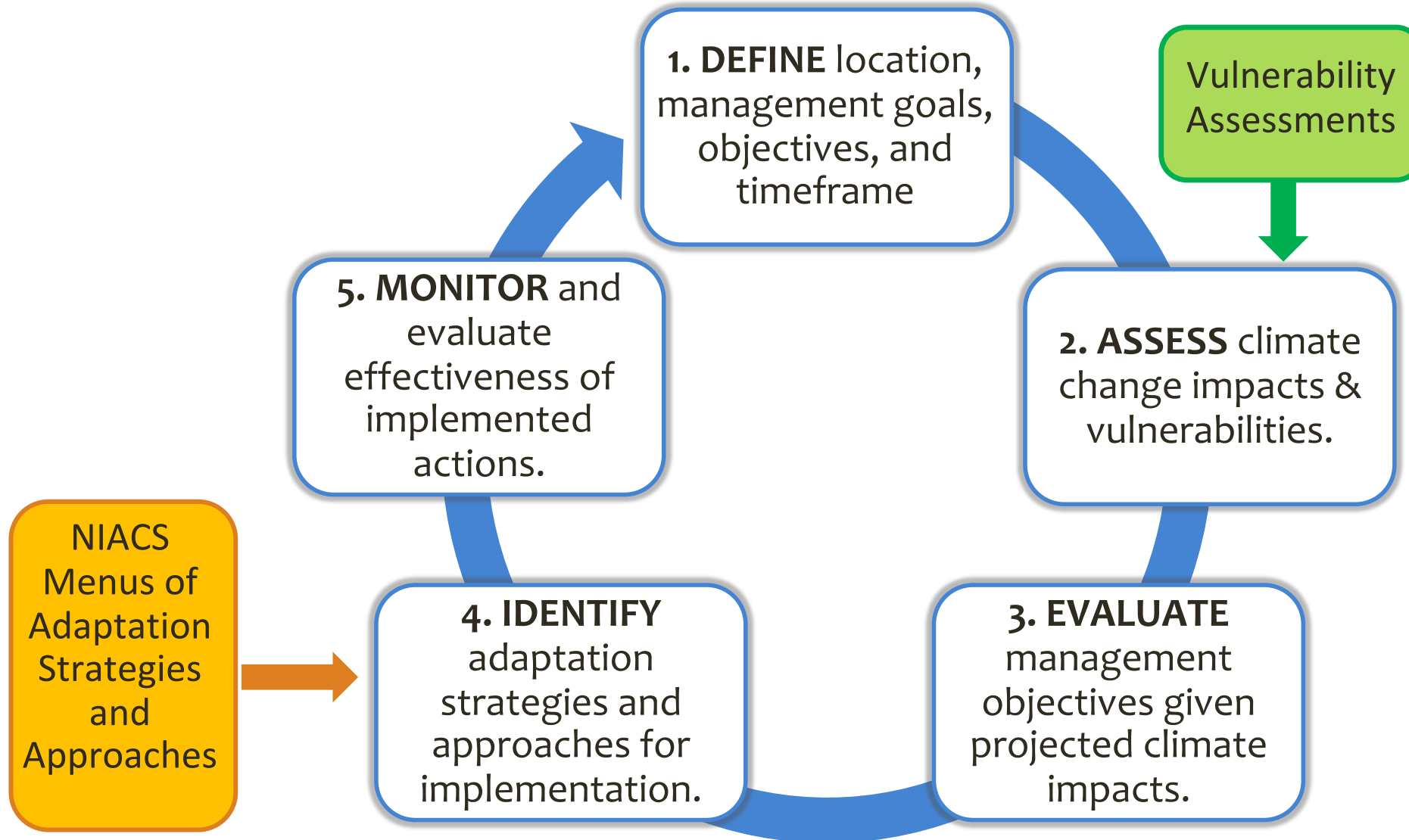
- Identify current and anticipated effects of climate change on the City of Durango Community Forests;
- Describe resources and tools that can be used to integrate climate change into management;
- Outline adaptation concepts and strategies in the context of sustainable forest management; and
- Identify actions that enhance the ability of forests and other ecosystems to adapt to changing conditions.



# Agenda Overview

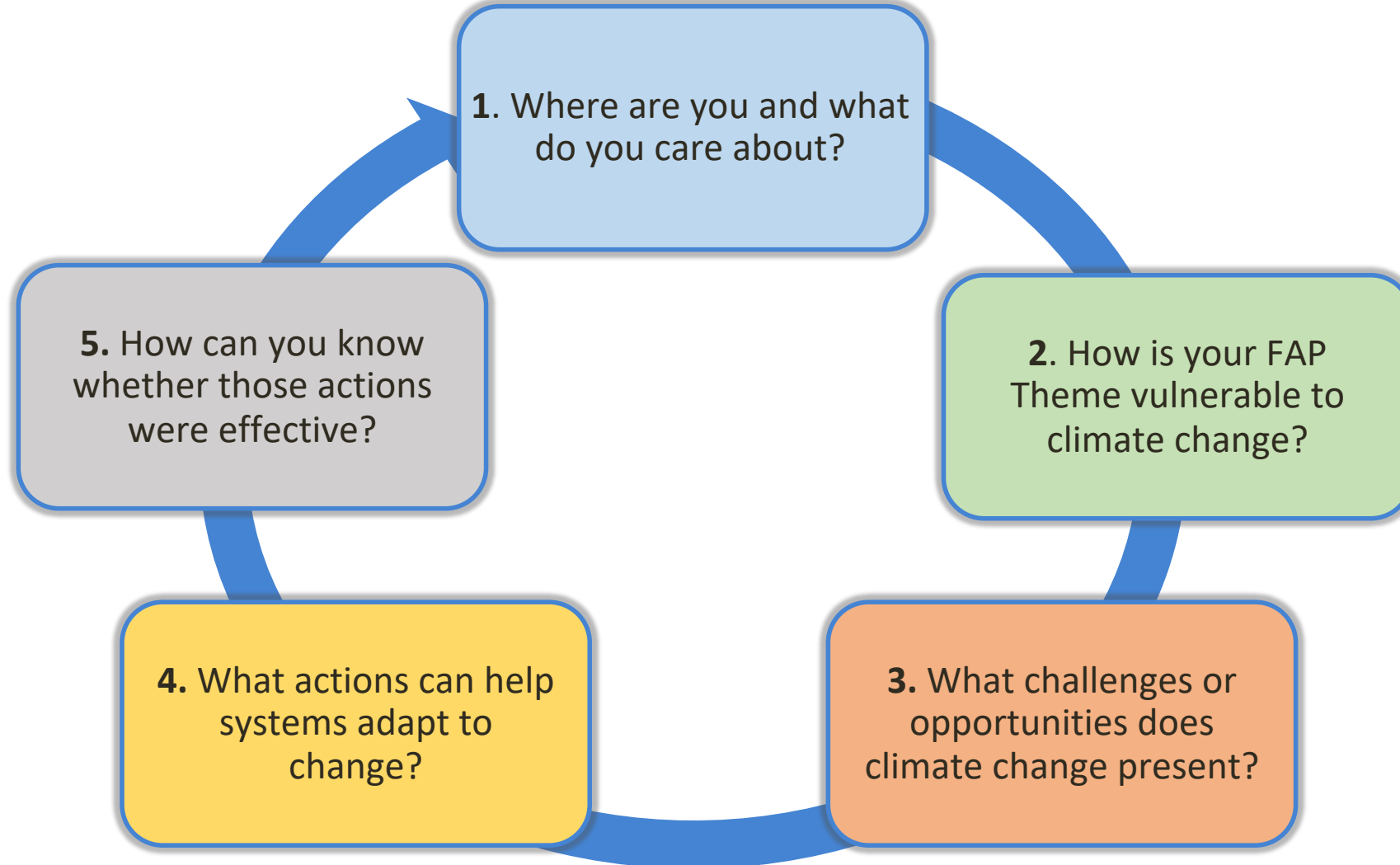
8:15	<b>Welcome, Purpose, &amp; Introductions:</b> Imogen Ainsworth	12:15	<b>Lunch</b> (Taco Bar from Zia Taqueria)
8:40	<b>Presentation on Durango's Community Forest Management Plan:</b> Scott McClain & Greg Sykes,	12:55	<b>Identifying Forest Adaptation Approaches and Tactics:</b> Courtney Peterson
9:00	<b>Regional and Local Climate Change Impacts on Vulnerabilities for Durango's Community Forests:</b> Emile Elias	1:15	<b>Identifying Forest Adaptation Approaches and Tactics</b>
9:15	<b>Tree Genetics and Climate Change Adaptation; and the Seedlot Selection Tool:</b> Andrew Bower	2:15	<b>Break</b>
9:45	<b>Climate Ready Trees for Albuquerque's Urban Forest:</b> Sarah Hurteau	2:30	<b>Identifying Metrics for Monitoring and Evaluating Effectiveness</b>
10:15	<b>Break</b>	3:00	<b>Telling Your Adaptation Story</b>
10:30	<b>Climate Change Impacts on Durango's Community Forests</b>	3:45	<b>Group Presentations on Climate Change Impacts and Adaptation Strategies</b>
11:05	<b>Adaptive Capacity &amp; Vulnerability of Durango's Community Forests</b>	4:15	<b>Next Steps/Putting it All Together</b>
11:50	<b>Challenges/Opportunities for Meeting Management Objectives</b>	4:45	<b>Evaluations &amp; Wrap-up</b>
		5:00	<b>Adjourn</b>

# Adaptation Workbook Process



## Deciphered

# Adaptation Workbook



# Adaptation Workbook

Structured process to identify adaptation actions

Step 1

Forest Action Plan Theme	Forest Type(s)/Key Species	Management Goals	Management Objectives	Time Frames

Step 4

Adaptation Actions			Benefits	Drawbacks/Barriers	Recommend Tactic?
Strategy/Approach (From Chapter 3)	Tactic	Time Frame			

Worksheets!

Worksheets!

Worksheets!

Worksheets!

# Intentionality

- Explicitly consider and address climate change
- Sure we might get lucky...
- Intentionally assessing risk and vulnerabilities **makes our plans more robust!**



## **Step 1:** DEFINE location, project, and time frames.

### **Key Question:**

- Where are you working?
- What are your desired future conditions, management goals, and objectives for this area?
- What is the timeframe?

# Selected Community Forest Management Plan goals & objectives:

- Maintain the character of Durango's urban forest
- Build diversity and resilience into Durango's urban forest
- Expand and strengthen the urban forest to help mitigate the impacts of increasing temperatures and extreme precipitation events
- Establish adaptive management strategies for uncertain future conditions
- Conserve water and reduce future maintenance costs
- Reduce costs associated with lost trees in future climate scenarios
  
- Increase species and age diversity to provide long-term community forest health
- Increase tree and shrub plantings on City and non-City public lands
- Develop landscape restoration and revegetation plans for open space or natural land City properties
- Provide sufficient tree planting to keep pace with community growth and offset tree removal
- Increase the proportion of large statured trees in the community forest for greater canopy effect and emphasize species that will become large, mature trees where appropriate
- Address protection and preservation of current trees
- Establish measurable goals such as plantings per year and plantings versus removals and develop a system to measure the percent of canopy cover for green infrastructure



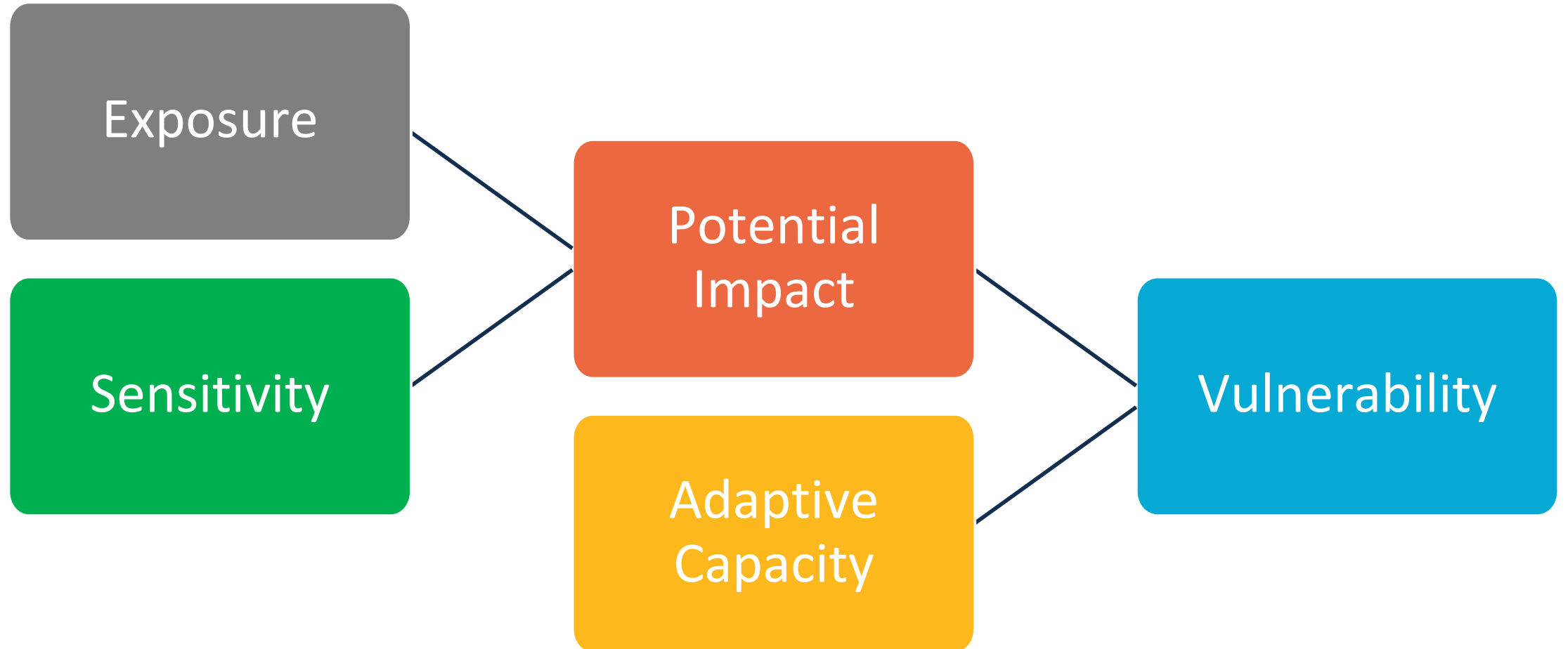
**Step 2**: ASSESS climate change impacts & vulnerabilities

**Step 2:** ASSESS site-specific climate change impacts and vulnerabilities.

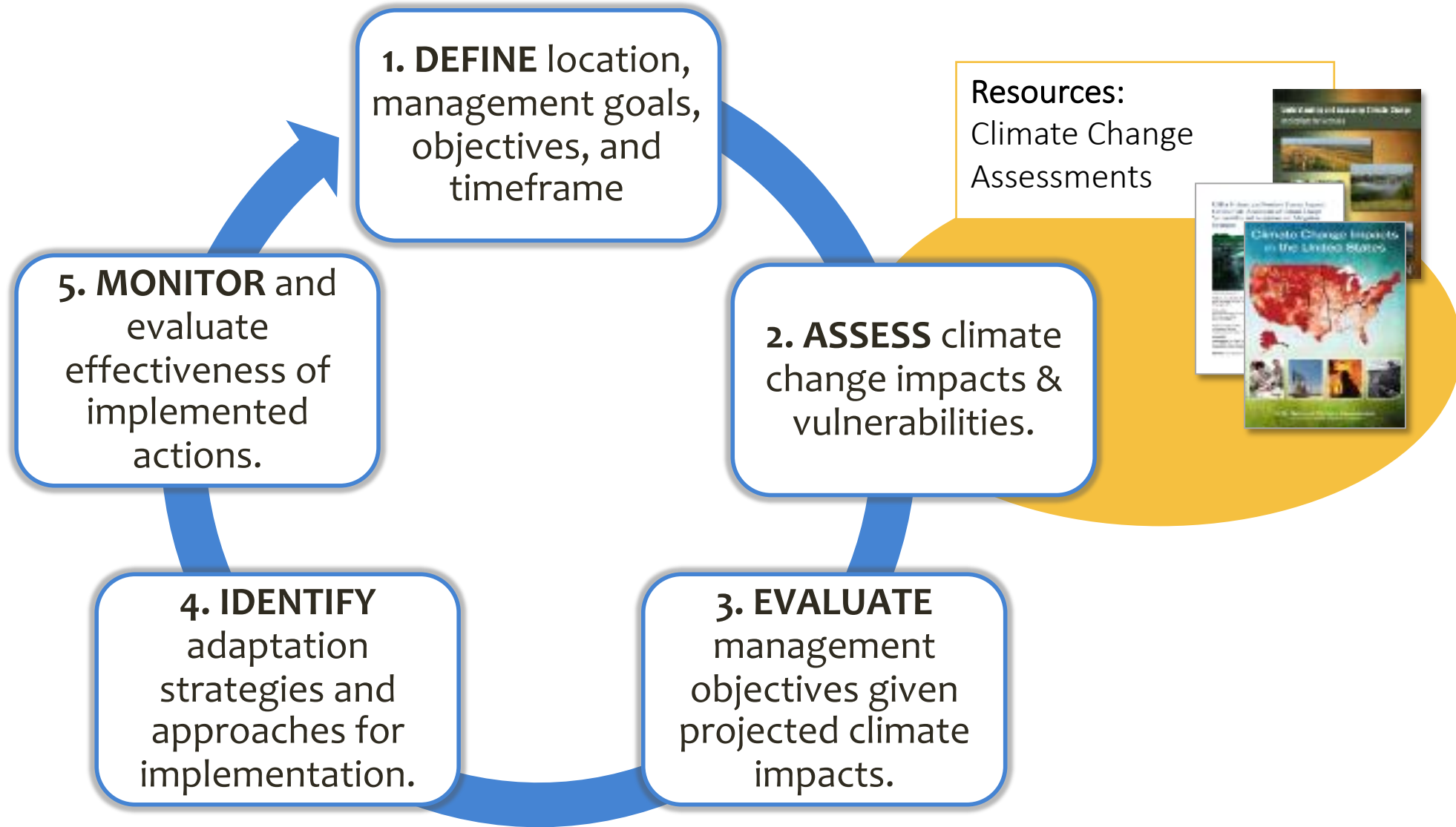
**Key Question:**

- How might the area be uniquely affected by climatic change and subsequent impacts?
- How might regional impacts be different in the project area?

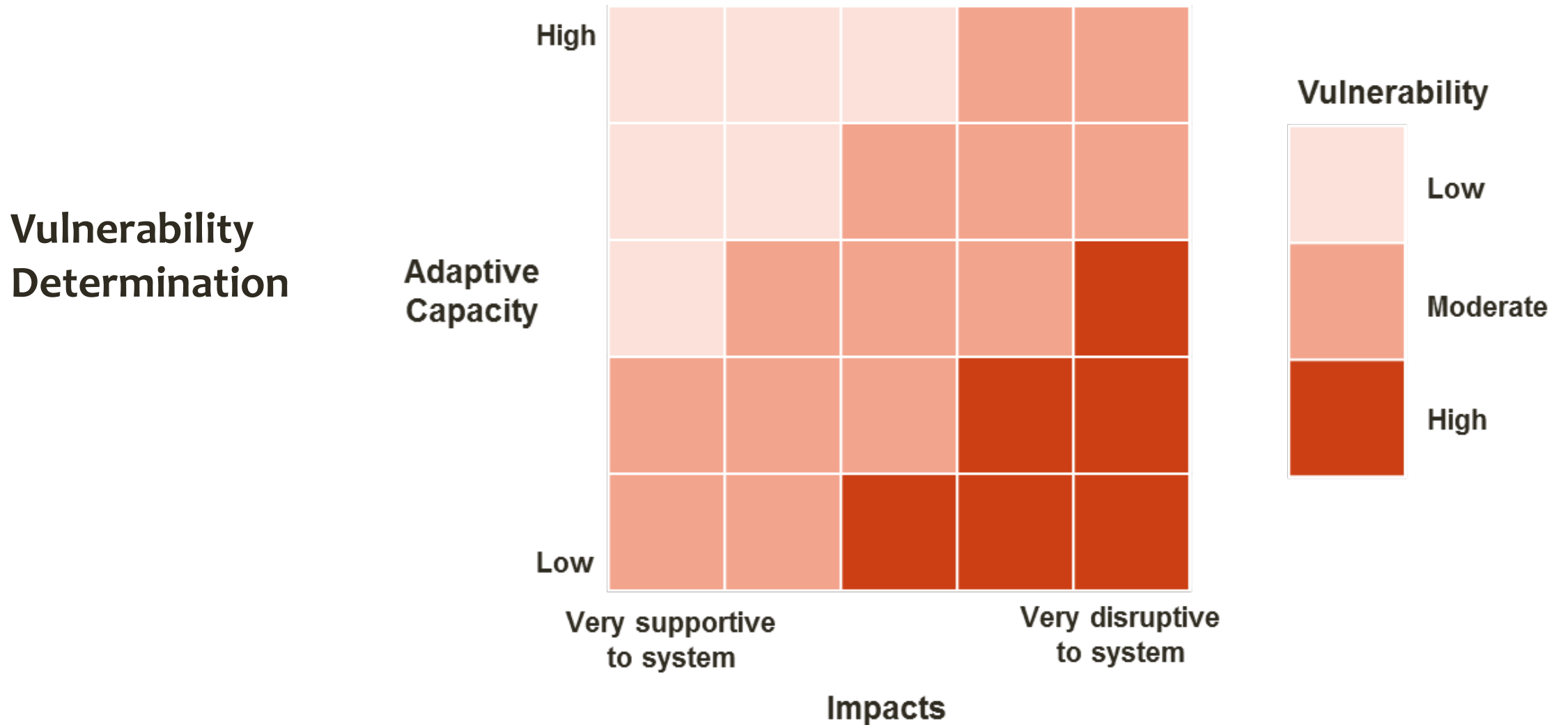
# Vulnerability of Ecosystems

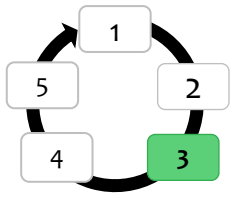


# Workbook Cycle: Step 2

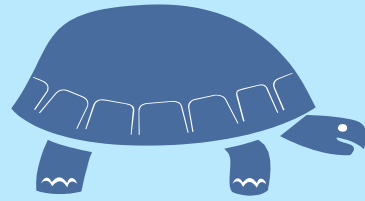


## Step 2: ASSESS site-specific climate change impacts and vulnerabilities.





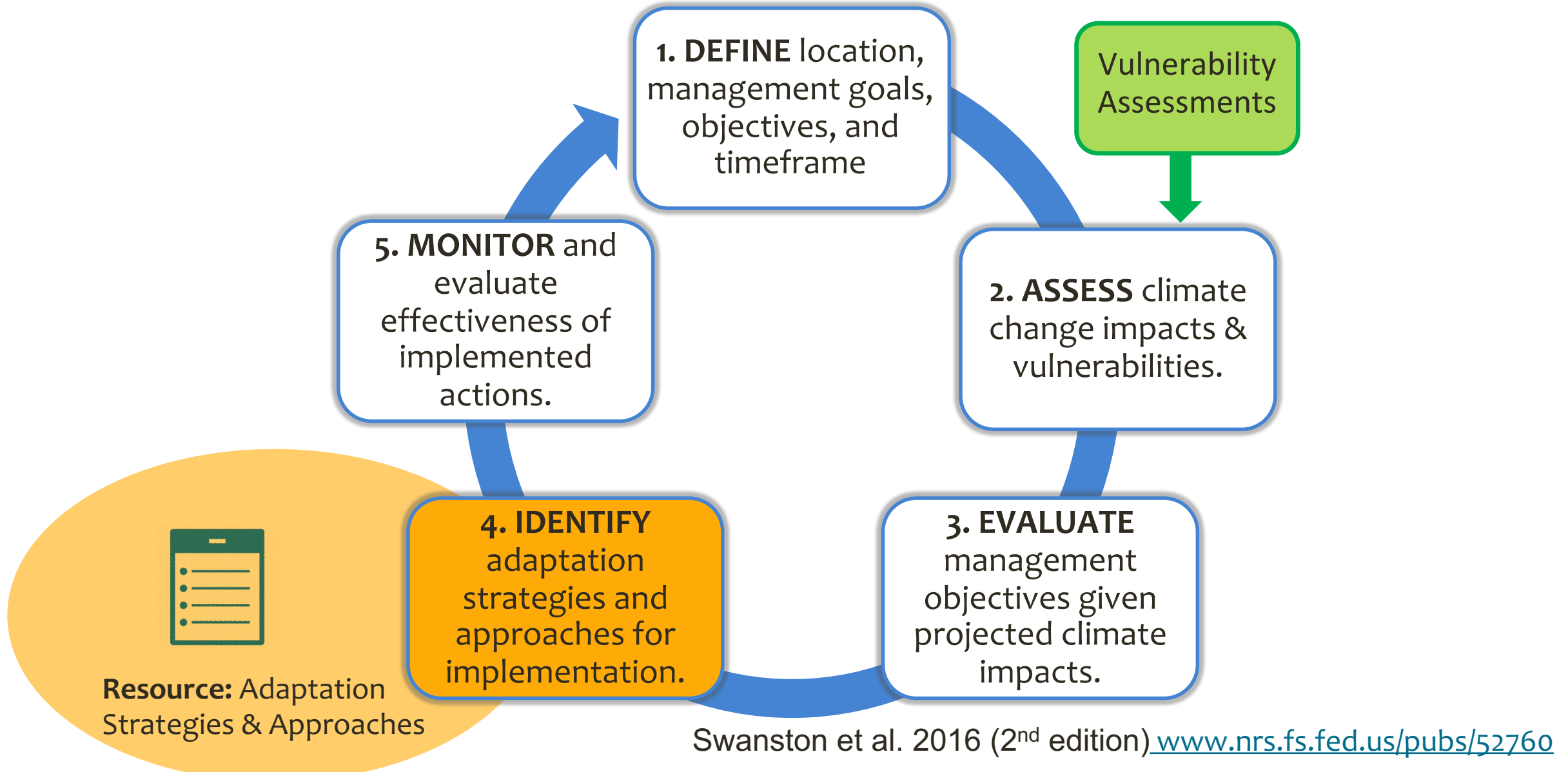
**Step 3:** EVALUATE management goals given projected impacts and vulnerabilities.

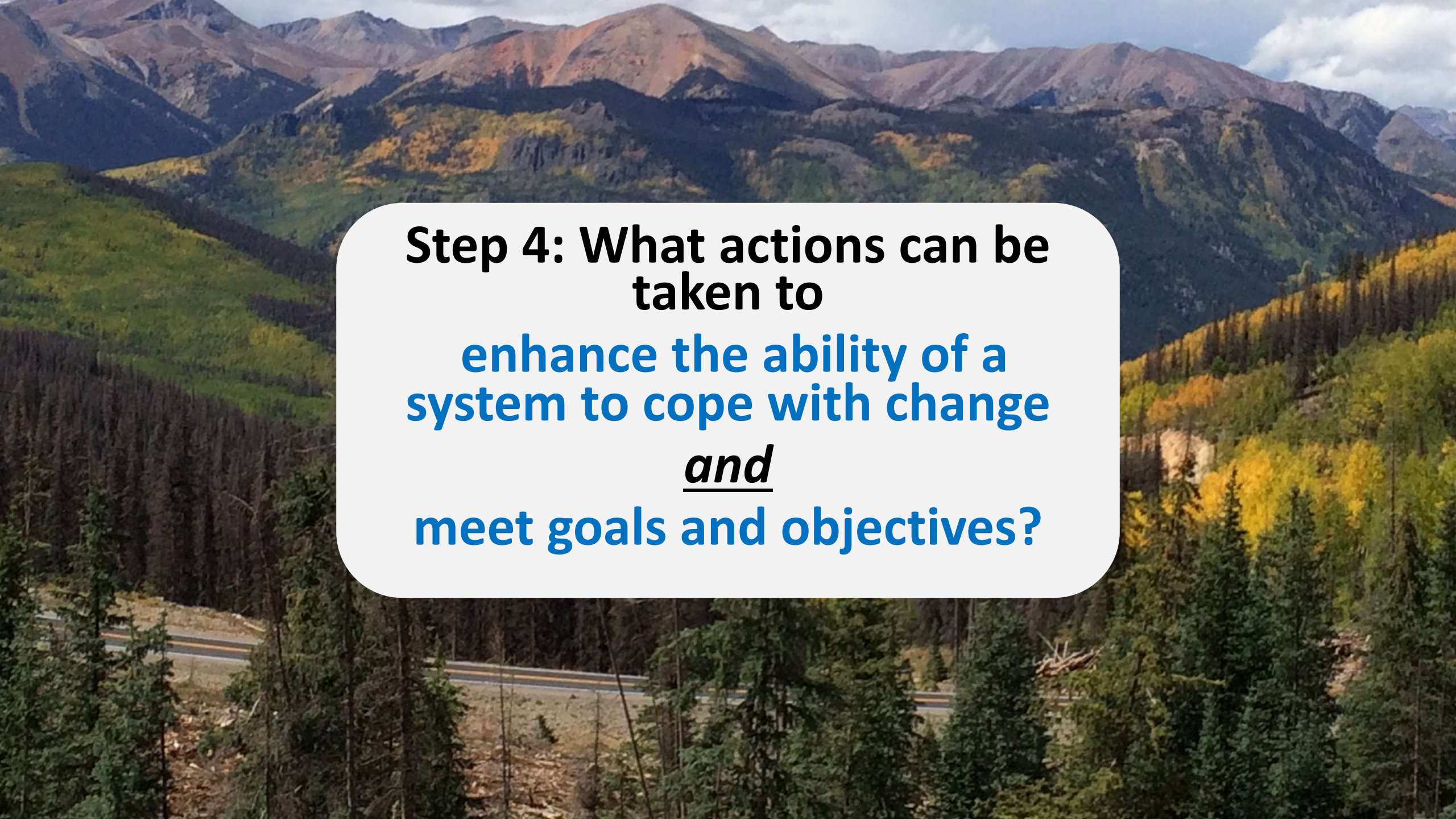


**Slow down!**

*Are you going to continue with the management goals and objectives that you have identified?*

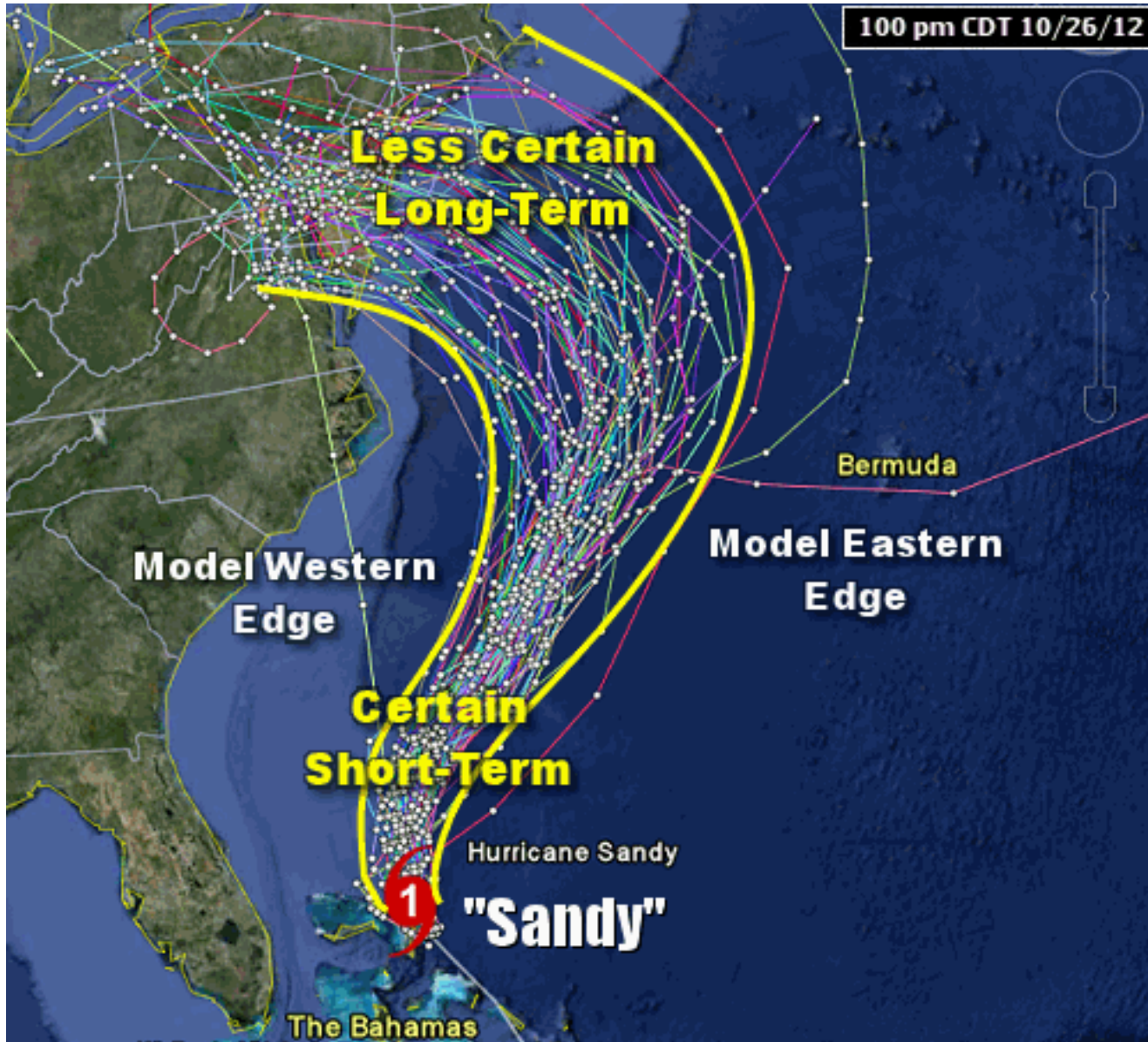
# Adaptation Workbook Process



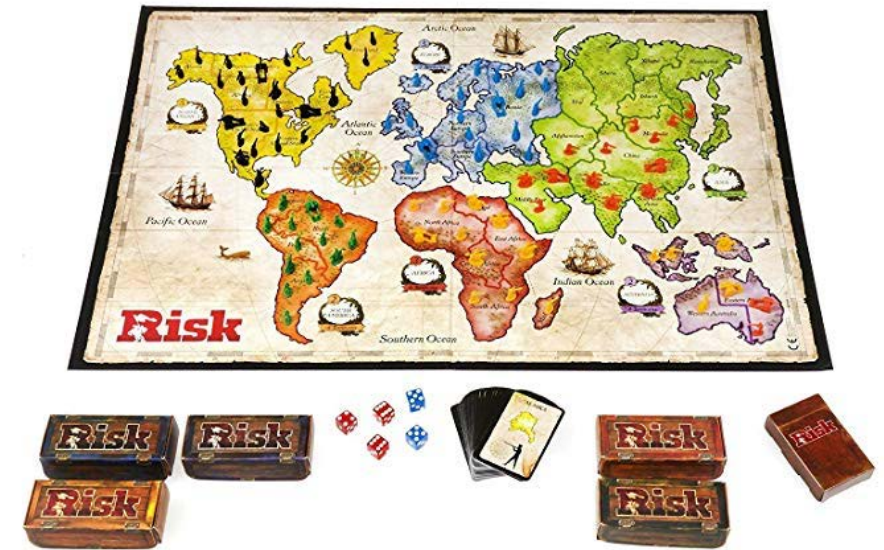


**Step 4: What actions can be taken to**  
**enhance the ability of a system to cope with change**  
***and***  
**meet goals and objectives?**

# We already deal with uncertainty!

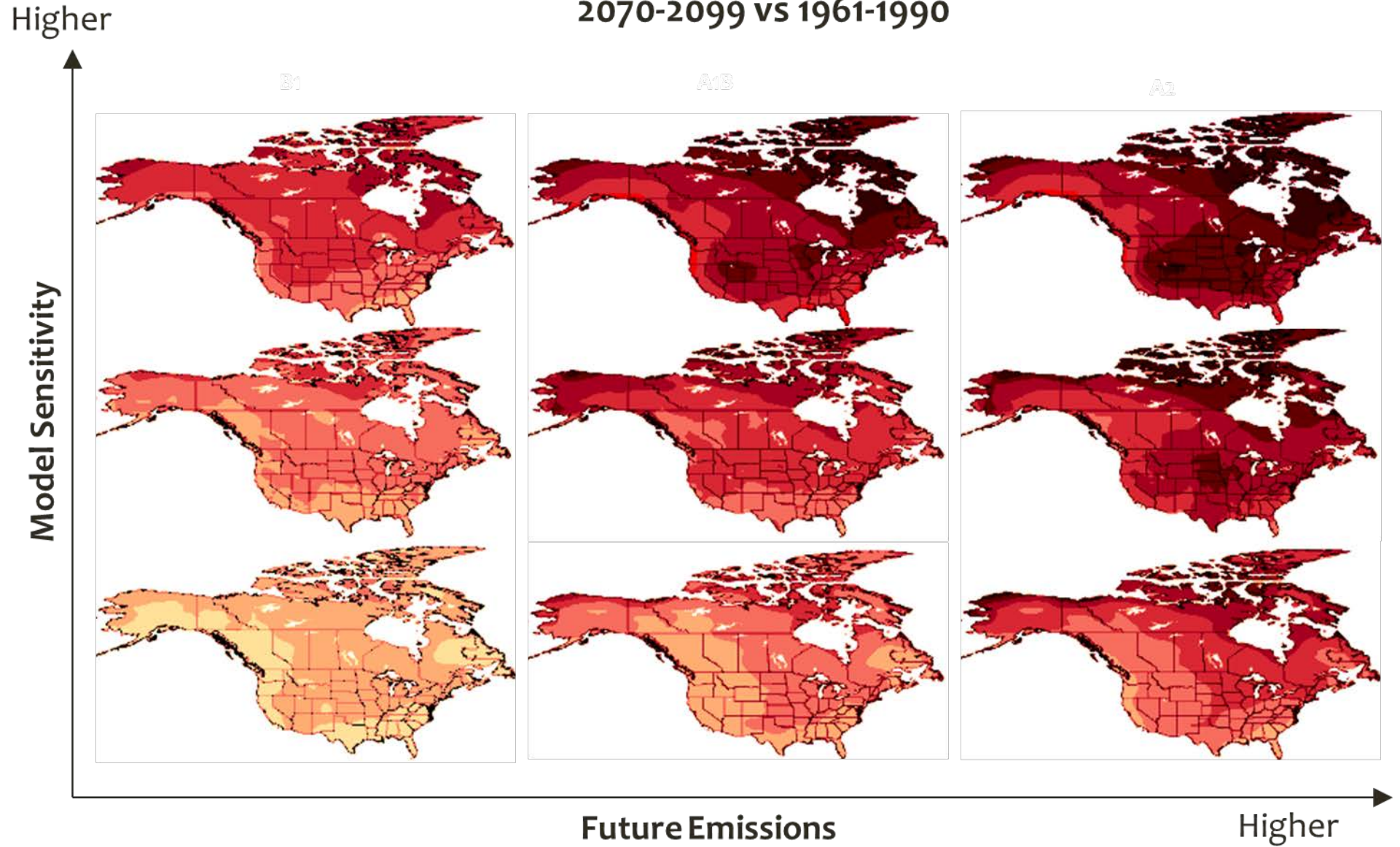


What is your risk tolerance?



# “Plausible climate futures”

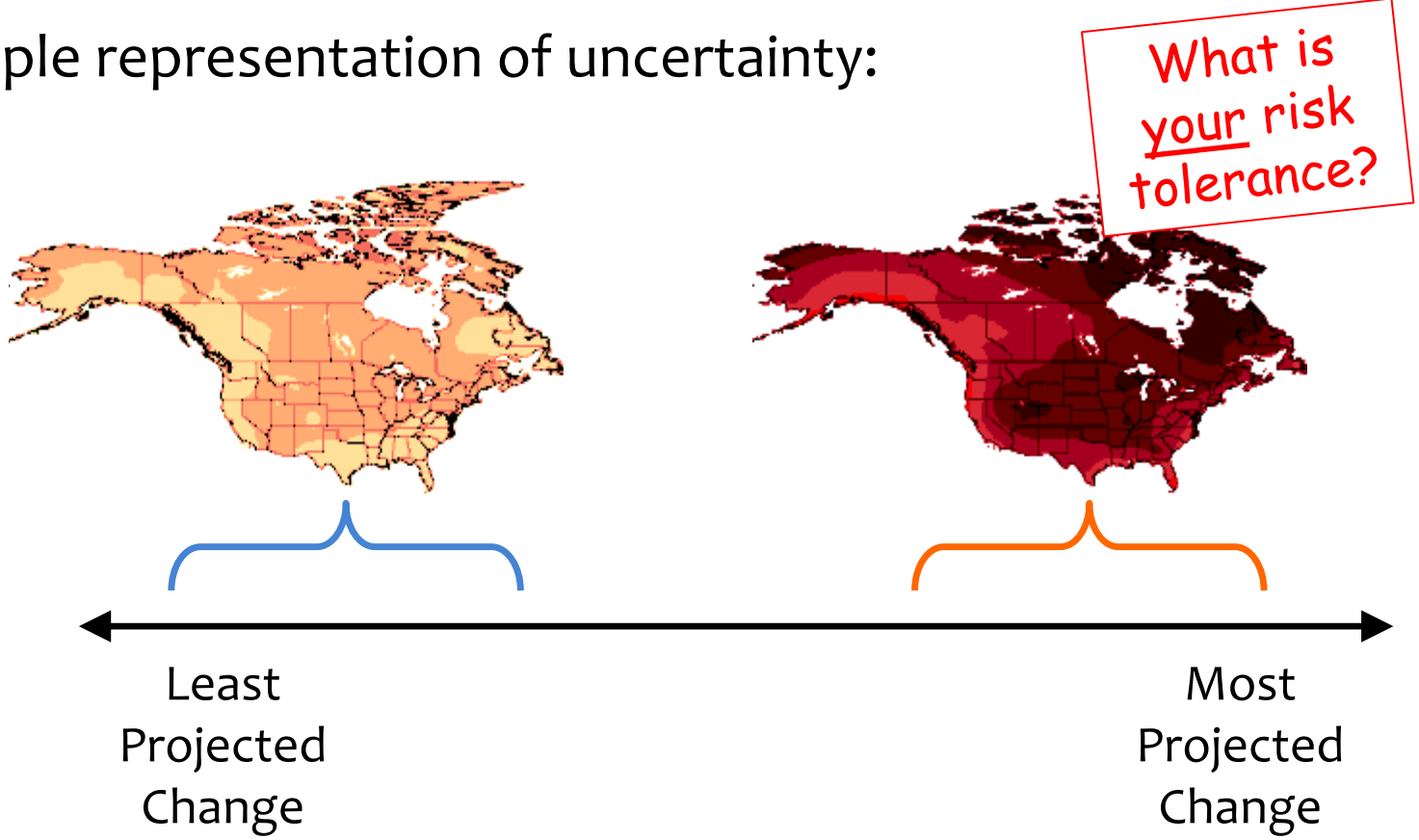
Change in Mean Monthly Temperature (° C)  
2070-2099 vs 1961-1990



# Uncertainty & Climate Scenarios

Certainty is a myth.  
Embrace uncertainty and manage risk.

Simple representation of uncertainty:



# KEY DEFINITIONS (SAF DICTIONARY OF FORESTRY, 2018)

- **Management Goal** = a broad, general statement, usually not quantifiable, that expresses a desired state or process to be achieved
  - \*note normally, a management **goal** is stated in terms of purpose, often not attainable in the short term, and provides the context for more specific **objectives**
- **Management Objectives:** a concise, time-specific statement of measurable planned results that correspond to pre-established goals in achieving a desired outcome
  - \*note – an **objective** commonly includes information on resources to be used, forms the basis for further planning to define the precise steps to be taken and the resources to be used and assigned responsibly in achieving the identified **goals**

# KEY DEFINITIONS (SAF DICTIONARY OF FORESTRY, 2018)

- **Desired Future Condition (DFC):** a description of the land or resource conditions that are believed necessary if *goals* and *objectives* are fully achieved
- **Prescription** = a set of management *practices* and intensities scheduled for application on a specific area to satisfy *multiple uses* or other *goals* and *objective*
- **Practice** = a specific activity, measure, course of action, or treatment undertaken on a forest ownership
- **Practice = Tactic**

# Adaptation Options

## Manage for Persistence

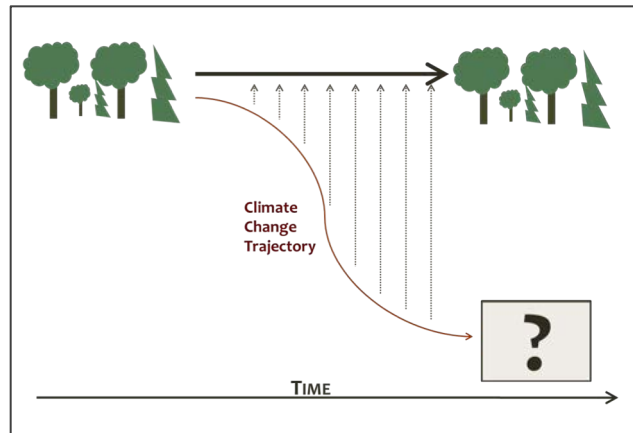
Ecosystems are still recognizable as being the same system (character)

## Manage for Change

Ecosystems have fundamentally changed to something different

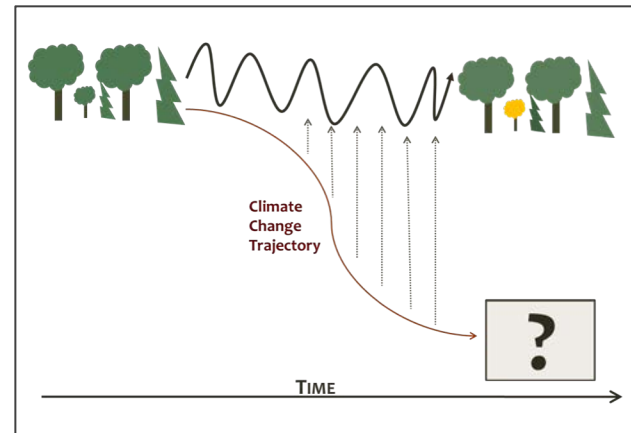


### RESISTANCE



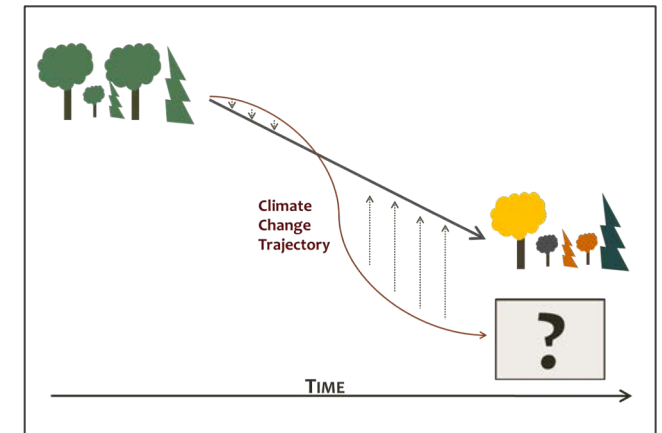
- Improve defenses of forest against change
- Maintain relatively unchanged conditions

### RESILIENCE



- Accommodate some degree of change
- Return to prior condition after disturbance

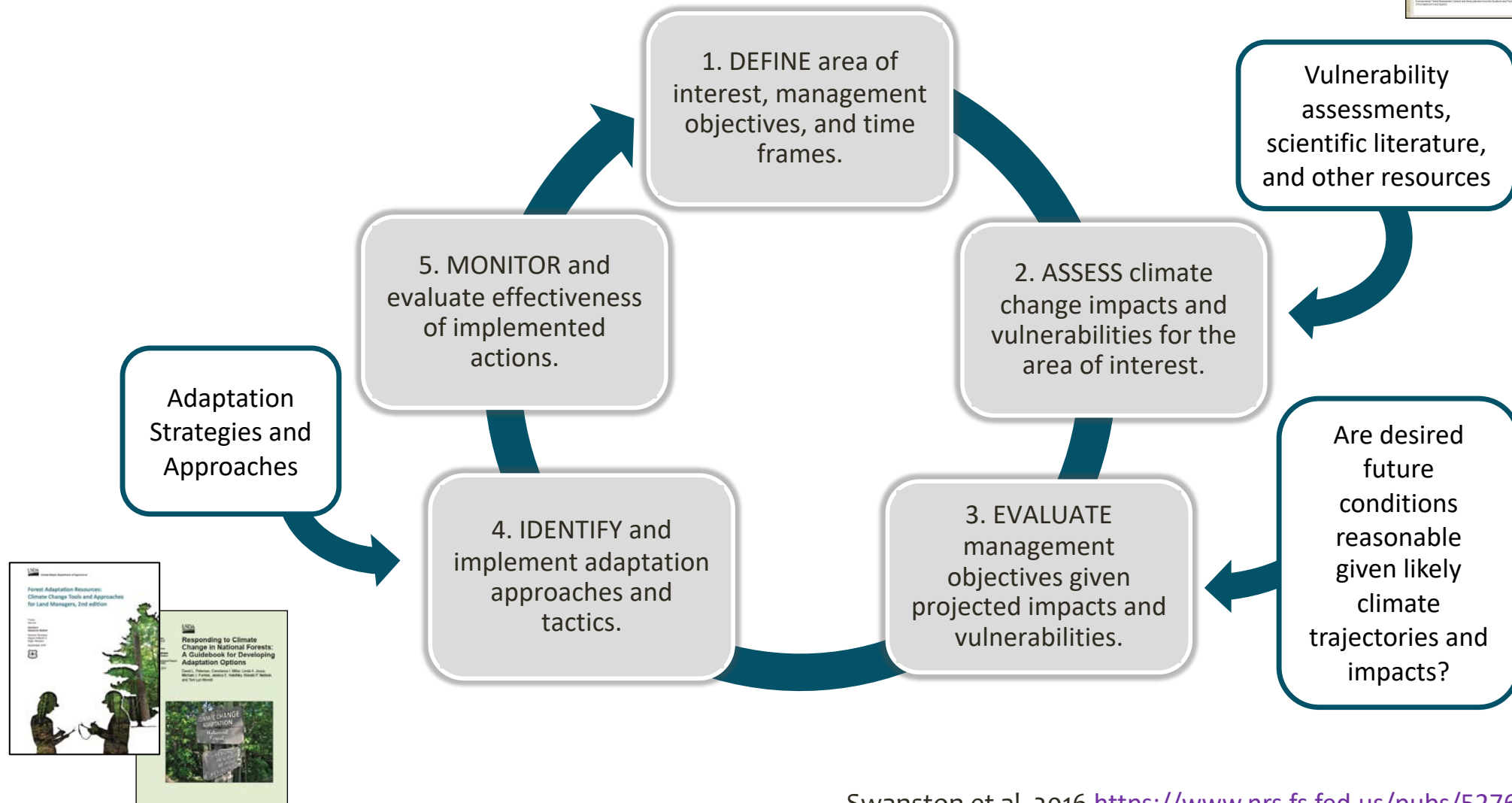
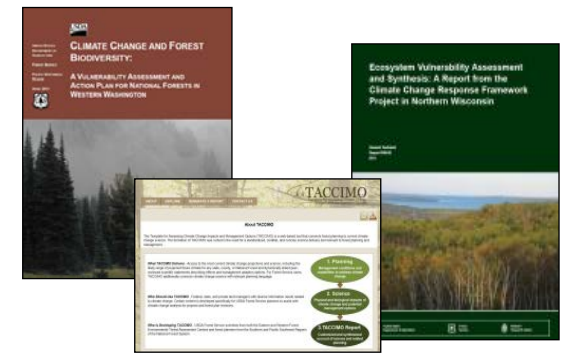
### TRANSITION



- Facilitate change
- Enable ecosystem to respond to new and changing conditions

# Identifying Adaptation Tactics

## Forest Adaptation Resources: Climate Change Tools & Approaches for Land Managers



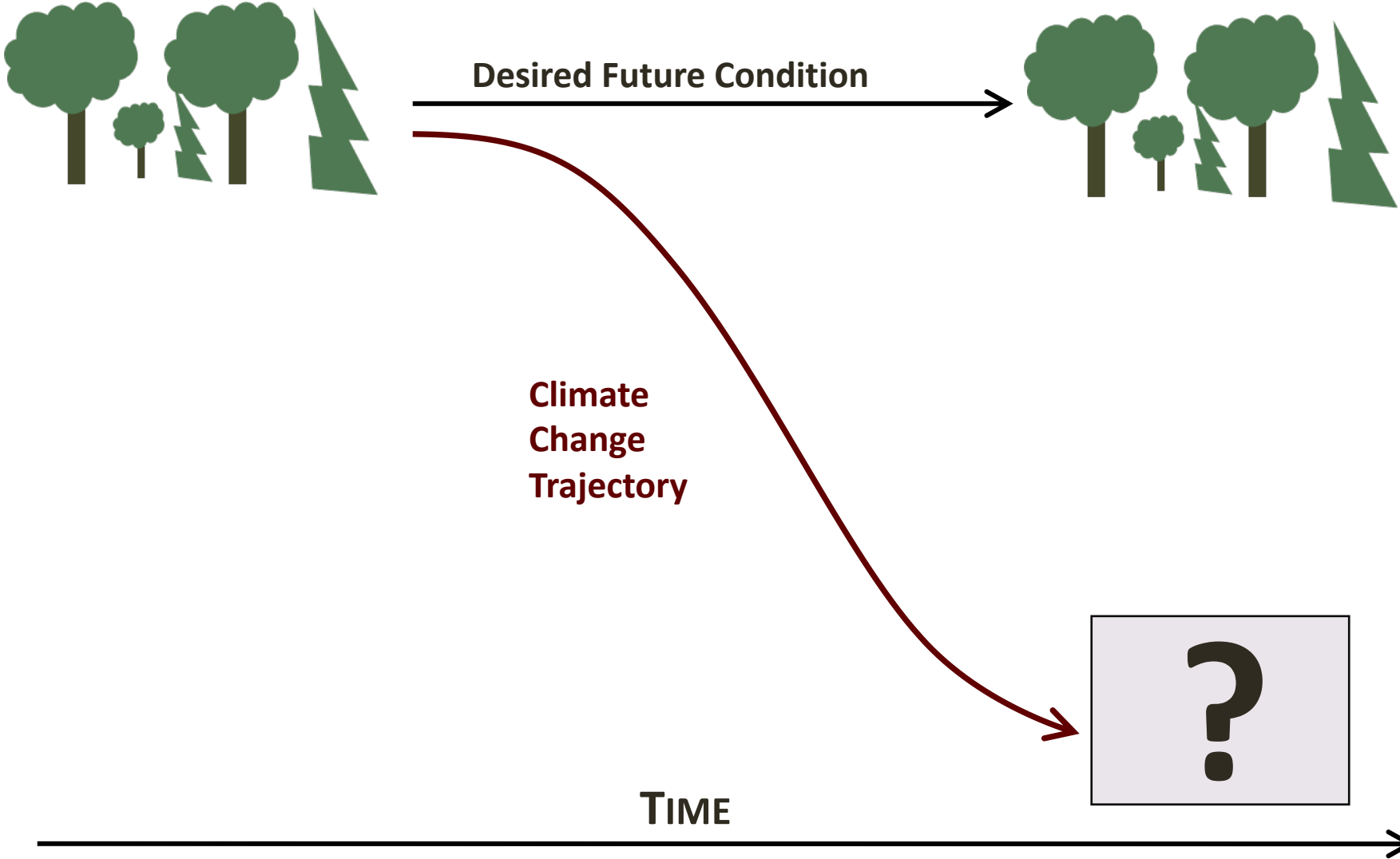
**Adaptation** - the adjustment of systems in response to climate change.



Ecosystem-based adaptation activities build on **sustainable management, conservation, and restoration.**

- What do you **value**?
- How much **risk** are you willing to tolerate?

# Climate-Driven Changes



# Adaptation Options

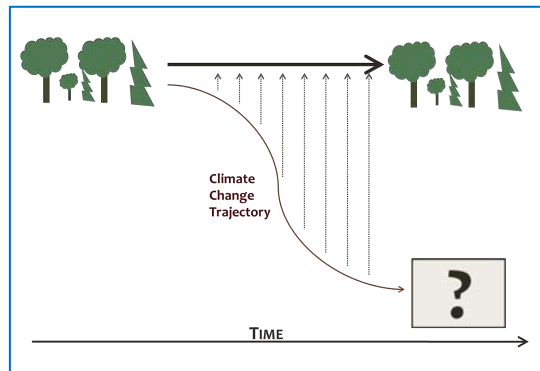
## Manage for Persistence:

Ecosystems are still recognizable as being the same system (character)

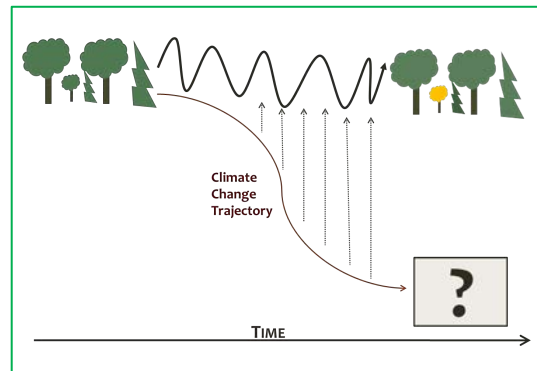
## Manage for Change:

Ecosystems have fundamentally changed to something different

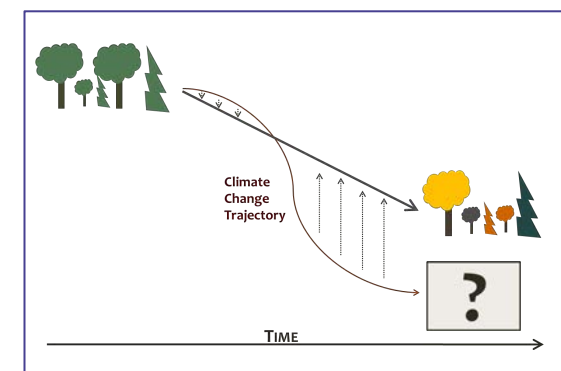
### RESISTANCE



### RESILIENCE



### TRANSITION



Reduce impacts/ Maintain current conditions

Forward-looking/ Promote change



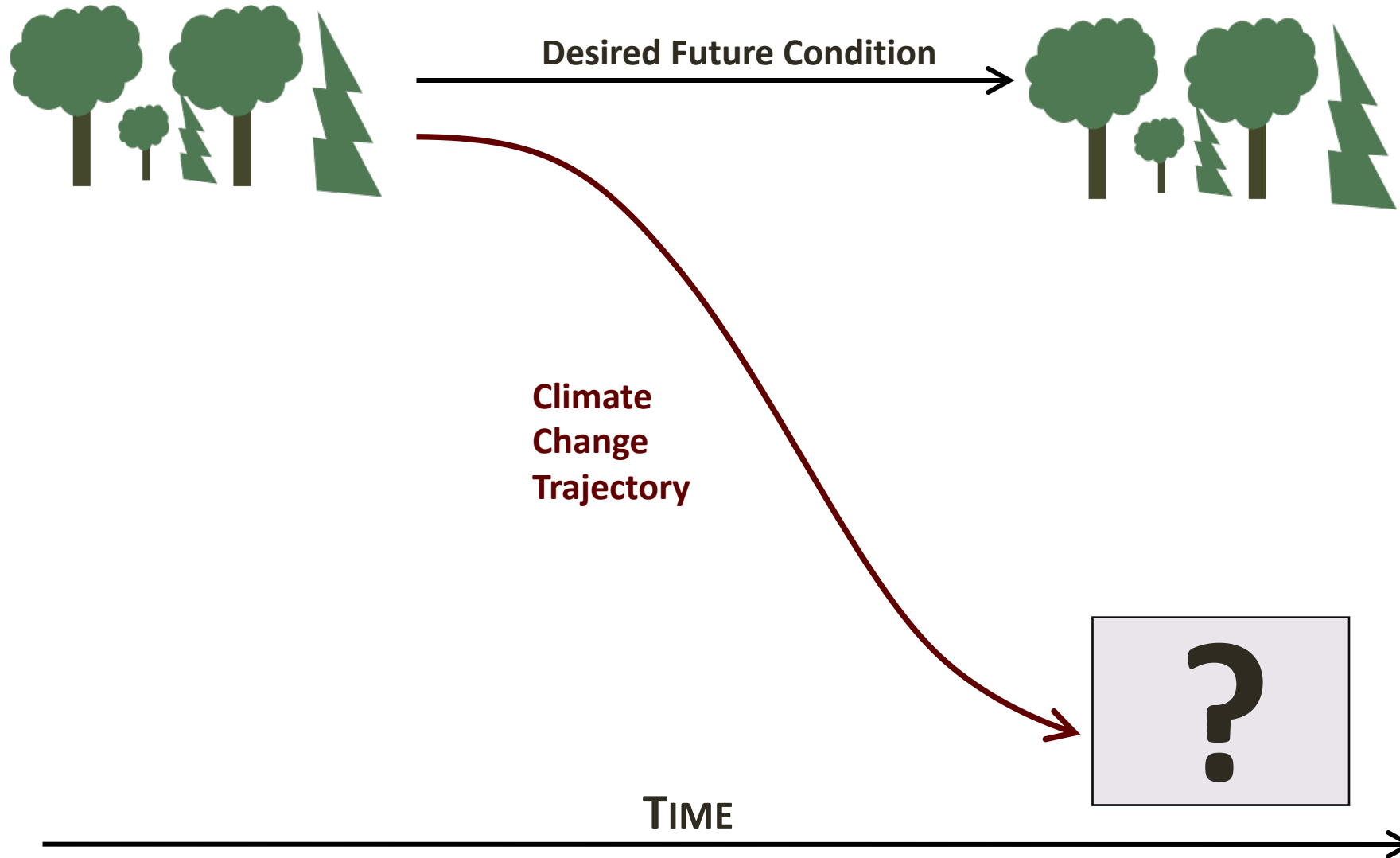
# Option #1: Resistance

Improve the defenses of the forest against anticipated changes or directly defend the forest against disturbance in order to maintain relatively unchanged conditions

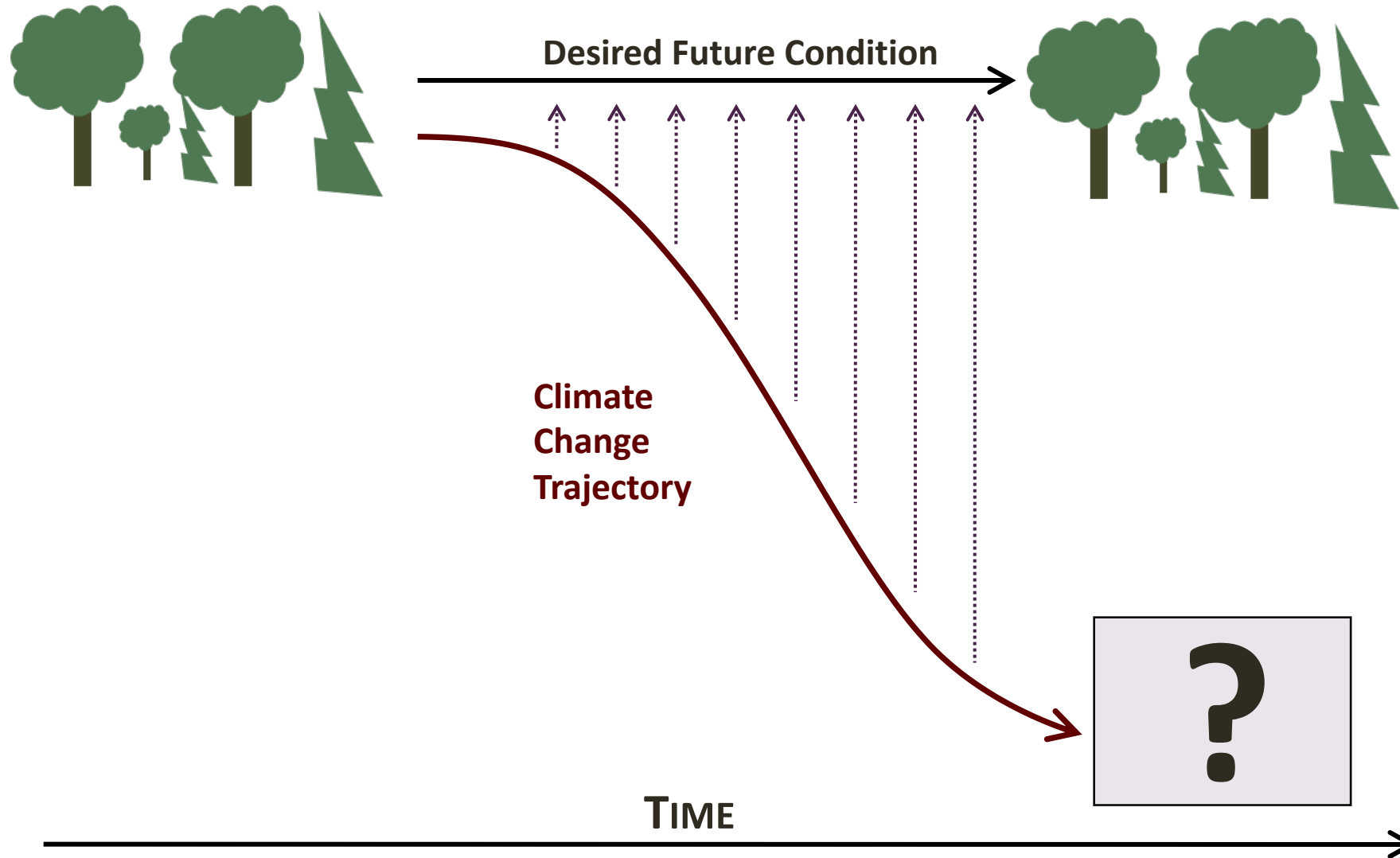
- Short-term
- High-value



# Option #1: Resistance



# Option #1: Resistance

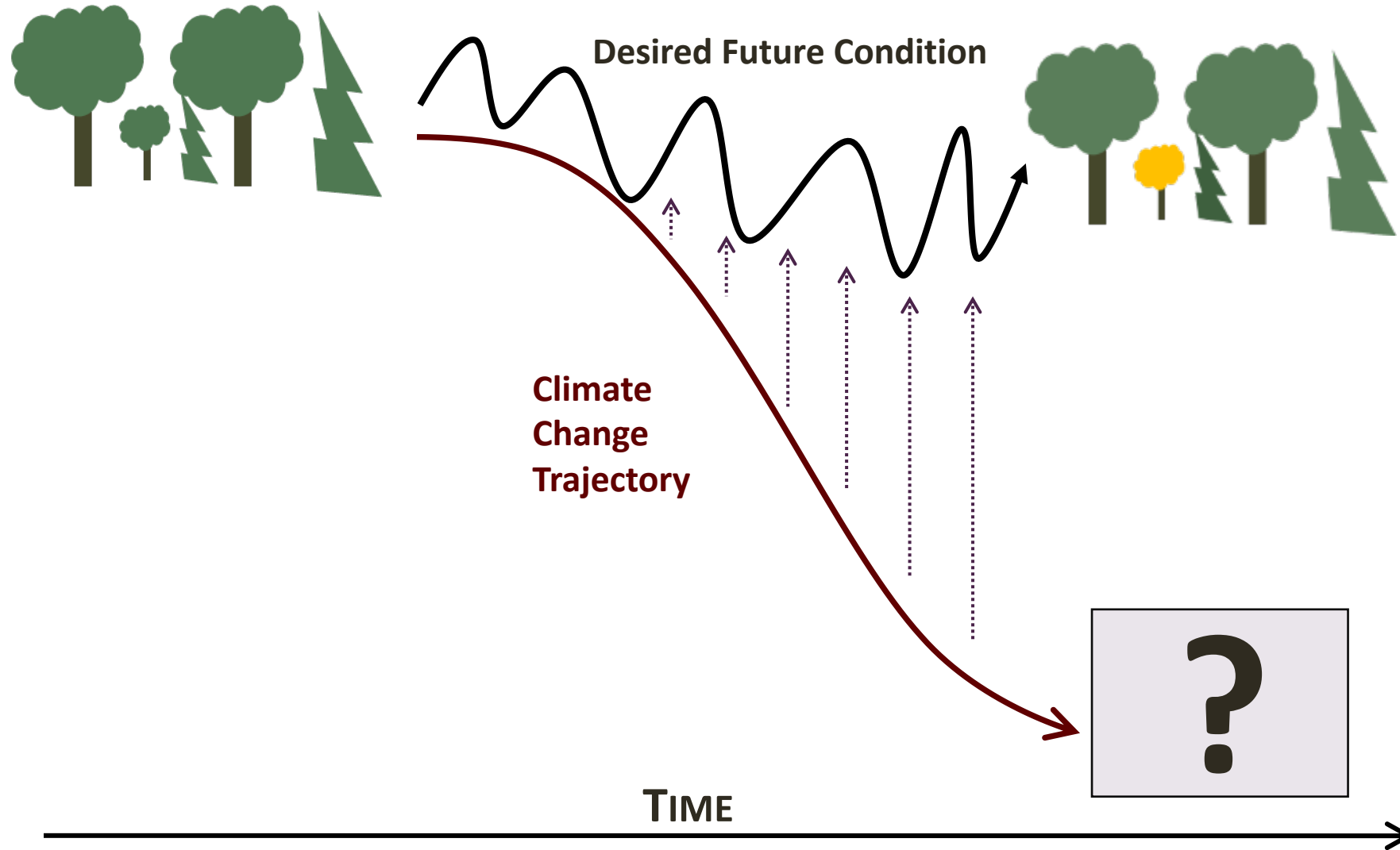


# Option #2: Resilience

Accommodate some degree of change, but encourage a return to a prior condition after disturbance



# Option #2: Resilience

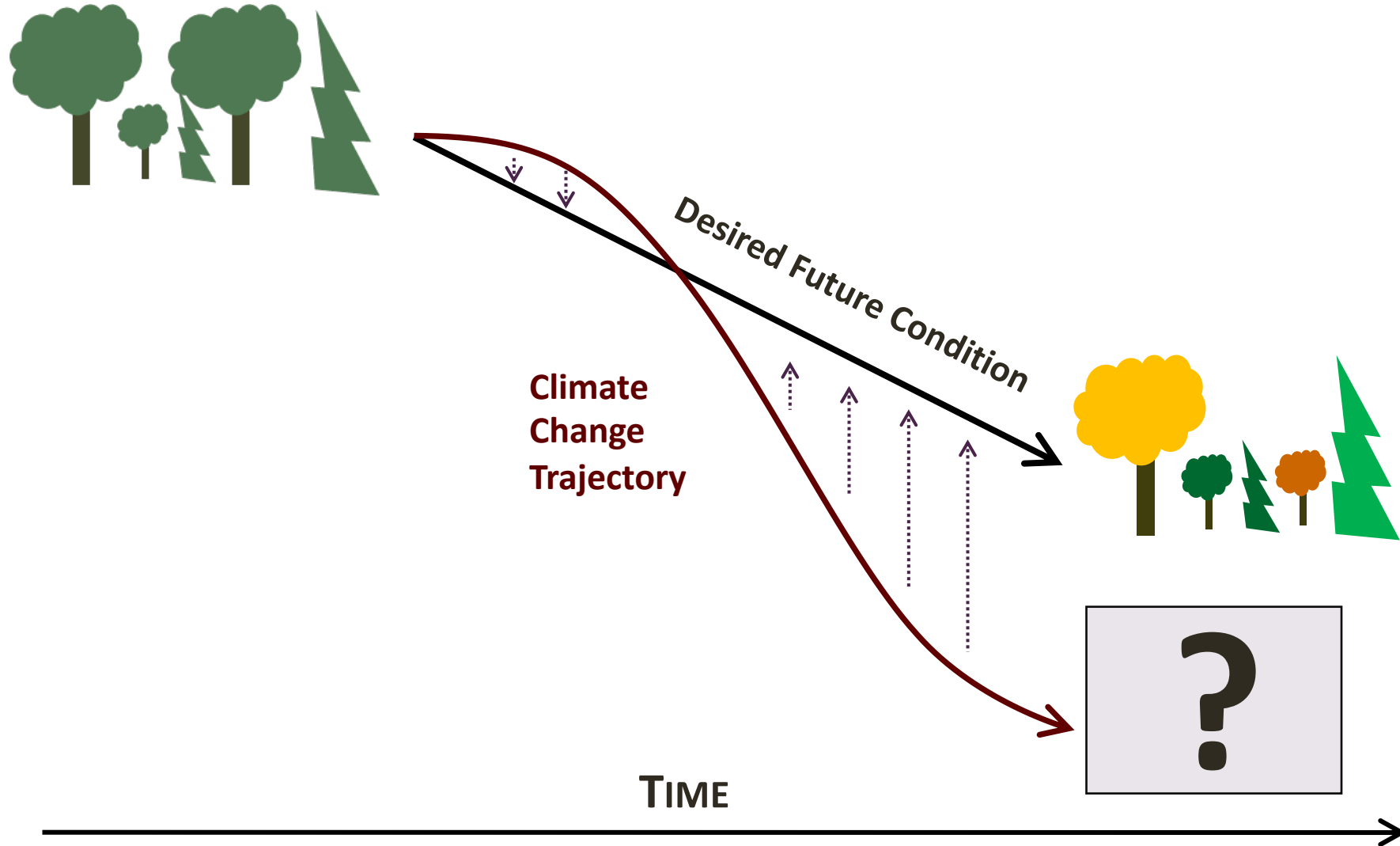


# Option #3: Transition (Response)

Intentionally accommodate change  
and enable ecosystems to  
adaptively respond to  
changing/new conditions

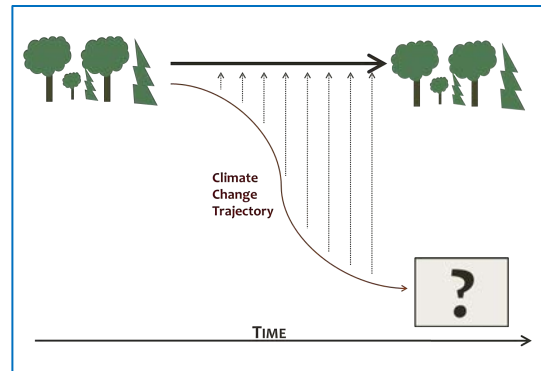


# Option #3: Transition (Response)

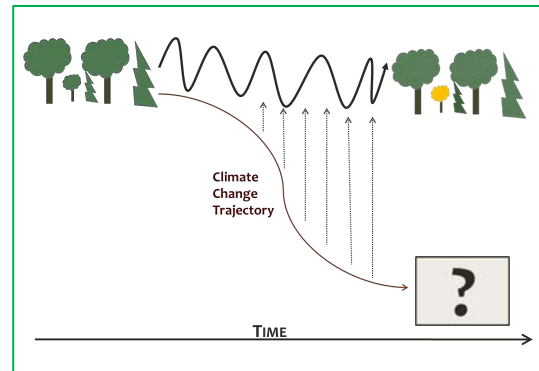


# Manage Risk

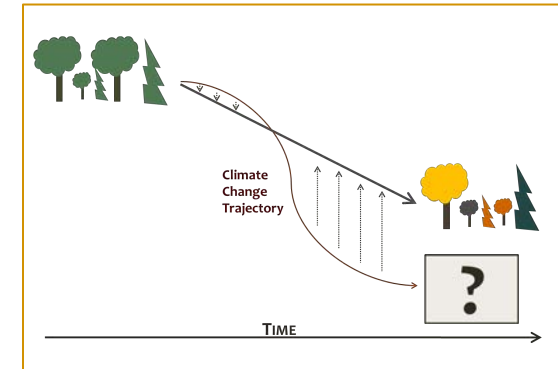
## RESISTANCE



## RESILIENCE



## TRANSITION



Design actions that are **robust across a range of potential future conditions**

# Intentionality

- Explicitly consider and address climate change
- Sure we might get lucky...
- Intentionally assessing risk and vulnerabilities **makes our plans more robust!**



# Adaptation Strategies & Approaches

Management Goals  
& Objectives

Climate Change  
Impacts

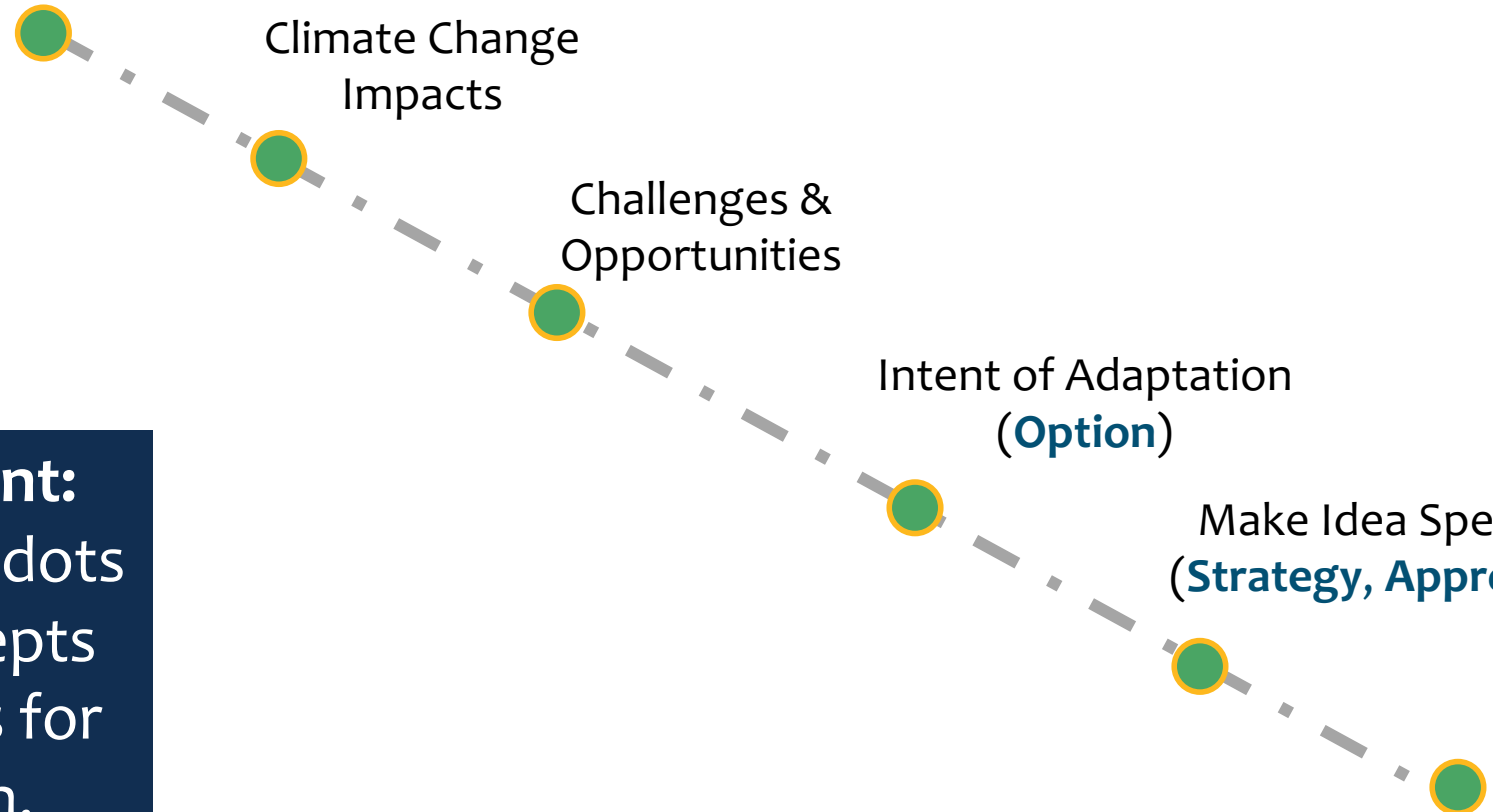
Challenges &  
Opportunities

Intent of Adaptation  
(**Option**)

Make Idea Specific  
(**Strategy, Approach**)

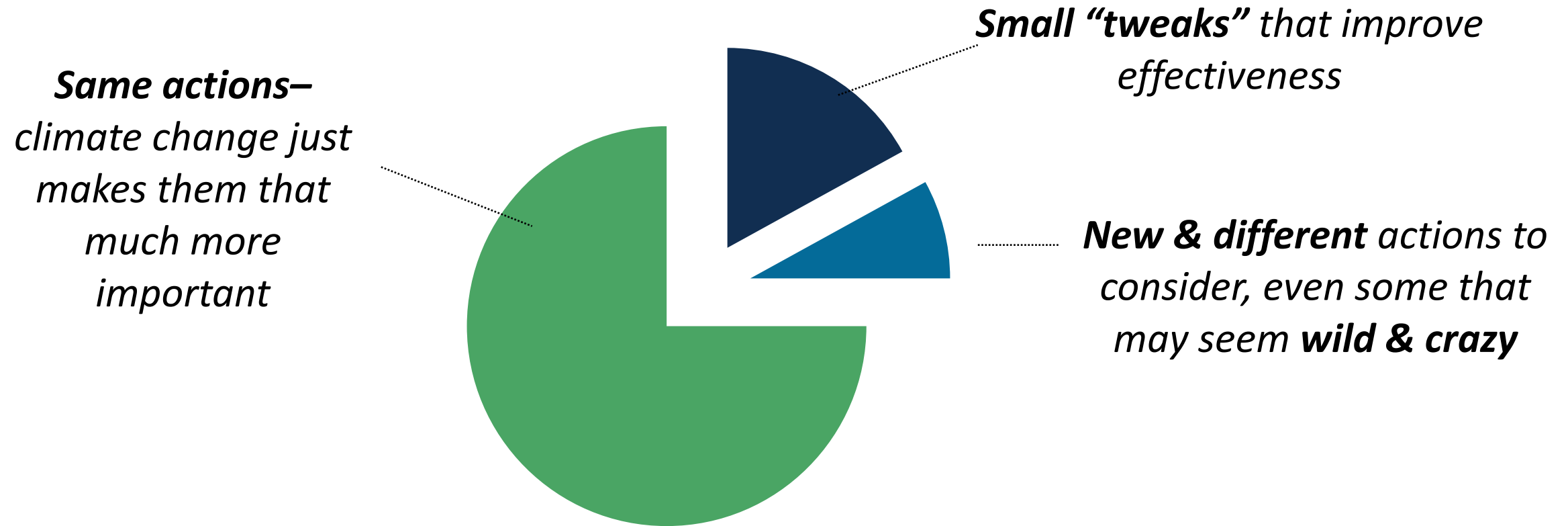
Action to Implement  
(**Tactic**)

**Why it's important:**  
Helps connect the dots  
from broad concepts  
to specific actions for  
implementation.



# One last thought....

Adaptation actions may not look that different from current management actions, especially in the near term.



*\*individual results will vary*

# Adaptation Strategies & Approaches



Translating broad **concepts** to **actions**

## Options (concepts):

- Resistance, Resilience, Transition

## Strategies:

- Regionally specific conditions

## Approaches:

- Actions for a specific ecosystem

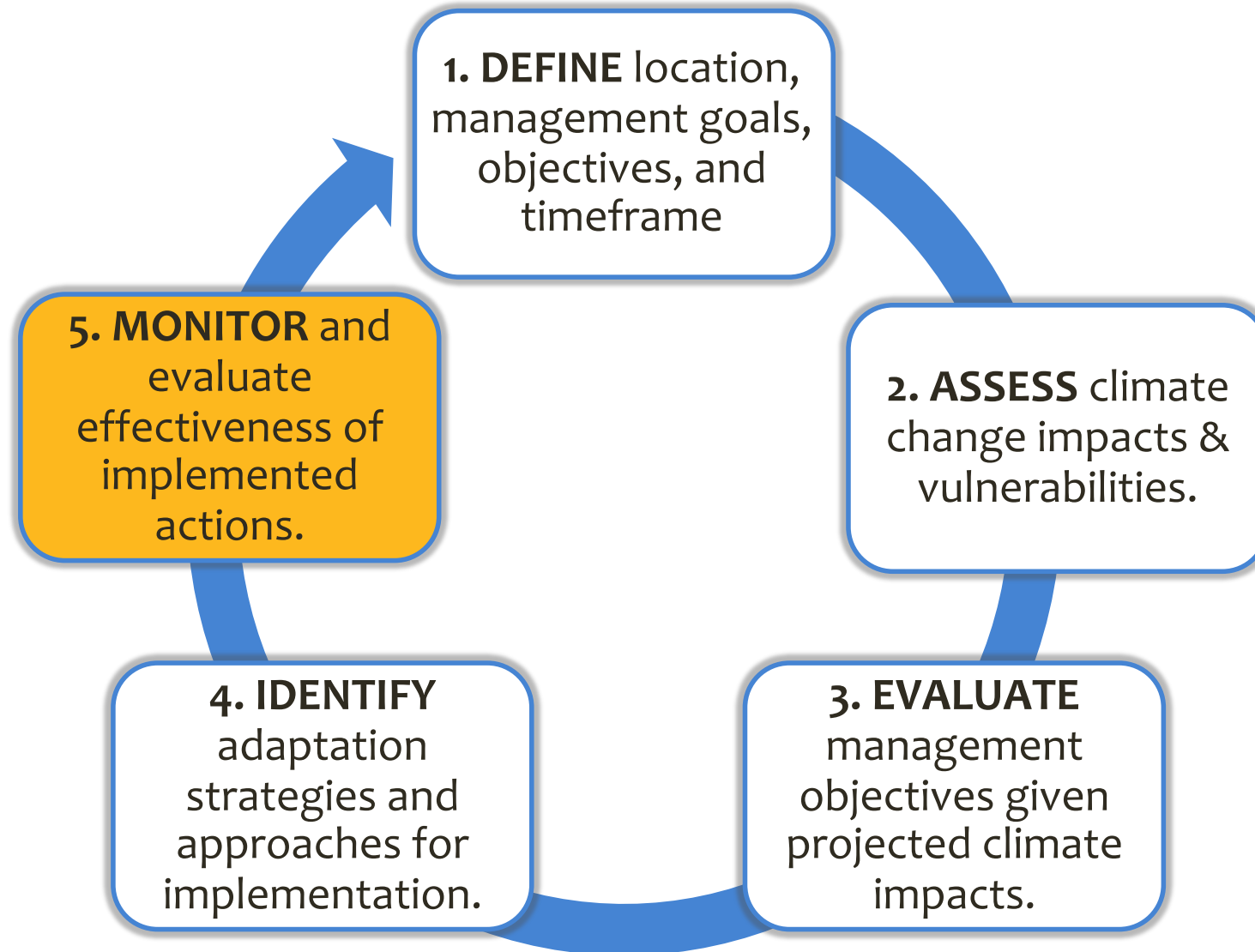
## Tactics:

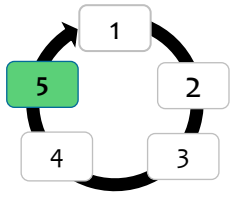
- Prescriptions for local conditions and mgmt. objectives



**Step 5**: MONITOR and evaluate effectiveness of implemented actions.

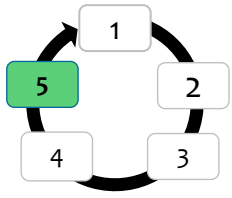
# Workbook Cycle: Step 5





## Step 5: MONITOR and evaluate effectiveness of implemented actions.

- **Adaptation Monitoring Variable** – What you will measure?
  - *Items that can tell you whether you have achieved your **management goals & objectives.***
- **Criteria for Evaluation** – a value or threshold that is meaningful for assessing effectiveness or informing future decisions
  - ***What is success?***
  - *What you're monitoring or measuring: **What are the units on your data?***
- **Monitoring Implementation**– How you will gather the information
  - *How, and when the monitoring will actually get done.*
  - ***Take advantage of existing monitoring when possible!***



**Step 5:** MONITOR and evaluate effectiveness of implemented actions.

**Adaptation Monitoring Variable** – What you will measure?

- *Planted seedling survival at 1, 2, 5, and 10 years after planting*

**Criteria for Evaluation** – a value or threshold that is meaningful for assessing effectiveness or informing future decisions

- 60% survival of non-local genotypes
- Eradication of invasive species

**Monitoring Implementation**– How you will gather the information

- *Regular post-planting stocking surveys.*
- *Supplemental surveys at 10 years.*





Questions? Thank you!