

Pinyon & Juniper Adaptation & Management Workshop

Thursday, October 12, 2023 from 9 a.m. – 5 p.m. MT

Friday, October 13, 2023 from 8 a.m. – 12 p.m. MT

Homewood Suites by Hilton, 1521 Oakridge Dr, Fort Collins, CO 80525



Photo: NPS, The Temples and Towers of the Virgin Veiled in fog, Zion NP

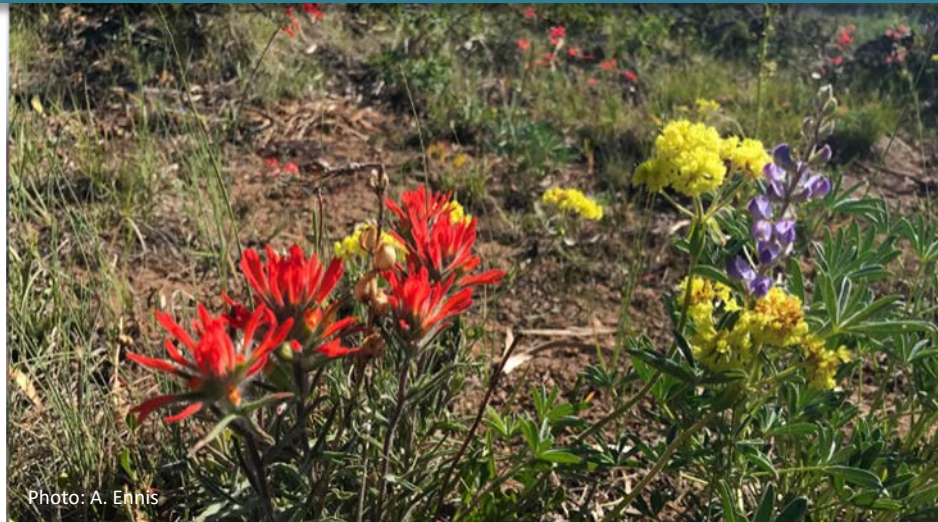


Photo: A. Ehnis



Photo: Mo Ewing





Land Acknowledgement

Photo: NPS

Project Background & Purpose



Workshop Goals

- Review regional and local effects of climate change on pinyon-juniper ecosystems
- Explore resources and tools that can be used to integrate climate change into pinyon-juniper management
- Identify challenges and opportunities for land managers related to pinyon and juniper
- Test a new decision support and prioritization tool for pinyon and juniper treatments under future climate on the Colorado Plateau
- Develop actionable steps to adapt pinyon and juniper management approaches to changing climate regimes



Pinyon-juniper woodland in Mesa Verde National Park. *NPS Photo.*

Introductions

Please share your:

- Name
- Position
- Agency
- Location
- One goal you are hoping to achieve through participation in this workshop



Hello
my name is



Workshop Guidelines

- Focus on what matters
- Contribute your thinking and experience
- Listen to understand and connect ideas
- Honor everyone's time
- Equal airtime - all participate, no one dominate
- Be present - mentally and physically



The Adaptation Workbook & Menus of Adaptation Strategies & Approaches

Photo: NPS

Photo: NPS

Courtney Peterson

Climate Adaptation Specialist

Northern Institute of Applied Climate Science

USDA Northern Forests & Southwest Climate Hubs

Adaptive Silviculture for Climate Change Network Program Manager

Courtney.Peterson@colostate.edu



United States Department of Agriculture
Climate Hubs

USDA Climate Hubs



Mission: Develop and deliver science-based, region-specific information and technologies to agricultural and natural resource managers to support climate-informed decision making, reduce agricultural risk, and build resilience.



Northern Institute of Applied Climate Science

Climate

Carbon

The Northern Institute of Applied Climate Science (NIACS) develops synthesis products, fosters communication, pursues science, and provides technical assistance in climate change adaptation and carbon management.

NIACS is a collaborative partnership of Federal, forest industry, conservation, higher education, and tribal organizations led and supported in part by the USDA Forest Service



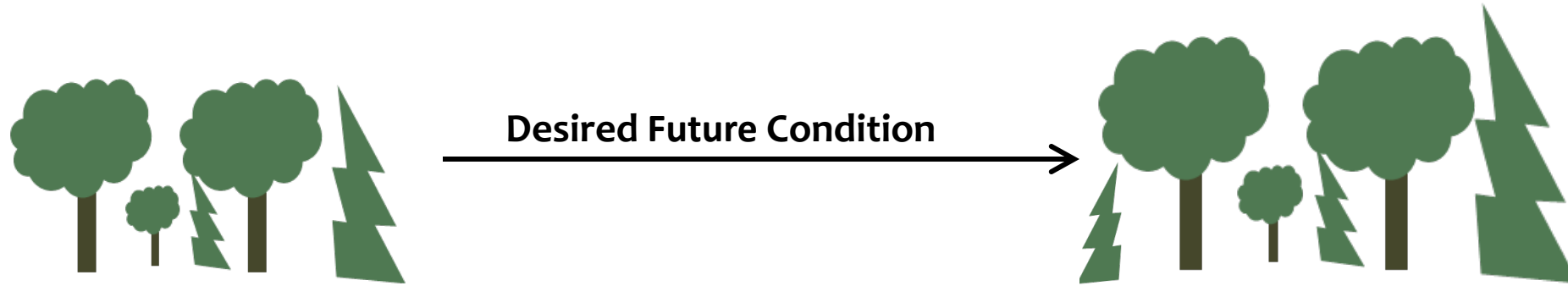
Adaptation - the adjustment of systems in response to climate change.



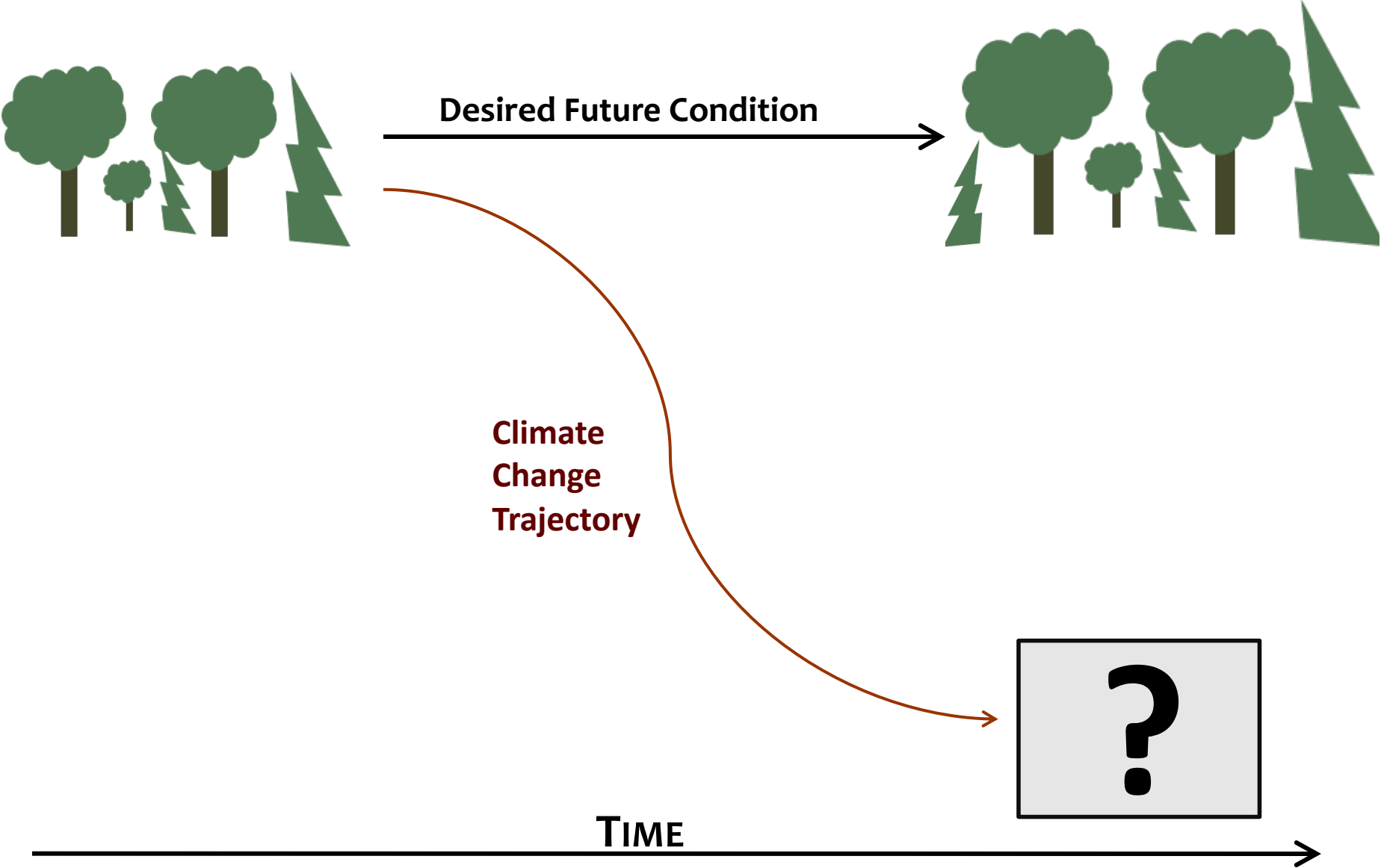
Ecosystem-based adaptation activities build on **sustainable management, conservation, and restoration.**

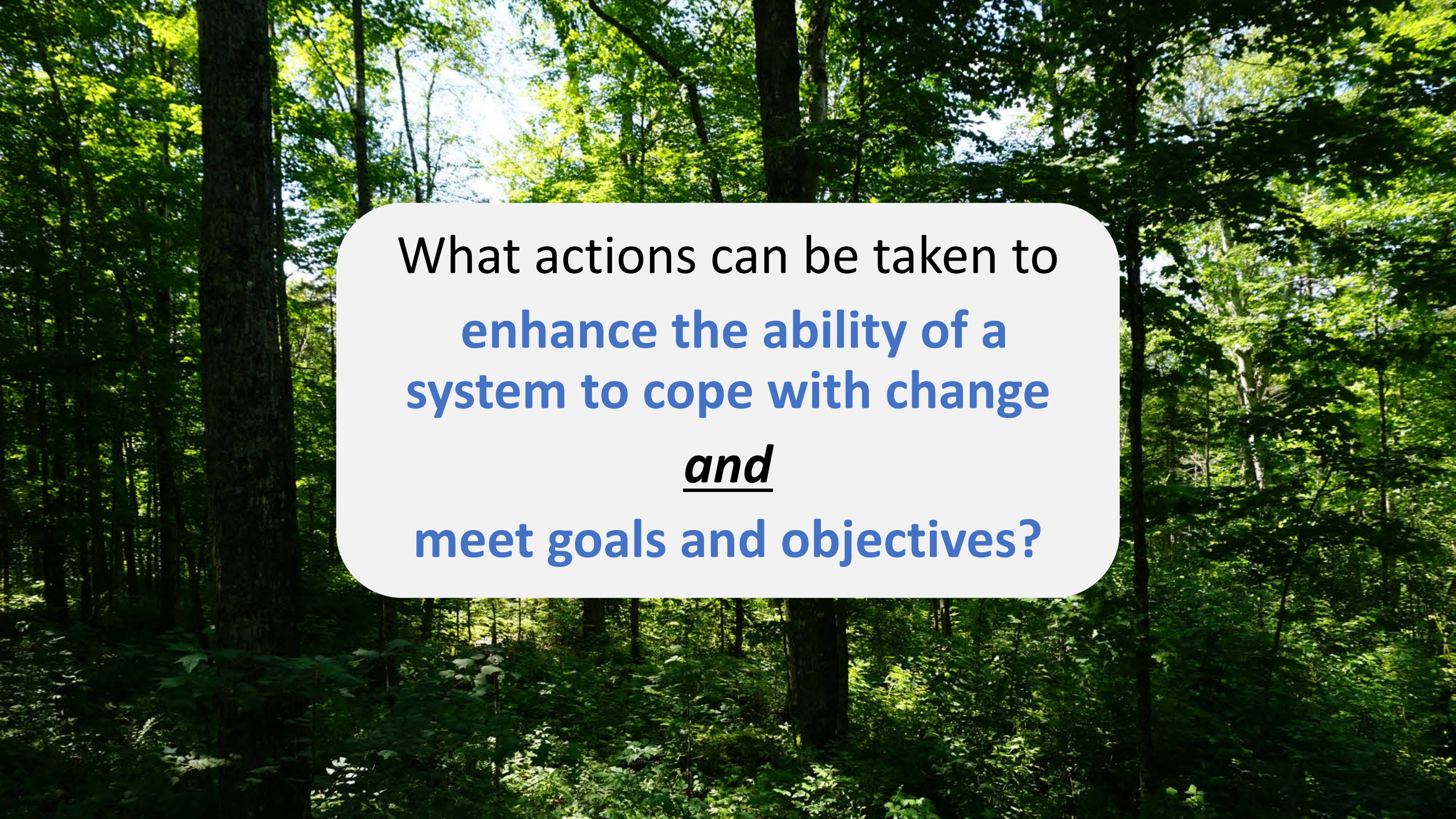
- What do you **value**?
- How much **risk** are you willing to tolerate?

Climate-Driven Changes



Climate-Driven Changes

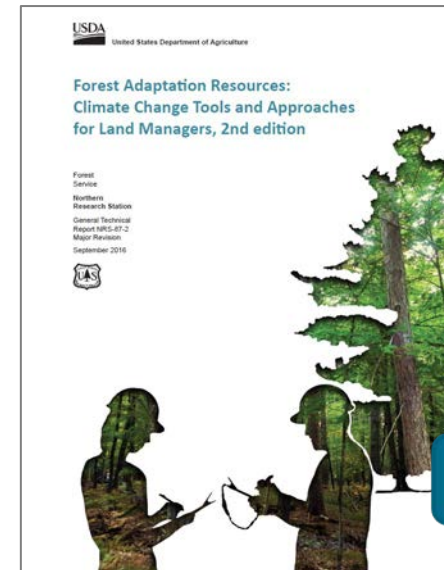




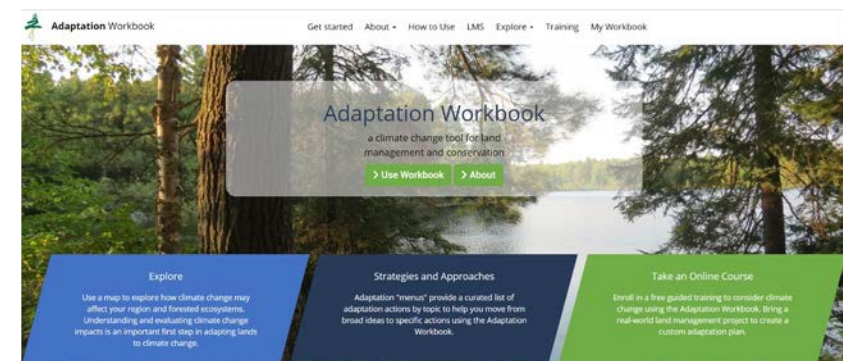
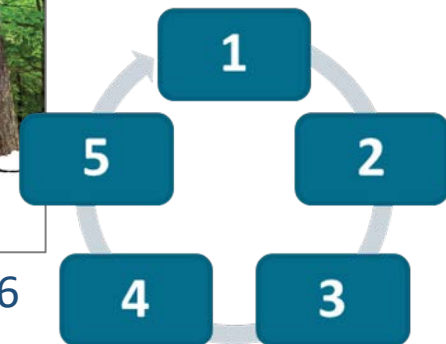
What actions can be taken to
**enhance the ability of a
system to cope with change
and
meet goals and objectives?**

Process: Climate Adaptation Workbook and Adaptation Resources

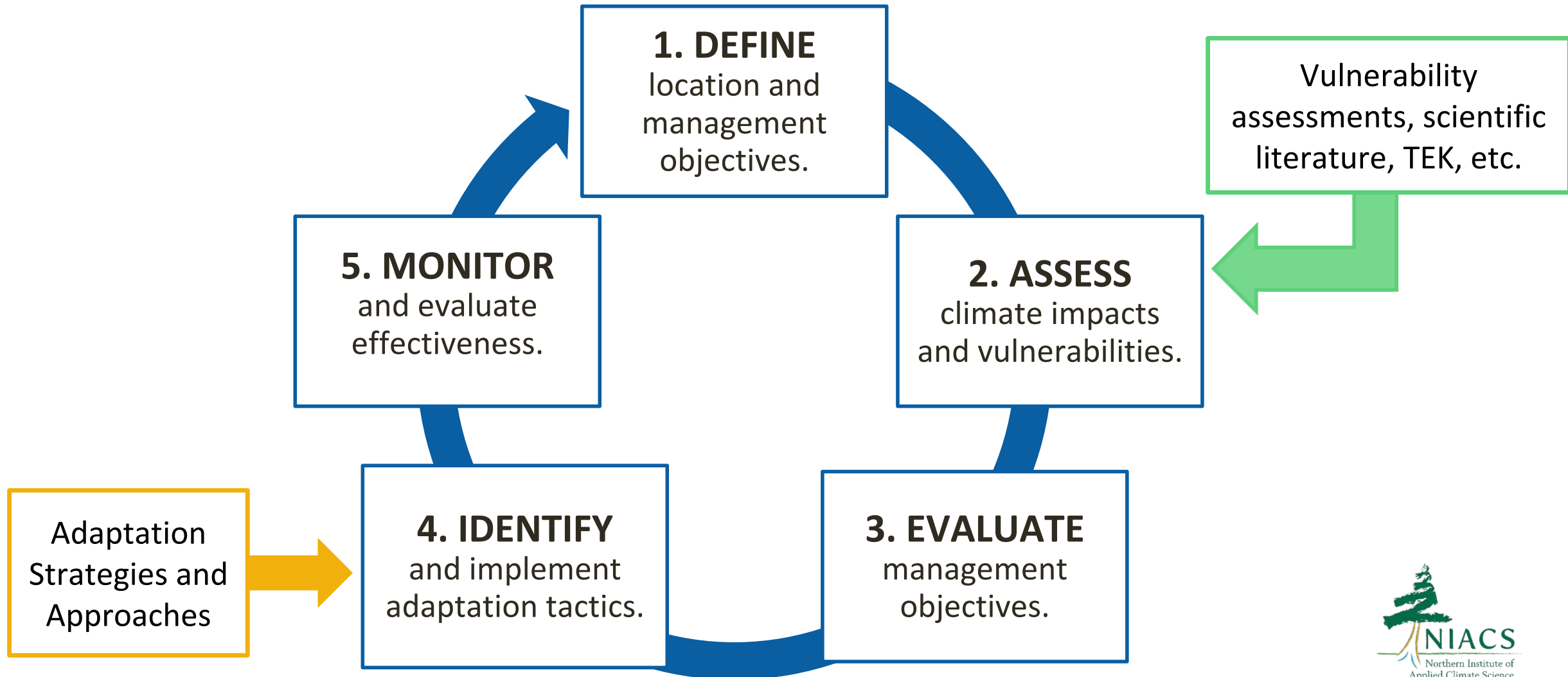
- Flexible 5-step workbook designed for a variety of landowners with diverse goals
- Works at project level
- Centers around manager's expertise, and judgement
- Creates **clear rationale** for actions by connecting them to **broader adaptation ideas**
- **Does not make recommendations**
- **Includes:**
 - Adaptation workbook
 - Adaptation strategies for different resource areas (menus)



Swanston et al. 2016
(2nd edition)



Adaptation Workbook

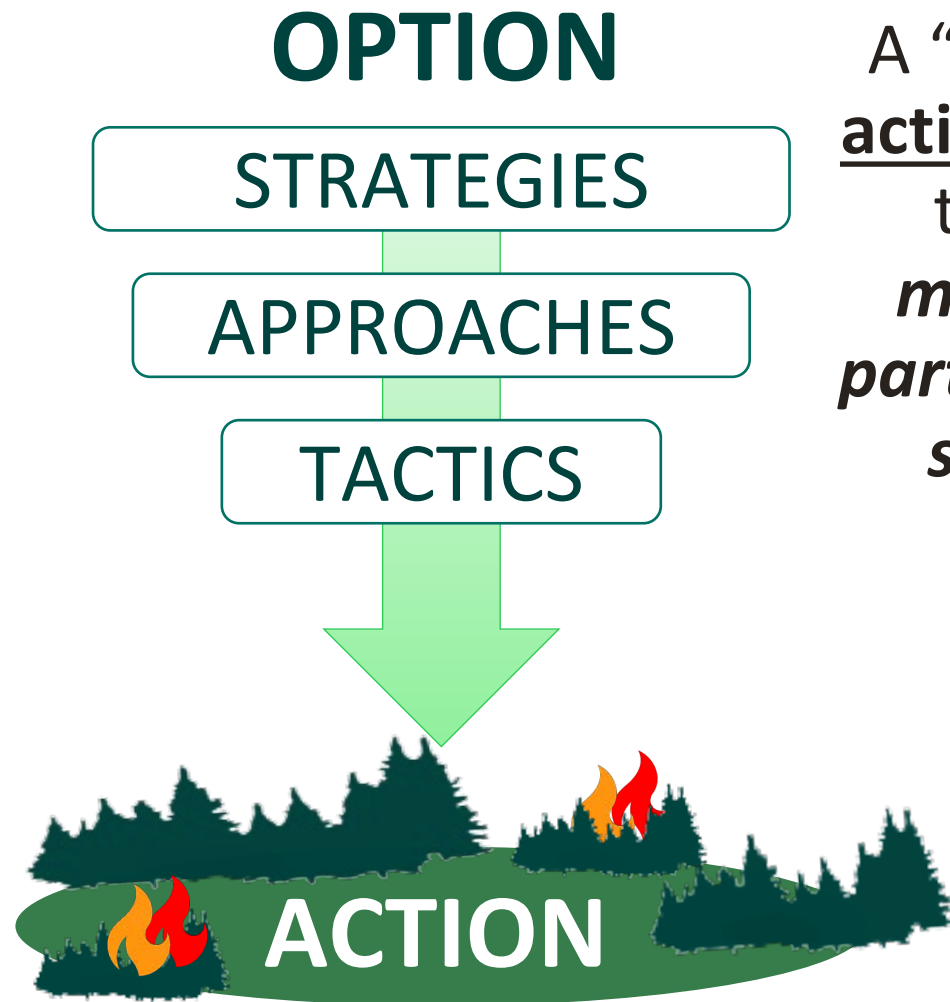


Adaptation Workbook = Climate Change Filter



Use the Adaptation Workbook to ensure ALL of your goals and objectives are robust to climate change impacts.

Adaptation Menu of Strategies and Approaches



A “menu” of possible actions that allows you to decide what is *most relevant for a particular location and set of conditions.*

Menu of Adaptation Strategies and Approaches
Developed for forests

Strategy 1: Sustain fundamental ecological functions.
1.1. Reduce impacts to soils and nutrient cycling.
1.2. Maintain or restore hydrology.
1.3. Maintain or restore riparian areas.
1.4. Reduce competition for moisture, nutrients, and light.
1.5. Restore or maintain fire in fire-adapted ecosystems.

Strategy 2: Reduce the impact of biological stressors.
2.1. Maintain or improve the ability of forests to resist pests and pathogens.
2.2. Prevent the introduction and establishment of invasive plant species and remove existing invasive species.
2.3. Manage herbivory to promote regeneration of desired species.

Strategy 3: Reduce the risk and long-term impacts of severe disturbances.
3.1. Alter forest structure or composition to reduce risk or severity of wildfire.
3.2. Establish fuelbreaks to slow the spread of catastrophic fire.
3.3. Alter forest structure to reduce severity or extent of wind and ice damage.
3.4. Promptly revegetate sites after disturbance.

Strategy 4: Maintain or create refugia.
4.1. Prioritize and maintain unique sites.
4.2. Preserve and maintain sensitive or at-risk species or communities.
4.3. Establish artificial reserves for at-risk and displaced species.

Strategy 5: Maintain and enhance species and structural diversity.
5.1. Promote diverse age classes.
5.2. Maintain and restore diversity of native species.
5.3. Retain biological legacies.
5.4. Establish reserves to maintain ecosystem diversity.

Strategy 6: Increase ecosystem redundancy across the landscape.
6.1. Manage habitats over a range of sites and conditions.
6.2. Expand the boundaries of reserves to increase diversity.

Strategy 7: Promote landscape connectivity.
7.1. Reduce landscape fragmentation.
7.2. Maintain and create habitat corridors through reforestation or restoration.

NIACS
et al. 2016. Forest Adaptation Resources. Research Report #2760. www.forestadaptation.org



Workbook + Menu

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.

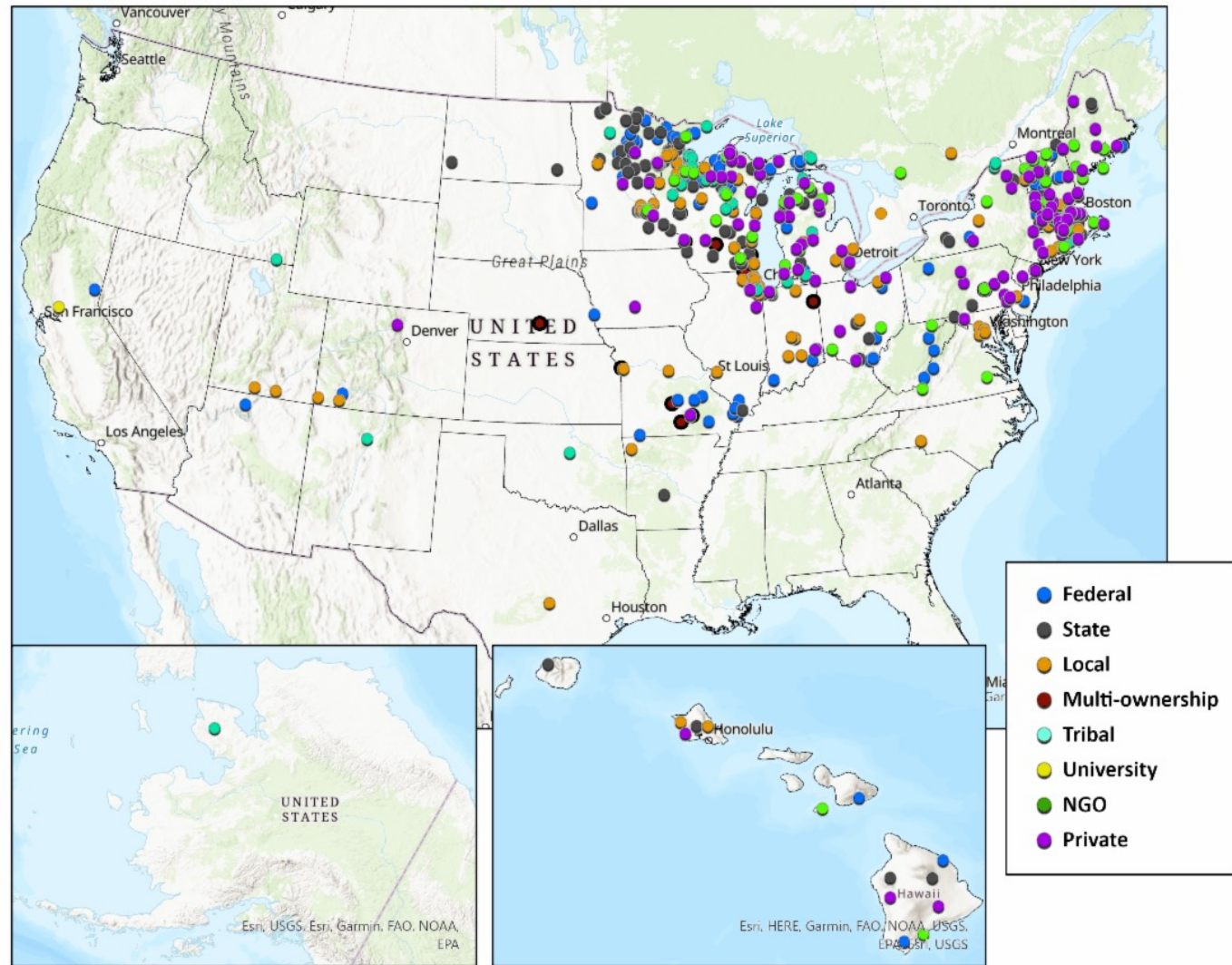
Adaptation Menu

Monitor effectiveness of actions

Adaptation Demonstrations

Real-world examples of climate-informed forest management.

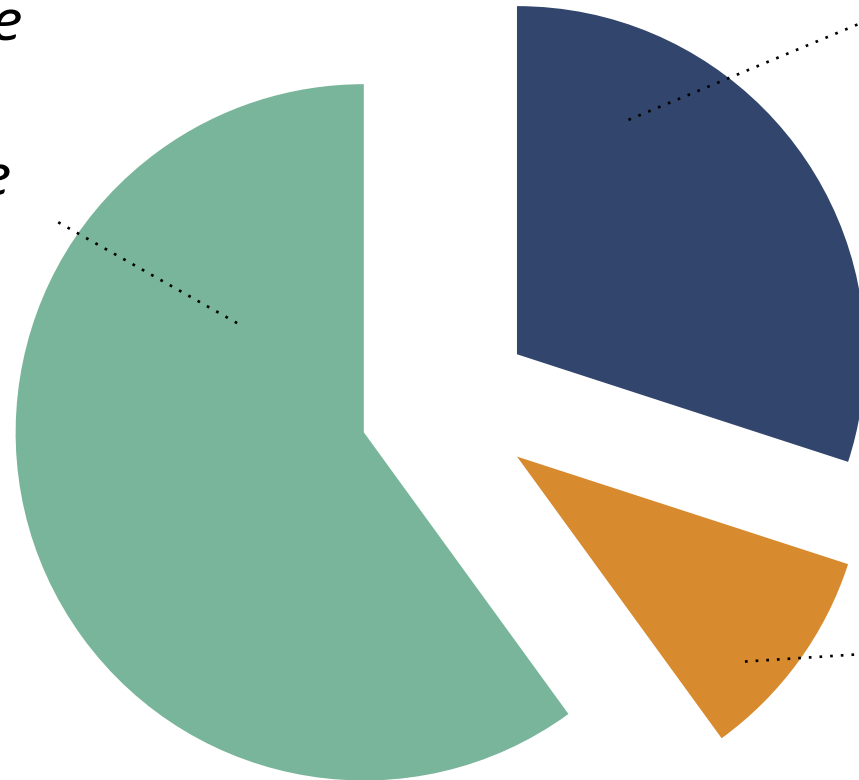
Over 500 projects have used the **Adaptation Workbook** to consider climate change and identify adaptation actions.



501 Climate change adaptation and mitigation demonstration projects, some featured on forestadaptation.org. Updated Sept. 27, 2021.

Adaptation Actions Can Be...

Same actions— climate change just makes them that much more important



Small “tweaks” that improve effectiveness

New & different actions to consider, even some that may seem **wild & crazy**

**individual results will vary*

Intentionality

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



Pinyon-Juniper Dynamics: Expansion, Contraction, Thickening

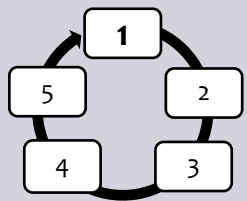
Nichole Barger, The Nature Conservancy



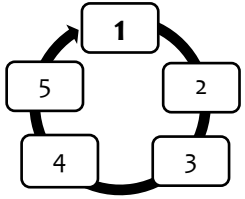
A top-down photograph of a white ceramic coffee cup with a blue handle, filled with dark coffee. A single, vibrant red maple leaf with yellow-orange veins is placed on the saucer to the right of the cup. The entire scene is set on a dark, textured, possibly wool or fur, surface. The lighting is soft, creating a cozy atmosphere.

Break

Wifi: Hhonor
Password: Diamond21



Step 1: Define area of interest, management goals and objectives, and timeframes.



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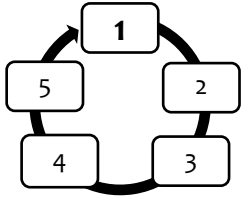
Key Questions:

- Define the project location and describe what you value most about the project area.
- What are achievable outcomes and measurable actions (i.e. your management goals & objectives)?
- Is there a project timeframe?



KEY DEFINITIONS (SAF DICTIONARY OF FORESTRY, 2018)

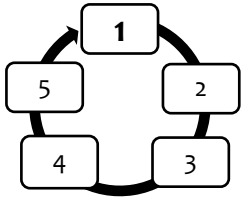
- **Management Goal** = a broad, general statement, usually not quantifiable, that expresses a desired state or process to be achieved
- **Management Objectives:** a concise, time-specific statement of measurable planned results that correspond to pre-established goals in achieving a desired outcome
- **Desired Future Condition (DFC):** a description of the land or resource conditions that are believed necessary if *goals* and *objectives* are fully achieved



Step 1: Define area of interest, management goals and objectives, and timeframes.

Example: Pinyon-juniper wooded shrubland

Goals	Objectives (How/ where/ how much?)
Restore and maintain a mosaic of woodland conditions across the landscape	<ul style="list-style-type: none"> • Alter management timing to reduce potential impacts to the structure and function of pinyon-juniper woodlands • Maintain stand-level stem densities of 2-6 trees/acre with a canopy cover of 10-40% and no areas with <5% or >70% cover
Maintain and promote tree populations at sustainable levels for regeneration	<ul style="list-style-type: none"> • Maintain sufficient tree cover, seed trees, and suitable microsites to allow for tree regeneration • Increase cover of <i>Pinus edulis</i> to encourage pinyon cone production
Reduce hazardous fuels and protect the area from future high-severity fire events	<ul style="list-style-type: none"> • Implement combination of mechanical treatments and prescribed burns to reduce horizontal and vertical fuel continuity



Step 1: Define area of interest, management goals and objectives, and timeframes.

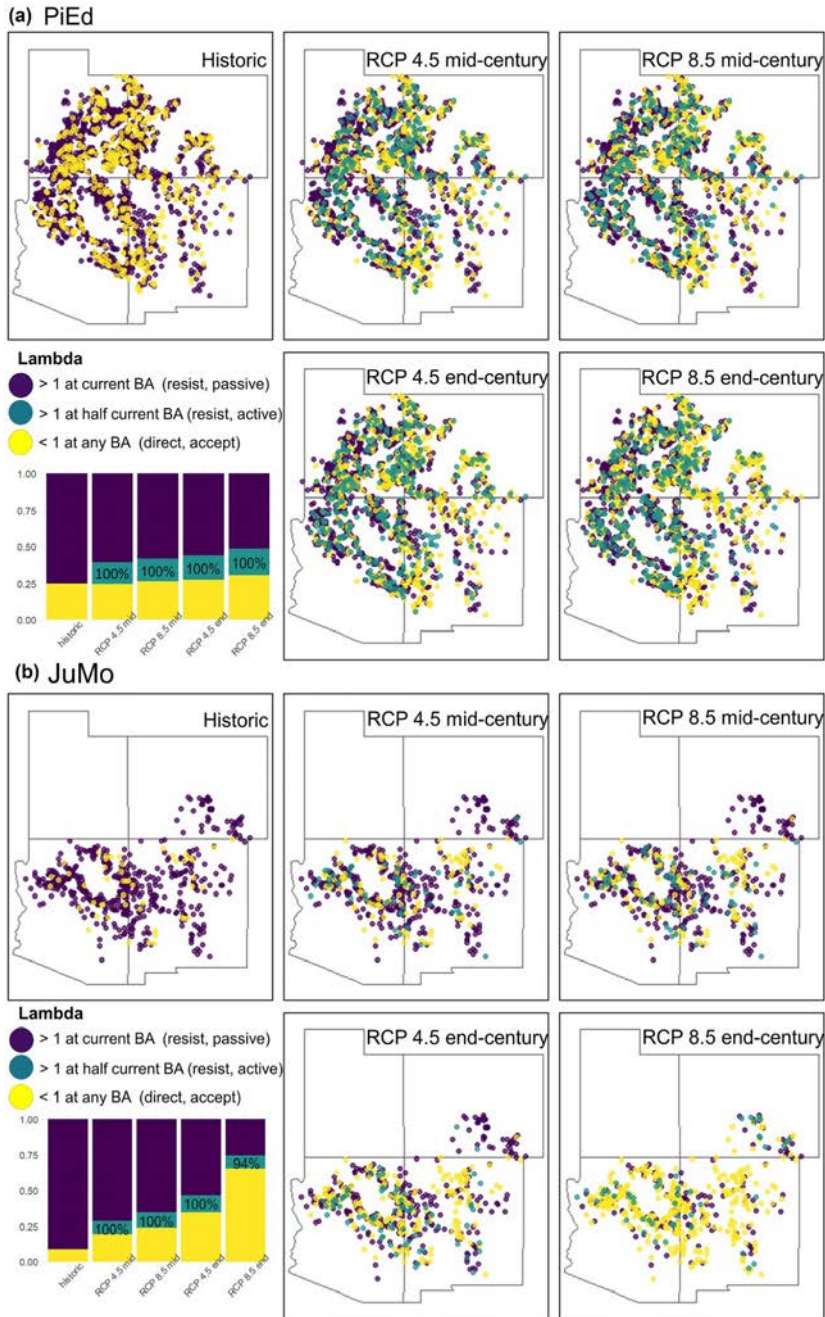
In your breakout groups:

- Review your assigned scenario.
- Do the goals and objectives seem reasonable given the project area?
- Are there key values missing from your scenario that should be added?
- Any changes you would make?
- Add specificity to objectives on how, where, and how much to the extent possible.



Climate Change Vulnerability Projections for CO Plateau

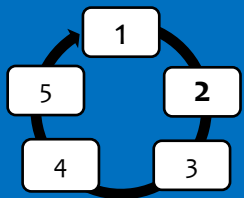
Adam Noel & Michael Duniway, USGS



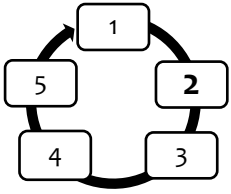


Lunch – Be back at 1:00





Step 2: ASSESS site-specific climate change impacts & vulnerabilities for your project area.



Step 2: ASSESS climate change impacts and vulnerabilities

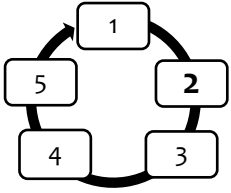
Purpose:

- Consider how climate change may specifically affect the project area

Key Questions:

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





Step 2: ASSESS climate change impacts and vulnerabilities.

Regional Climate Impacts

Based on regional resources

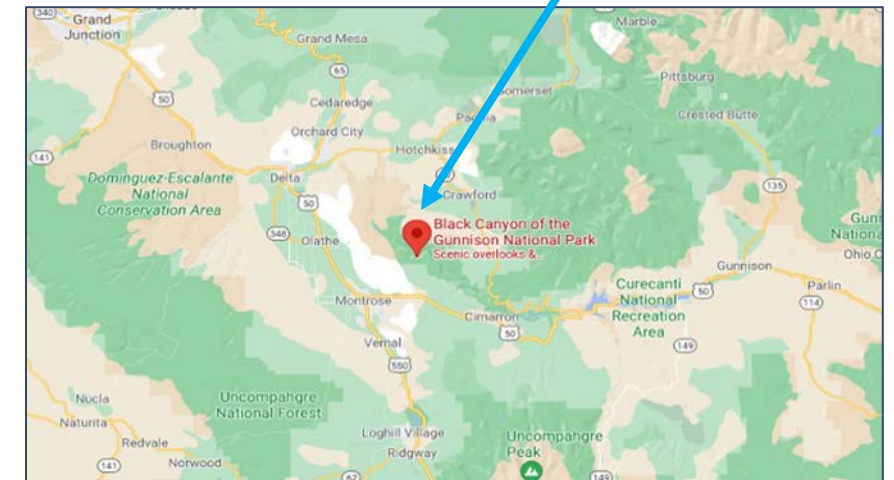
- Warmer temperatures
- Longer growing season
- Less snow and shorter winters
- Altered seasonal precipitation and streamflows
- Increased summer moisture stress and drought
- More frequent heavy precipitation events
- Increases in non-native plants
- Potential changes in wildfire regimes

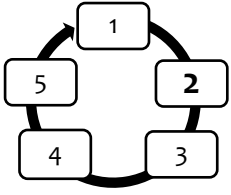
Site-Specific Impacts

Based on your expertise

How will my site be uniquely affected???

List of impacts is based on your location





Step 2: ASSESS climate change impacts and vulnerabilities for your project area.

Regional Climate Impacts
Based on regional info



You will describe site-specific considerations
Based on your expertise



Mgmt. Unit/ Topic	Climate Change Impacts and Vulnerabilities	
	Regional From vulnerability assessments	For the Property or Project Area Based on your knowledge of the site
Capital Reef National Park	Increased potential for non-native plant invasion	<ul style="list-style-type: none"> Tamarisk populations could increase with hotter, drier temperatures and outcompete native vegetation
	Seasonal shifts in soil moisture across the year	<ul style="list-style-type: none"> Hill tops are especially vulnerable to growing season moisture stress

Vulnerability Components

Direct and indirect effects of climate change (sensitivity + exposure)

- Temperature
- Precipitation
- Stressors
- Species shifts

Potential Impact

Adaptive Capacity

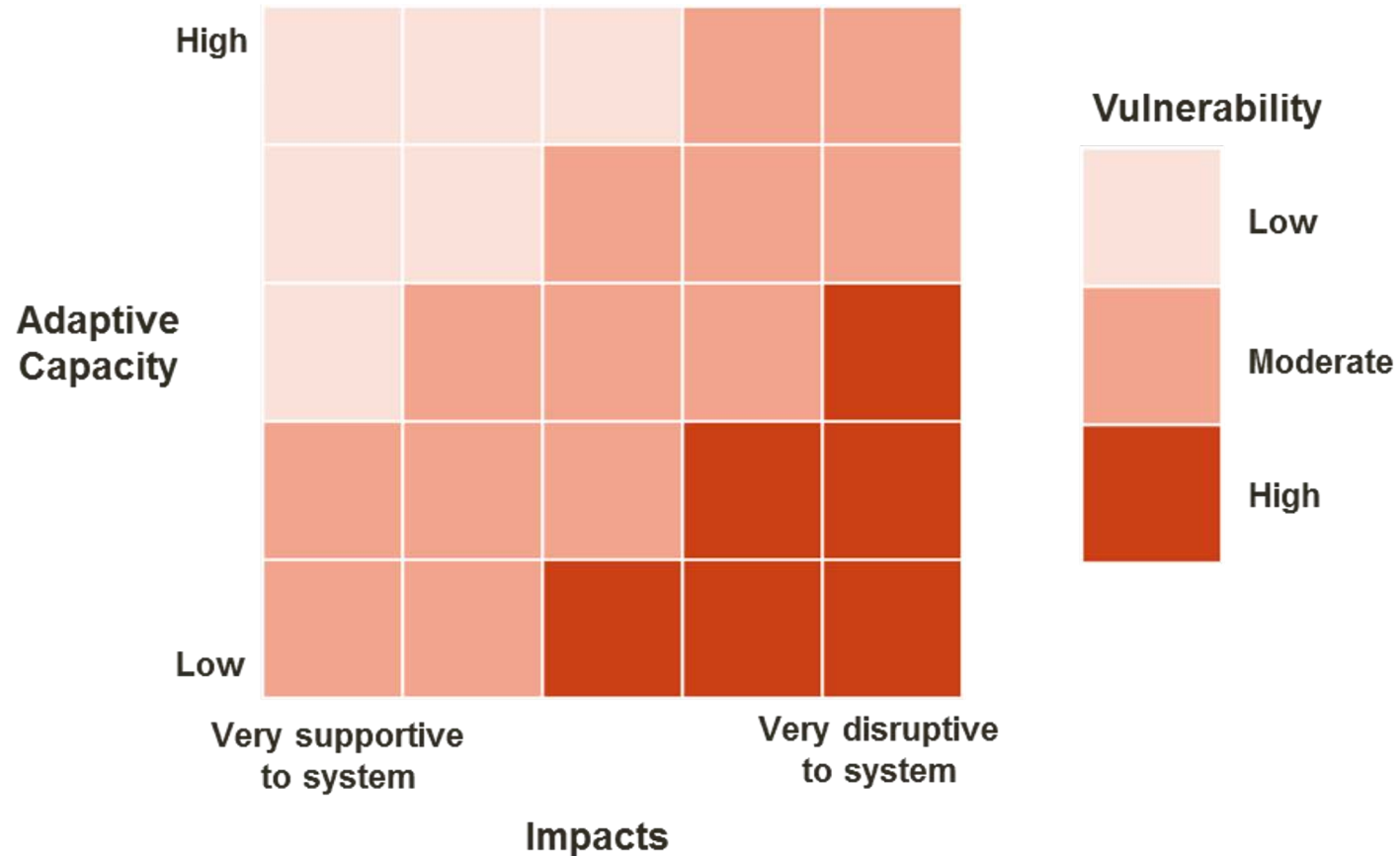
Ability of the system to cope with change

- High diversity
- Species tolerance or plasticity
- Multiple ways to respond to disturbance (e.g. upslope movement)

Vulnerability

Vulnerability Determination

How would you rate the overall climate vulnerability of your project area?



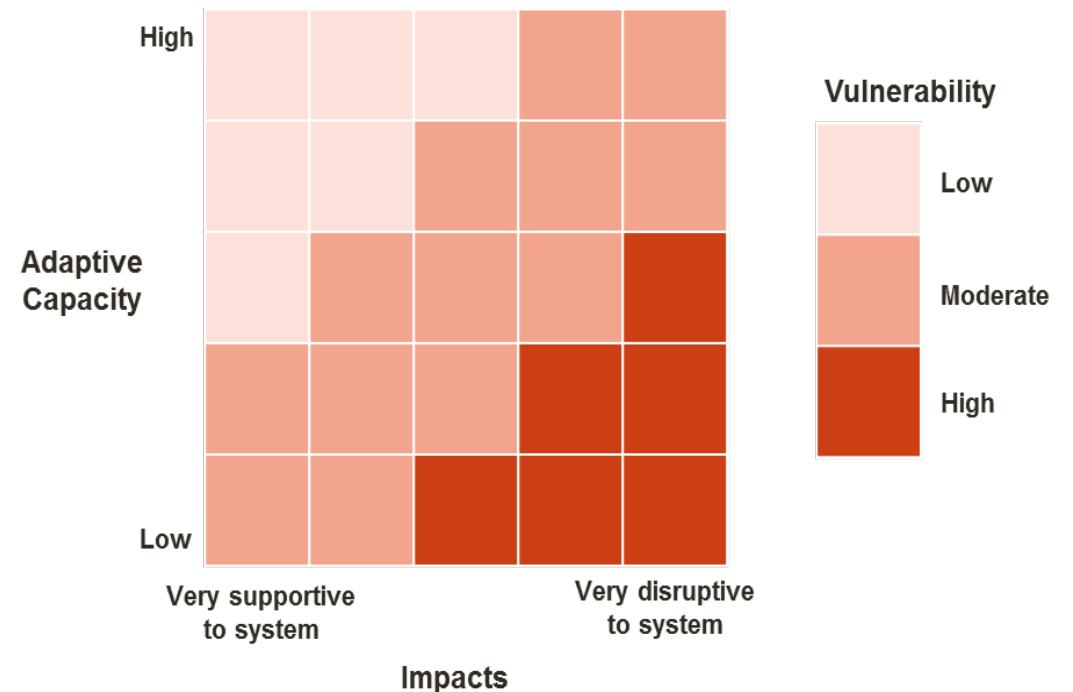
Work Time

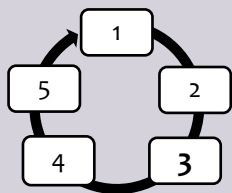
- Read through regional impacts list – select the impacts more important to consider for your scenario
- Write down local considerations that may make your area more less/vulnerable for each selected impact
- **Are there particular features or conditions** within the project area that might increase/decrease climate risk?
 - Species or structural composition
 - Topography
 - Soil characteristics
 - Past management history
 - Current management plans
 - Presence of pests, disease, or nonnative species
 - Behavior of visitors, proximity to WUI



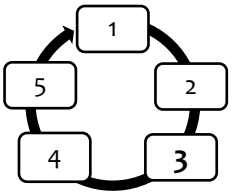
Impacts & Vulnerability Group Synthesis

- Key impacts are listed on papers around the room
- Use dots to vote on which impacts are going to affect your project most (3 votes per person)
- Discuss your project's overall impacts and adaptive capacity and select a rating to place on the figure





Step 3: What challenges or opportunities does climate change present?



Step 3: Evaluate management objectives given climate change

Purpose: Realistically assess the ability to meet goals and objectives under current management.

Key Questions:

- How might climate change challenge our ability to meet goals and objectives for your scenario?
- Are there climate-related opportunities?
- Do our objectives need to change?



Photo: <https://www.nps.gov/subjects/swscience/pinyon-juniper-woodlands.htm>

Climate Vulnerability vs. Challenges to Objectives

Step 2 is about the place:

- Detailing site characteristics that may present climate-related vulnerabilities

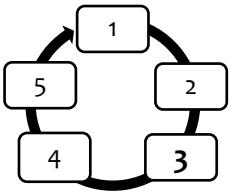


Step 3 is about your goals

- Describe how climate change may affect your ability to achieve the project goals and objectives



Similar but different!



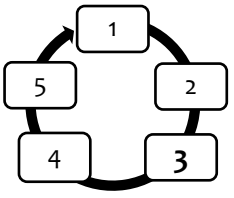
Step 3: Evaluate management objectives given climate change

Challenges to Meeting Management Objective with Climate Change: Things that will make it harder to achieve the management objective due to climate change.

Opportunities to Meeting Management Objective with Climate Change: Things that will make it easier to achieve the management objective due to climate change.

***Focus on challenges within control of your management (not global markets, policies, etc.)*





Step 3: Evaluate management objectives given climate change

Feasibility – Can you meet your management objectives using current (proposed actions) management actions?

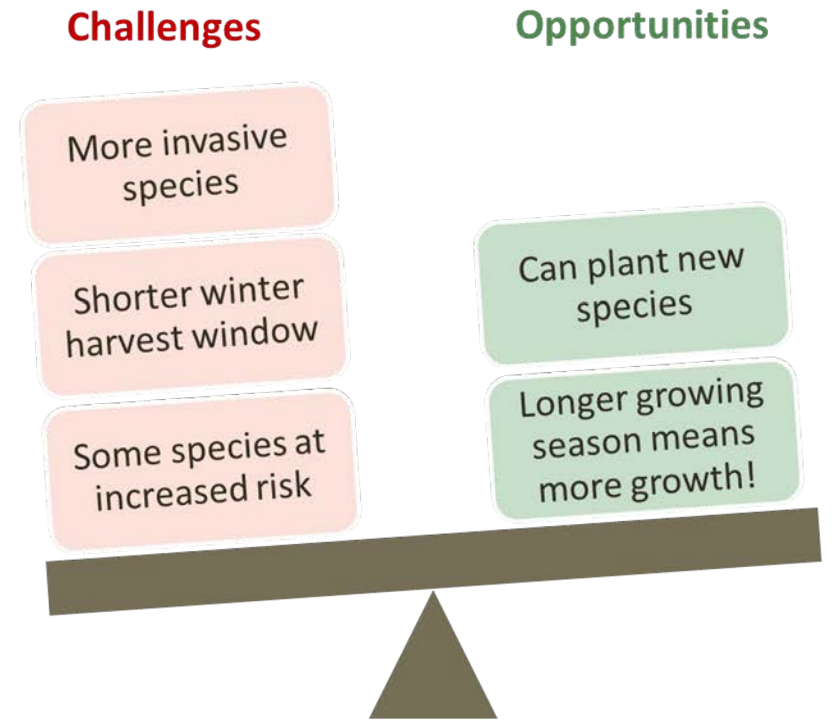
High: We can do it! *Opportunities > Challenges*

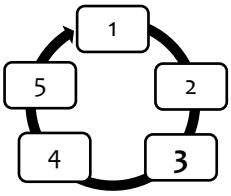
Moderate: Somewhere in the middle

Low: We'll need more resources or effort.

Challenges > Opportunities

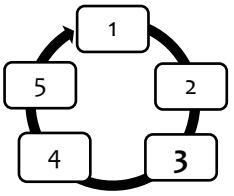
Other Considerations – Social, financial, or other factors that also affect your ability to meet objectives.



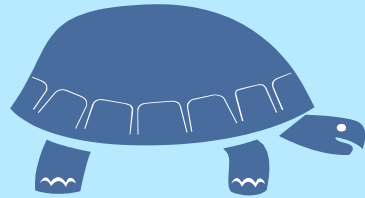


Step 3: Evaluate management objectives given climate change

Objective	Challenge from Climate Change	Opportunity from Climate Change	Feasibility	Other considerations
Create opportunities for carbon sequestration through large tree retention	Drought stressed trees have increased susceptibility to bark beetle attacks	<p>Increased drought conditions hinder fungi growth and promote tougher leaves that are less palatable to pests</p> <p>Increased habitat range for Douglas-fir, aspen, and ponderosa pine (possible assisted migration)</p>	Moderate	Higher elevation species have no where to migrate up to
Utilize low intensity understory prescribed fire as an initial treatment	Increasingly hot/dry conditions may limit the windows available to conduct Rx fire.	Fire promotes species diversity and resilient systems due to more diverse sets of genes in the ecosystem that react to fires differently	Low	Capacity and personnel availability to implement Rx fires are limited.

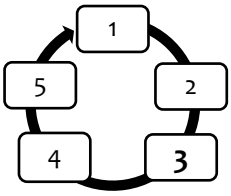


Step 3: Evaluate management objectives given climate change

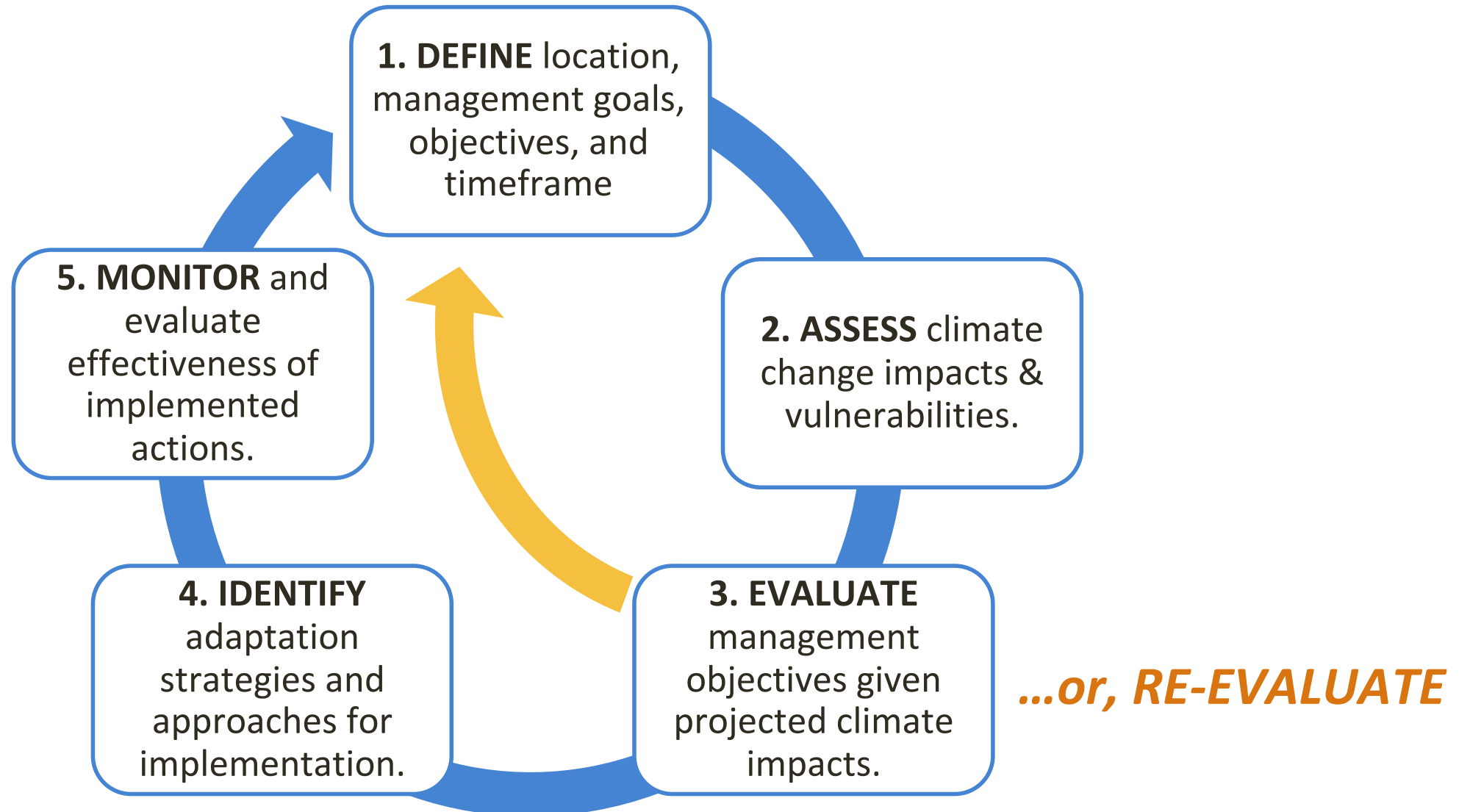


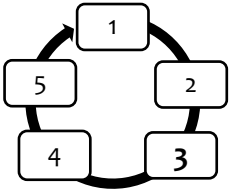
Slow down!

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

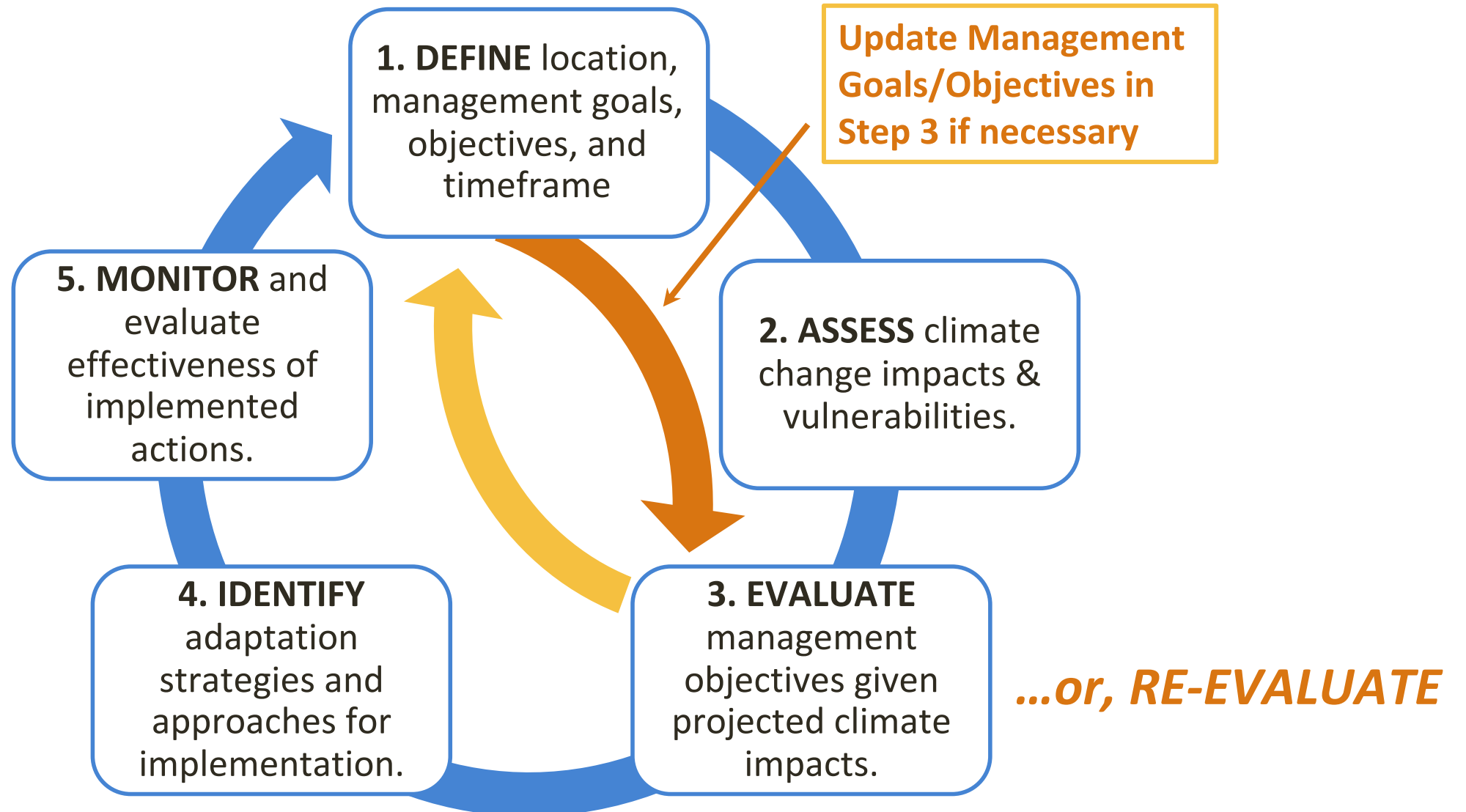


Step 3: Evaluate management objectives given climate change





Step 3: Evaluate management objectives given climate change



In Breakout Groups:

- What are the climate-related challenges to achieving your objectives?
- What are the climate-related opportunities to achieving your objectives?
- [As time allows] Discuss feasibility of meeting objectives under the proposed action.

3:00 p.m. – Reconvene for group discussion.

** Focus on climate-related challenges (not global markets, policies, etc.)*





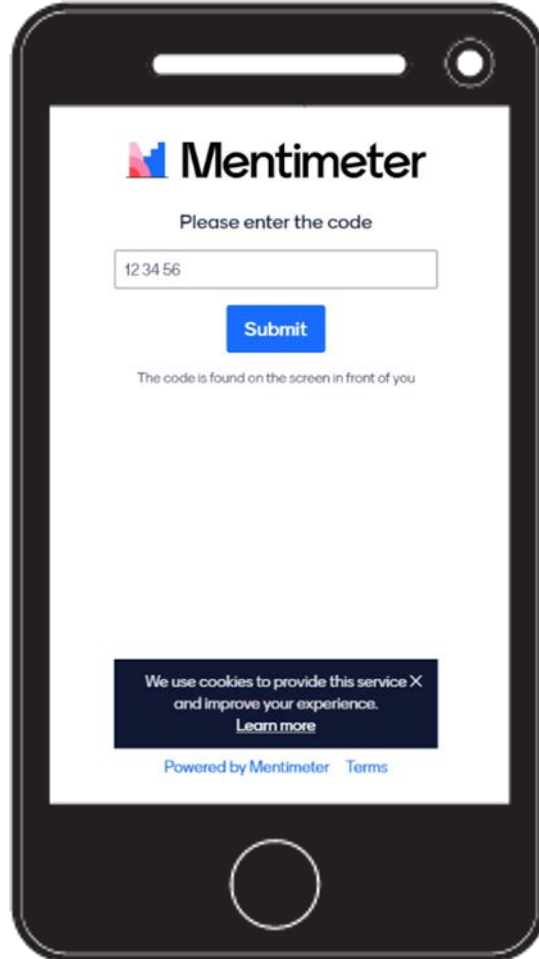
DISCUSSION

Write down:

- One key challenge (pink sticky)
- One key opportunity (green sticky)



DISCUSSION – Feasibility Rating



- Find your way to [menti.com](https://www.menti.com)
- Access on your computer or use your phone!



Pinyon & Juniper Management Adaptation Menu





Adapting to Climate Change



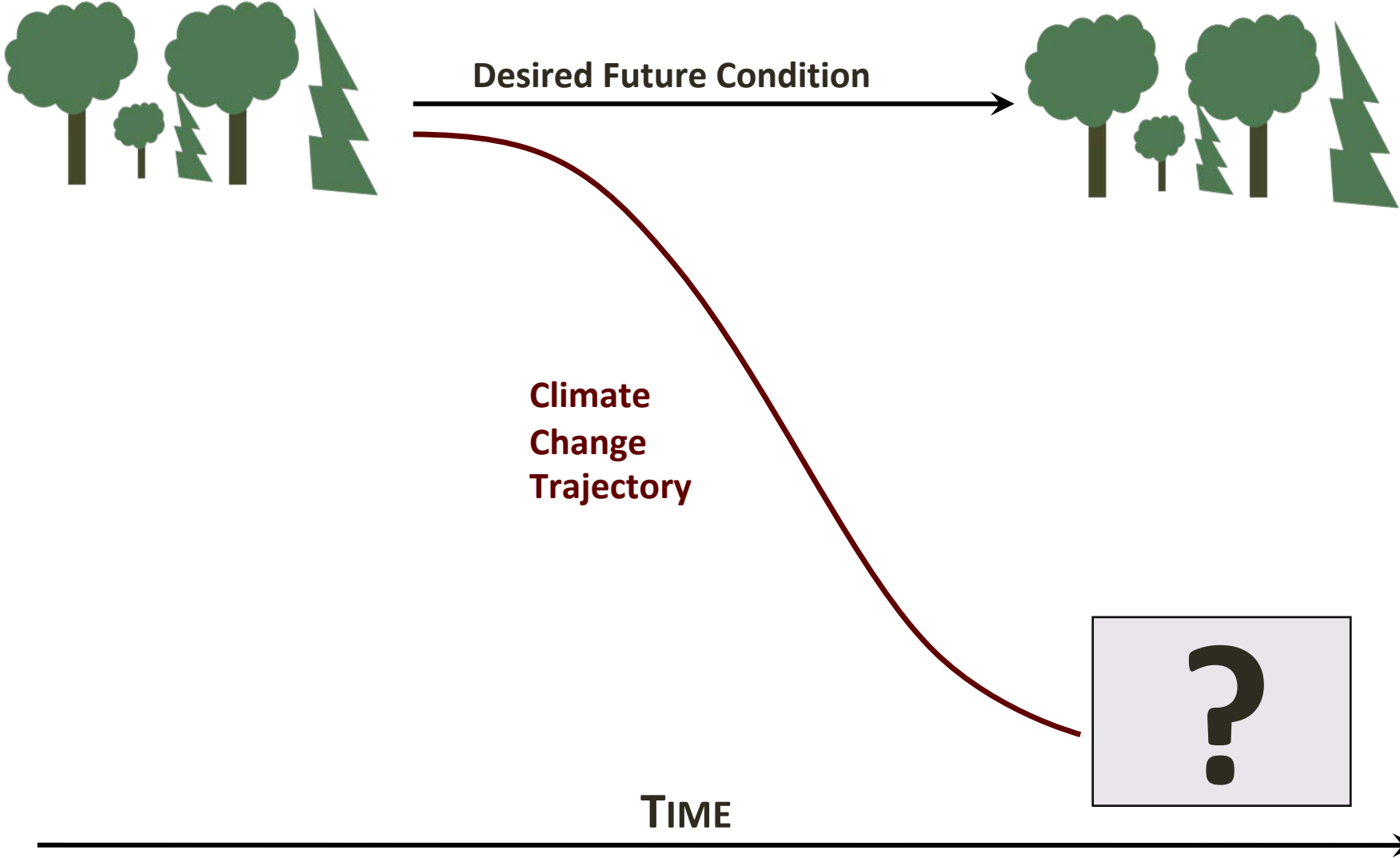
Adaptation - the adjustment of systems in response to climate change.

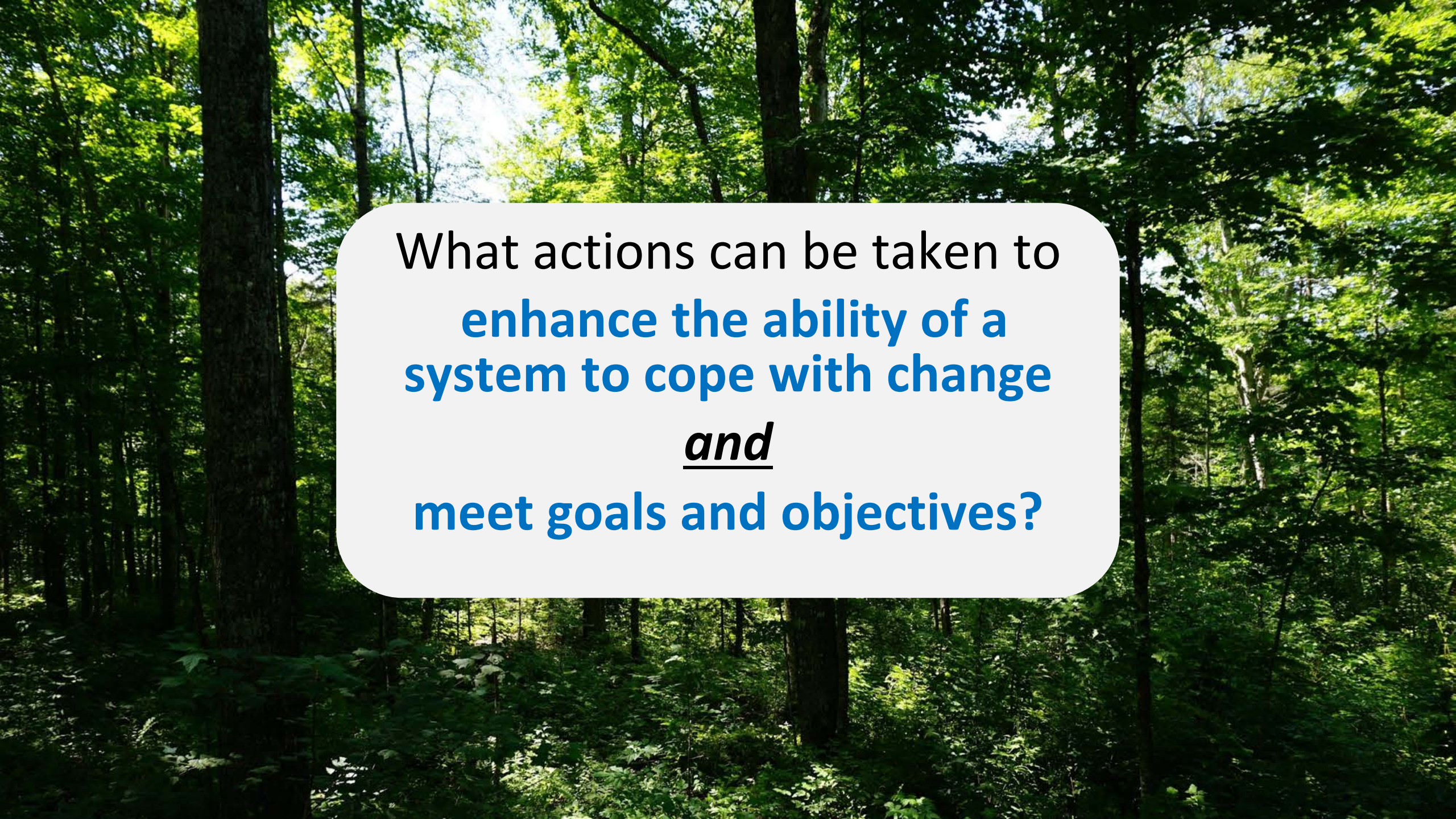


Ecosystem-based adaptation activities build on **sustainable management, conservation, and restoration.**

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

Climate-Driven Changes





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

Adaptation Options - Managing Risk

RESISTANCE



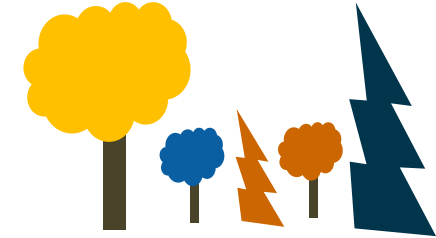
- Improve defenses of forest against change and disturbance
- Maintain relatively unchanged conditions

RESILIENCE



- Accommodate some degree of change
- Return to prior reference condition following disturbance

TRANSITION



- Intentionally facilitate change
- Enable ecosystem to respond to changing and new conditions

← Reduce impacts/maintain current conditions

→ Forward-looking/promote change

Adaptation Concepts - RAD

Resist

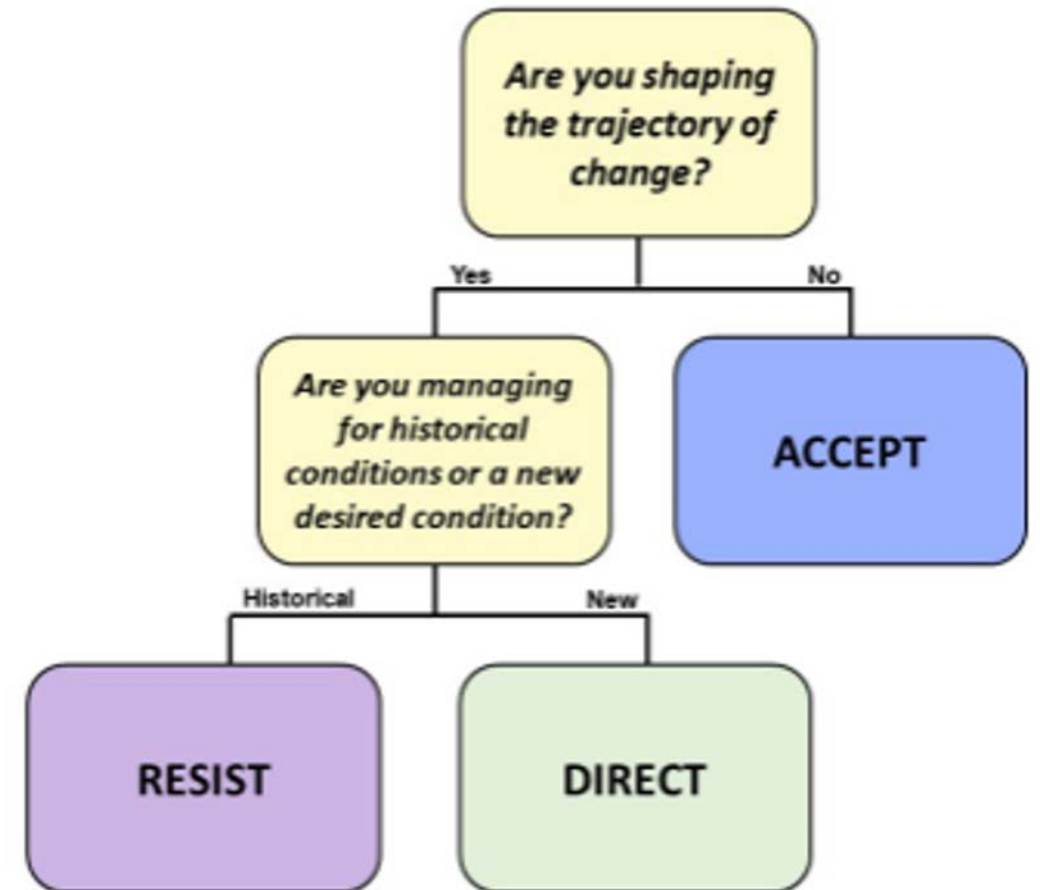
Maintain ecosystem processes, function, structure, or composition based upon **historical** or acceptable current conditions.

Accept

Allow ecosystem processes, function, structure, or composition to change, without intervening to alter their trajectory.

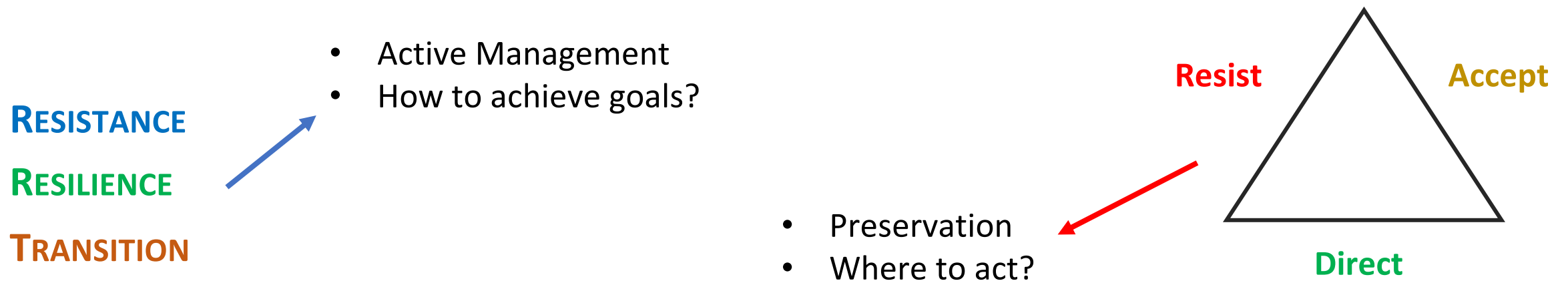
Direct

Actively shape ecosystem processes, function, structure, or composition towards **desired new conditions**.



The Bottom Line

- Different conceptual frameworks may resonate with you depending on where you're coming from.



- All of these are meant to help you communicate what you're trying to do and be explicit about intent.

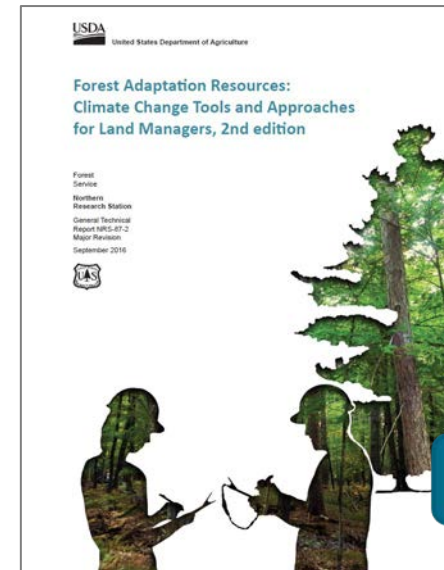
Intentionality

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

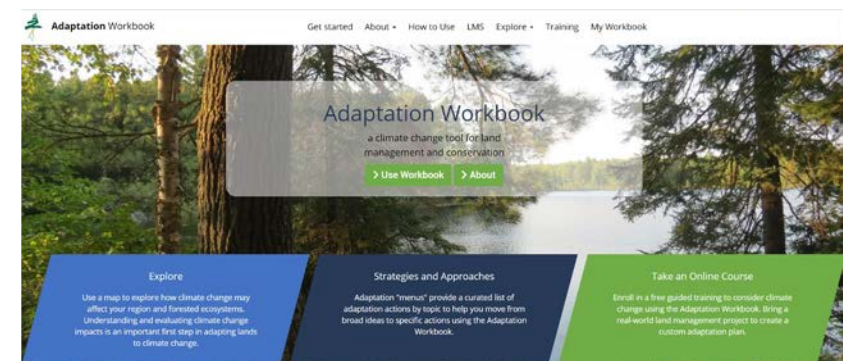
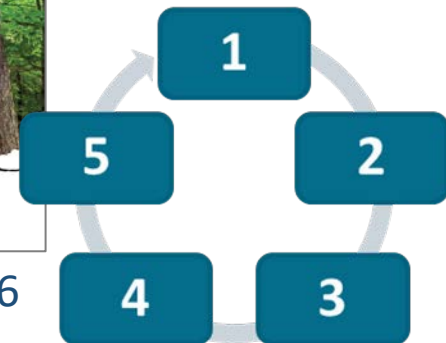


Process: Climate Adaptation Workbook and Adaptation Resources

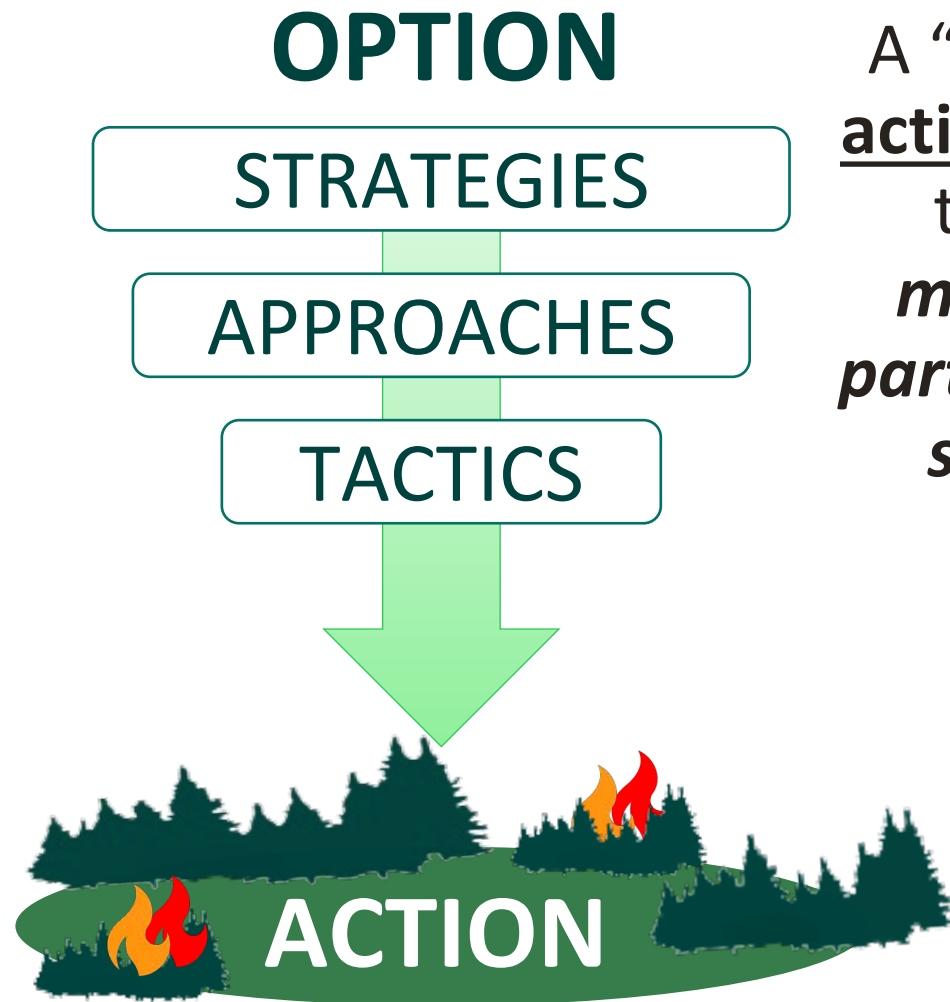
- Flexible 5-step workbook designed for a variety of landowners with diverse goals
- Works at project level
- Centers around manager's expertise, and judgement
- Creates **clear rationale** for actions by connecting them to **broader adaptation ideas**
- **Does not make recommendations**
- **Includes:**
 - Adaptation workbook
 - Adaptation strategies for different resource areas (menus)



Swanston et al. 2016
(2nd edition)



Adaptation Menu of Strategies and Approaches



A “menu” of possible actions that allows you to decide what is *most relevant for a particular location and set of conditions.*

Menu of Adaptation Strategies and Approaches
Developed for forests

Strategy 1: Sustain fundamental ecological functions.
1.1. Reduce impacts to soils and nutrient cycling.
1.2. Maintain or restore hydrology.
1.3. Maintain or restore riparian areas.
1.4. Reduce competition for moisture, nutrients, and light.
1.5. Restore or maintain fire in fire-adapted ecosystems.

Strategy 2: Reduce the impact of biological stressors.
2.1. Maintain or improve the ability of forests to resist pests and pathogens.
2.2. Prevent the introduction and establishment of invasive plant species and remove existing invasive species.
2.3. Manage herbivory to promote regeneration of desired species.

Strategy 3: Reduce the risk and long-term impacts of severe disturbances.
3.1. Alter forest structure or composition to reduce risk or severity of wildfire.
3.2. Establish fuelbreaks to slow the spread of catastrophic fire.
3.3. Alter forest structure to reduce severity or extent of wind and ice damage.
3.4. Promptly revegetate sites after disturbance.

Strategy 4: Maintain or create refugia.
4.1. Prioritize and maintain unique sites.
4.2. Preserve and maintain sensitive or at-risk species or communities.
4.3. Establish artificial reserves for at-risk and displaced species.

Strategy 5: Maintain and enhance species and structural diversity.
5.1. Promote diverse age classes.
5.2. Maintain and restore diversity of native species.
5.3. Retain biological legacies.
5.4. Establish reserves to maintain ecosystem diversity.

Strategy 6: Increase ecosystem redundancy across the landscape.
6.1. Manage habitats over a range of sites and conditions.
6.2. Expand the boundaries of reserves to increase diversity.

Strategy 7: Promote landscape connectivity.
7.1. Reduce landscape fragmentation.
7.2. Maintain and create habitat corridors through reforestation or restoration.

NIACS
et al. 2016. Forest Adaptation Resources. Research Report #2760. www.forestadaptation.org

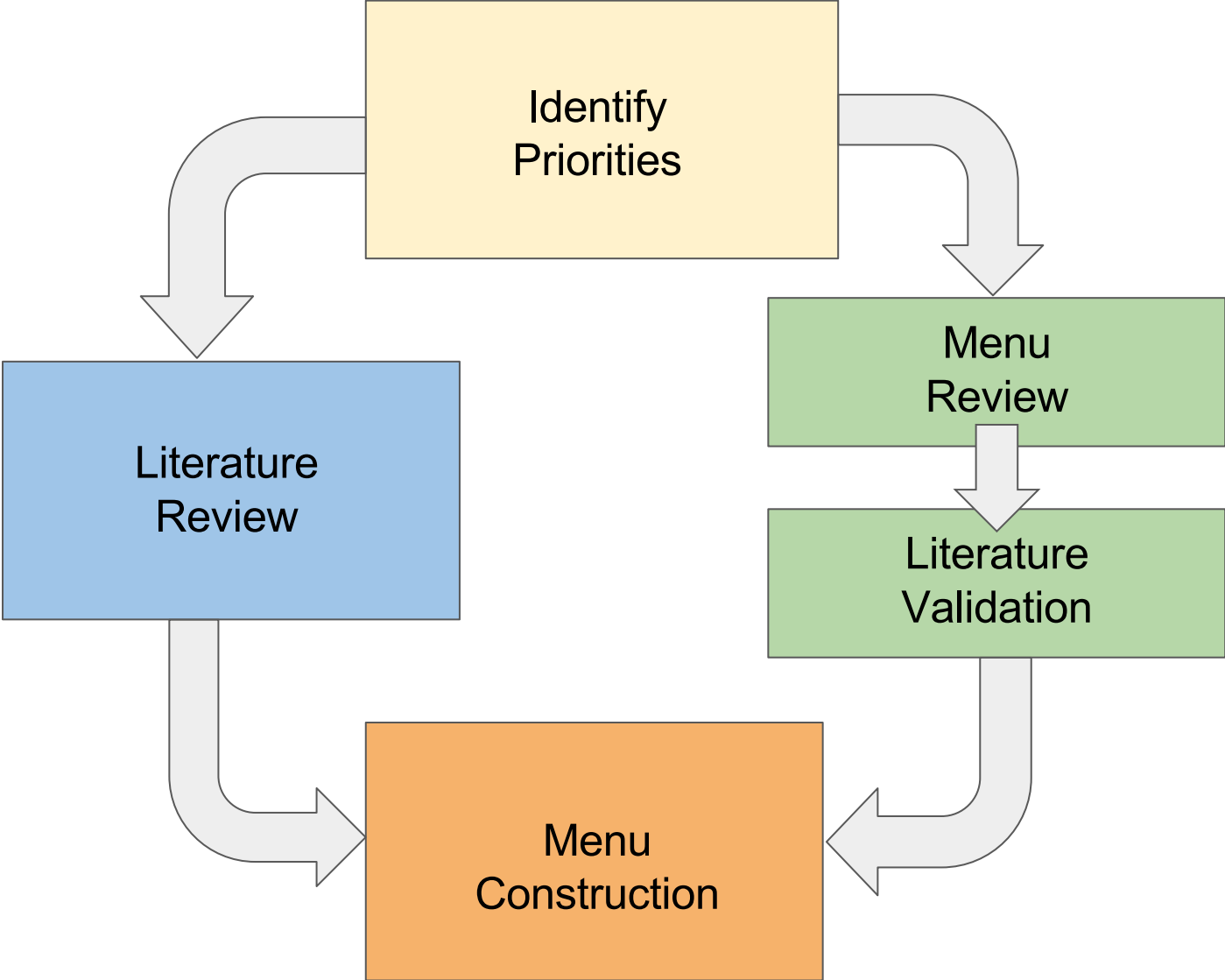


Linking Strategies to Research

- Ensuring Evidence-Based Management
- Identifying contradictory approaches
- Highlighting research gaps
- Supporting stakeholder confidence
- Validating through field testing



Evidence-Based Menu Construction



Adaptation Menu of Strategies and Approaches

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



www.adaptationworkbook.org/niacs-strategies

Options:

- **Foundational adaptation concepts:**
- Resistance, Resilience, Transition or Resist, **Accept**, **Direct**

Strategies:

- Broad adaptation responses that consider:
 - Regional ecological conditions
 - Overarching management goals

Approaches:

- More detailed responses that consider:
 - Site-level conditions
 - Site-level management objectives

Tactics:

- Prescriptive actions designed for:
 - Specific site conditions
 - Specific management objectives

Example: PJ Management Adaptation Menu

OPTION

 Option: **Direct** (facilitate change)

STRATEGIES

APPROACHES

TACTICS



ACTION

Example: PJ Management Adaptation Menu

OPTION

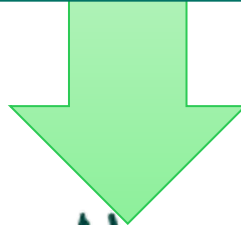
STRATEGIES



Strategy 2: Maintain and restore diversity of native species and diverse habitats

APPROACHES

TACTICS



ACTION

Example: PJ Management Adaptation Menu

OPTION

STRATEGIES

APPROACHES

TACTICS

Approach 2B. Restore favorable soil properties and microbial communities for native plant establishment

ACTION



Example: PJ Management Adaptation Menu

OPTION

STRATEGIES

APPROACHES

TACTICS



Tactic example: Inoculate soil with mycorrhizal fungi and other beneficial soil organisms to enhance native plant survival
(describe when, where and how)



Example: PJ Management Adaptation Menu


OPTION

STRATEGIES

APPROACHES

TACTICS

ACTION



Tactic example: Implement strategic-rest grazing throughout the growing season to increase native plant richness and diversity while still maintaining desirable animal weight gain (describe when, where and how)

Example: PJ Management Adaptation Menu

OPTION

STRATEGIES

APPROACHES

TACTICS

→ Approach 3A. Adjust timing and intensity of grazing to control invasive species and avoid damage to desirable vegetation

ACTION



Example: PJ Management Adaptation Menu

OPTION

STRATEGIES

APPROACHES

TACTICS

Strategy 3. Time management actions to minimize negative impacts on ecosystems and wildlife

ACTION



Example: PJ Management Adaptation Menu

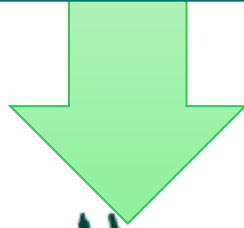
OPTION

 Option: **Direct** (facilitate change)

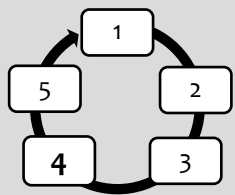
STRATEGIES

APPROACHES

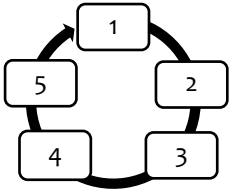
TACTICS



ACTION



Step 4: What actions can help systems adapt to change?

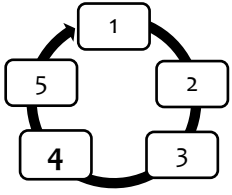


Step 4: Identify and select adaptation approaches and tactics for implementation

- What actions can help cope with change and help meet the project goals and objectives?
- How will future planners know what you were trying to do?
- Consider a variety of actions, including:
 - **Things you already do** that are even more important because of climate change.
 - **Small tweaks or enhancements** that improve upon what you are already doing.
 - **Major changes**, or wild and crazy ideas, from the current way of doing things.



Photos: NPS

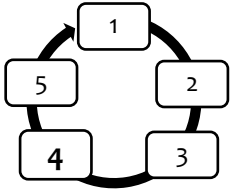


Step 4: Identify and select adaptation approaches and tactics for implementation

Strategies & Approaches – Select from the PJ Menu. Pick any that seem to make sense and help address your biggest climate challenges while achieving your management goals.

Tactic – Describe a specific action you can take.

These details should ideally answer the **what, where, and how** you will implement the actions.



Step 4: Identify and select adaptation approaches and tactics for implementation

Benefits – Describe why the tactic is good.

For example:

- addresses biggest or multiple challenges
- is cheap and easy
- has co-benefits
- is likely to succeed

Drawbacks and Barriers – Describe why it's not so good.

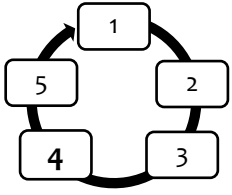
For example:

- it may have negative side effects,
- requires high cost or effort
- may not be successful
- has social, financial, or other barriers

Timeframe – Specify when you will implement the tactic.

For example:

- Summer 2024
- Winter 2024-2025
- Within 3 years of...
- After...
- If... then...

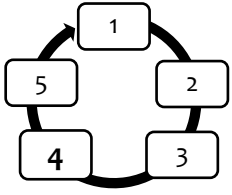


Step 4: Identify and select adaptation approaches and tactics for implementation

Practicability – Is it both **effective** (will meet desired intent) and **feasible** (capable of being implemented)?

- **High:** Yes to both!
- **Moderate:** Yeah, but it will take some additional effort or planning...
- **Low:** No, the barriers/drawbacks seem too big or the benefits too small.





Step 4: Identify and select adaptation approaches and tactics for implementation

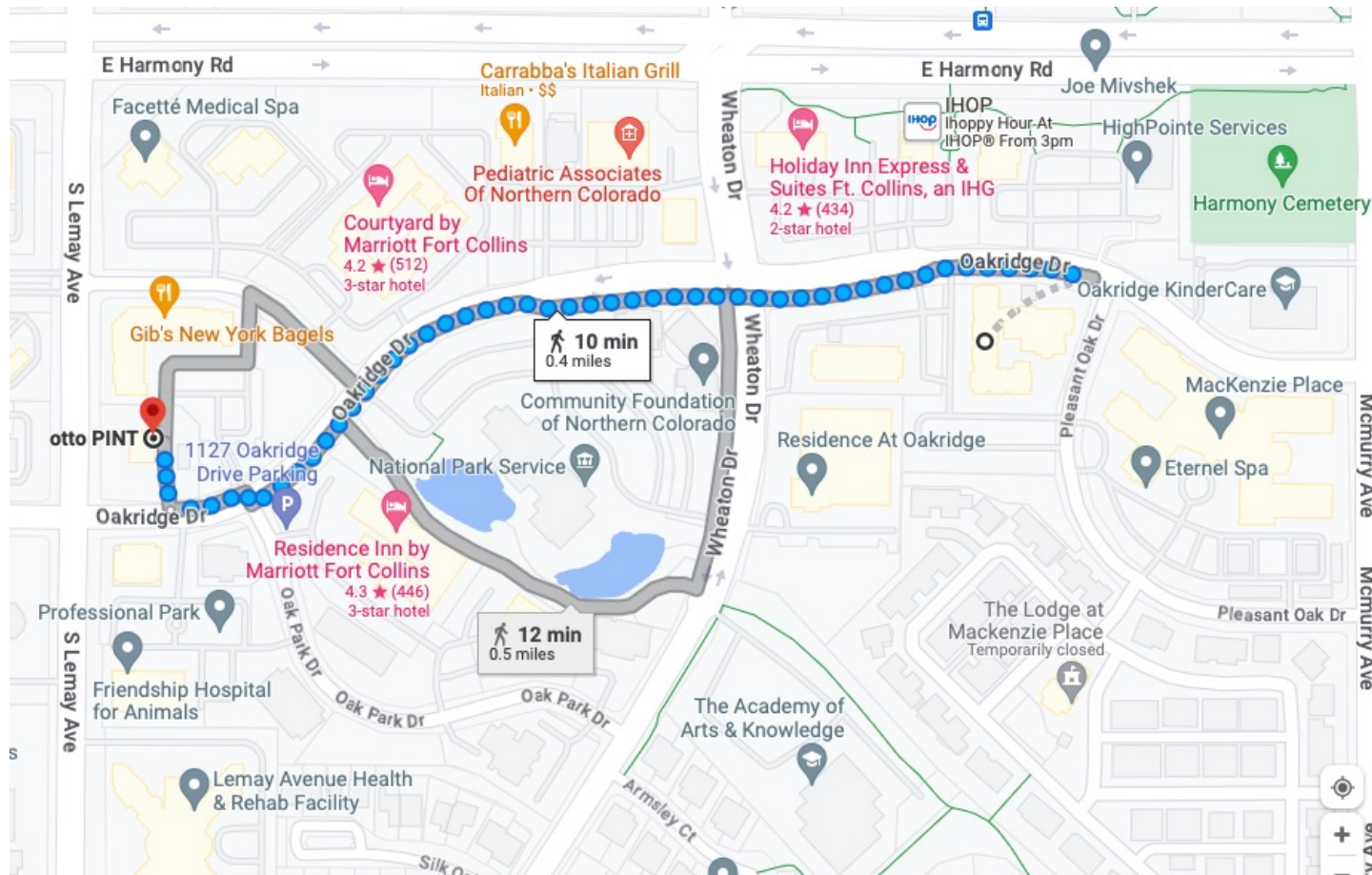
Recommend Tactic– Given all this, is this tactic likely to be helpful?

- *Also consider: trade-offs, urgency, likelihood of success, cost, and effort...*

Yes: look to integrate into plan, prescription, or other activities

No: not useful at this time





Join Us for Happy Hour!

6:00 p.m. at Otto Pint

1100 Oakridge Drive, Fort Collins, CO

Pinyon & Juniper Adaptation & Management Workshop

Thursday, October 12, 2023 from 9 a.m. – 5 p.m. MT

Friday, October 13, 2023 from 8 a.m. – 12 p.m. MT

Homewood Suites by Hilton, 1521 Oakridge Dr, Fort Collins, CO 80525



Photo: NPS, The Temples and Towers of the Virgin Veiled in fog, Zion NP



Photo: A. Ennis



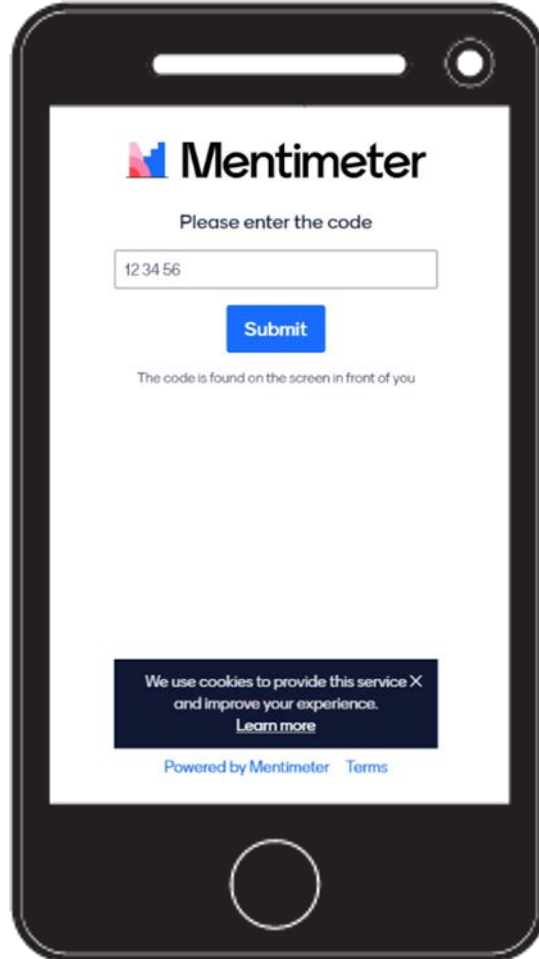
Photo: Mo Ewing





Reflections from Day 1

PJ Menu Discussion



- Find your way to [menti.com](https://www.menti.com)
- Access on your computer or use your phone!



PJ Management Adaptation Menu Discussion

Q1: Did you think of an tactic that wasn't captured by one of the Approaches?

Q2: Overall, were the approaches you selected geared toward resisting climate change, directing change to align with future conditions, or accepting change?

Q3: Do the approaches you selected help reduce the biggest impacts you identified?

Q4: Do your approaches address the challenges you identified, capitalize on opportunities, and help you meet your goals and objectives?



Break



Feedback on PJ Management Adaptation Menu

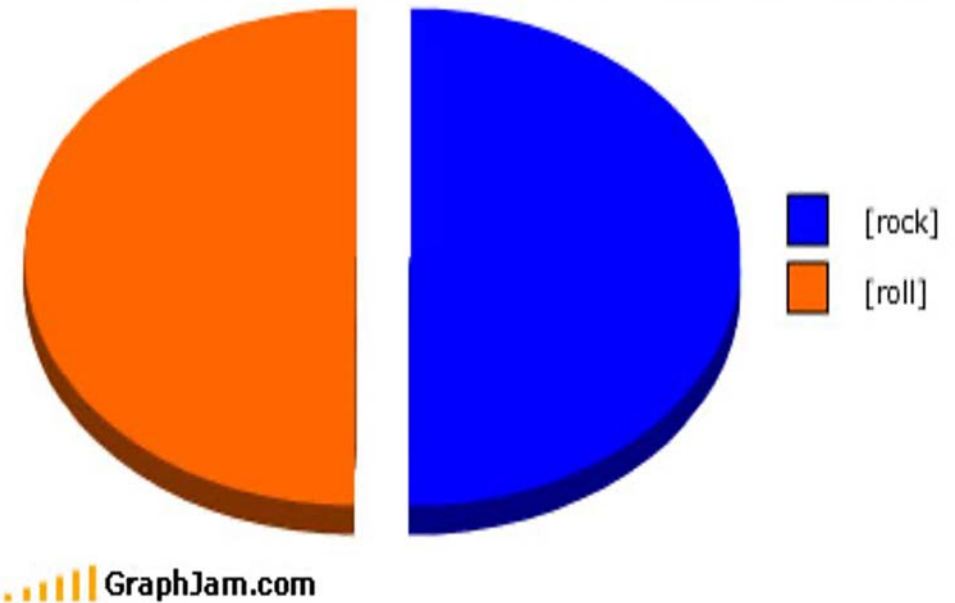
- What did you like about the Pinyon & Juniper Management Adaptation Menu? Which ideas or concepts were described well? Were there any you found particularly useful?
- What could use improvement? Are there terms/ statements that were confusing or misleading? Please list your ideas.
- Are there missing topics in the menu? Were you expecting to find something that wasn't there?
- In what situations do you think it would be most useful to use this menu?

How are Menus Created?

Recipe:

- A need from the community
- Partners
- Literature review
- Vetting in real-world situations
- Peer-review
- Publication

MATERIAL USED TO BUILD THIS CITY



Adaptation Menu: Benefits

Address challenges in implementing adaptation:

1. Connecting broad ideas to specific actions
2. Making actions intentional
3. Communicating your ideas
4. Boosting creativity

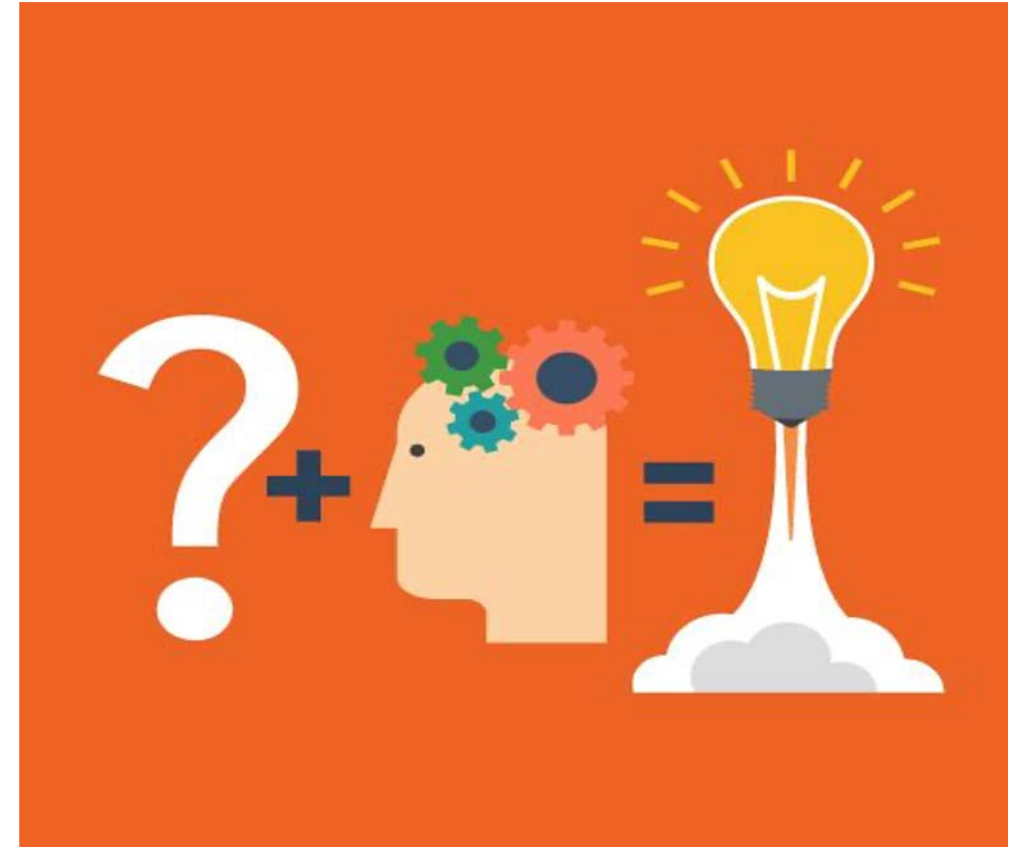
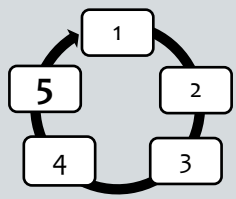
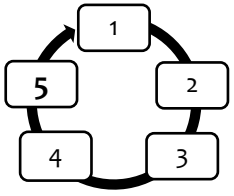


Photo: Aly Ennis



Step 5: MONITOR and evaluate effectiveness of implemented actions.



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Purpose: Practice adaptive management

Key Questions:

- How will you know if your actions were effective?
- What can you learn to inform future management?
- Provide an example of something you could monitor to evaluate whether your project actions helped to both achieve your goals and increase your area's ability to adapt to changing conditions.



A Few Thoughts about Monitoring

- Learning about our actions is useful
- Our track record is not very good

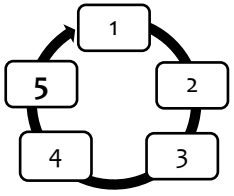




Types of Monitoring

Be VERY CLEAR about the question you are asking - this guides the monitoring approach:

- **Effectiveness monitoring** = Did our actions actually have the desired effect?
- **Scientific research** = Is this outcome statistically significant compared to a control? Could we expect similar results elsewhere?
- **Impact/response monitoring** = What changes are occurring?
- **Implementation monitoring** = Did we do the action?



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!***

Workbook + Menu

Management Goals & Objectives

Climate Change Impacts

Challenges & Opportunities

Intent of Adaptation (Option)

Make Idea Specific (Strategy, Approach)

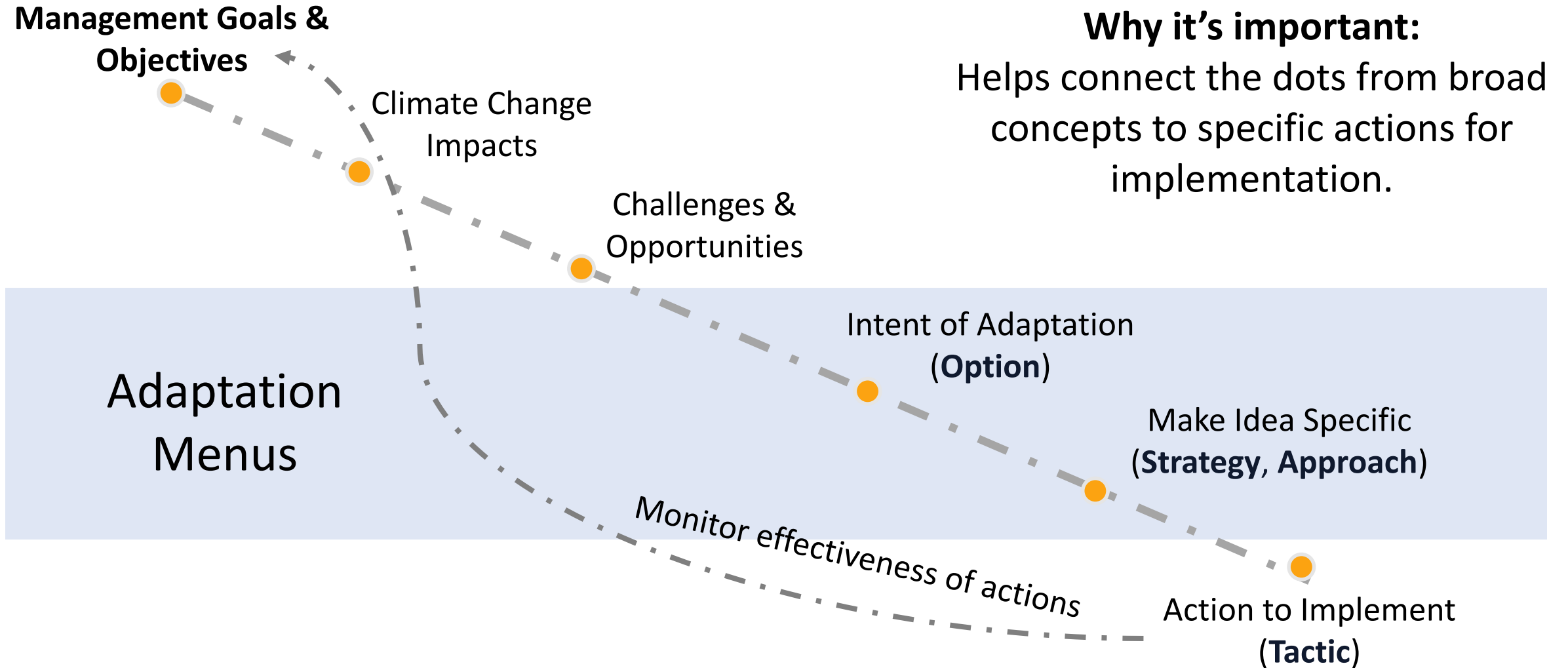
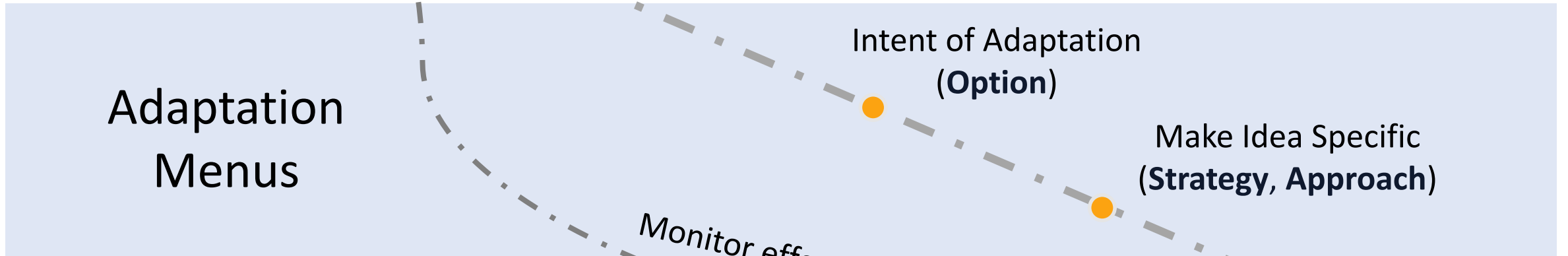
Action to Implement (Tactic)

Why it's important:

Helps connect the dots from broad concepts to specific actions for implementation.

Adaptation Menu

Monitor effectiveness of actions



Monitoring Discussion

- Provide an example of something you could monitor to evaluate whether your project actions helped to both achieve your goals and increase your area's ability to adapt to changing conditions.
- What are the key monitoring questions that could help determine if adaptation actions are successful?
- What monitoring indicator(s) should we be using?
- How could we complete this monitoring (e.g. building on existing data or resources, potential partners)?



Photos: <https://cfri.colostate.edu/expertise/forest-science/>





What is one research or management priority you have after participating in this workshop?



Please provide your feedback on this workshop! We appreciate it!



Thank you!

