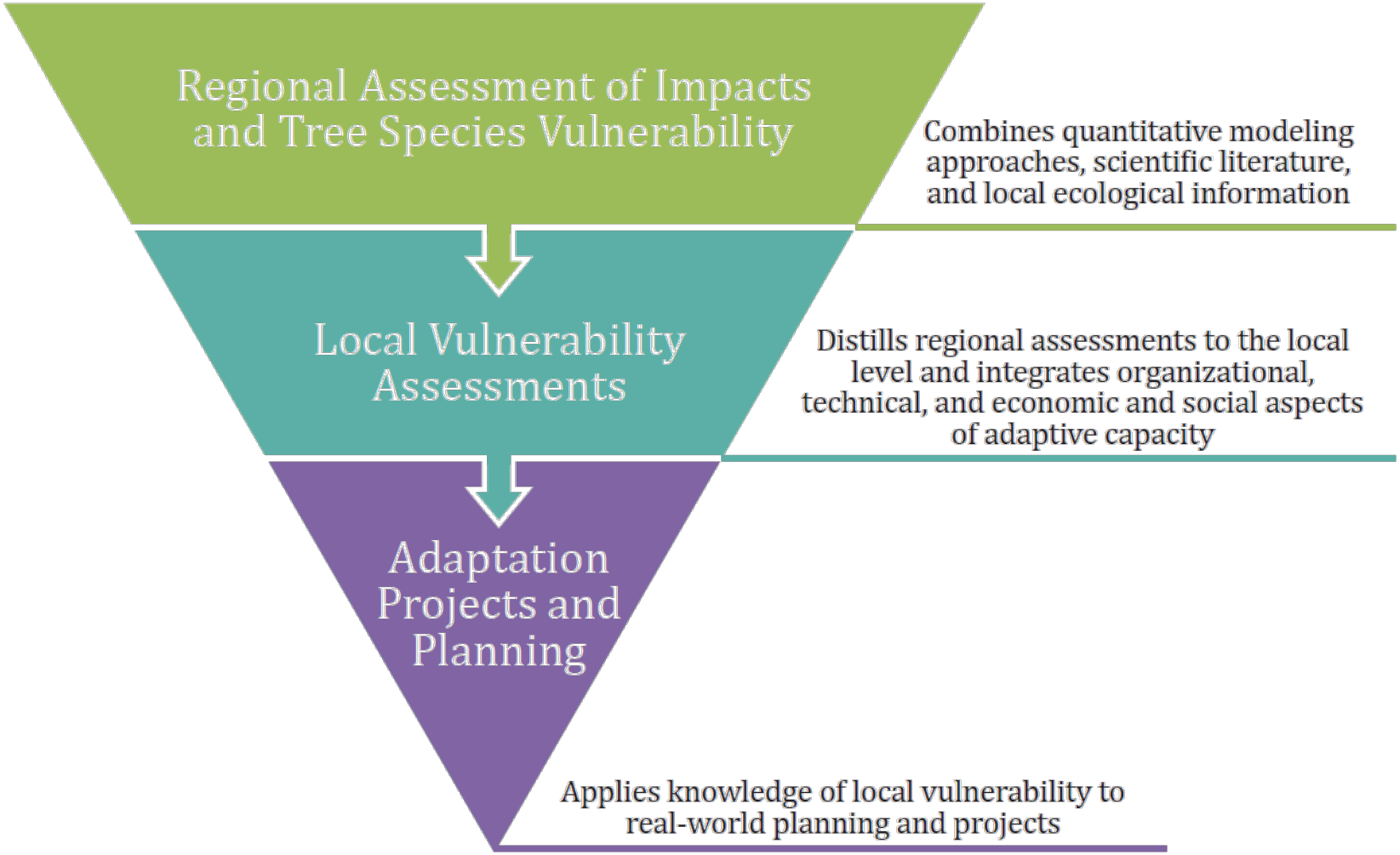
URBAN FOREST ADAPTATION PLANNING AND PRACTICES

November 16, 2016

NIACS
Northern Institute of Applied Climate Science

FOREST SERVICE
US
DEPARTMENT OF AGRICULTURE

Urban Forestry
Climate Change Response Framework



Brandt et al. 2016. Environmental Science and Policy

Two Questions

1. How might climate change affect the resources that I manage?

2. What actions could help prepare for those effects?

Forest Adaptation Resources

- Designed for a variety of land managers with **various goals** and **objectives**
- Tailored to **eastern forests in rural and urban areas**
- **Does not make recommendations**
- Two menus of adaptation **strategies & approaches,** including one for urban forest ecosystems

http://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs87-2.pdf

ADAPTATION WORKBOOK

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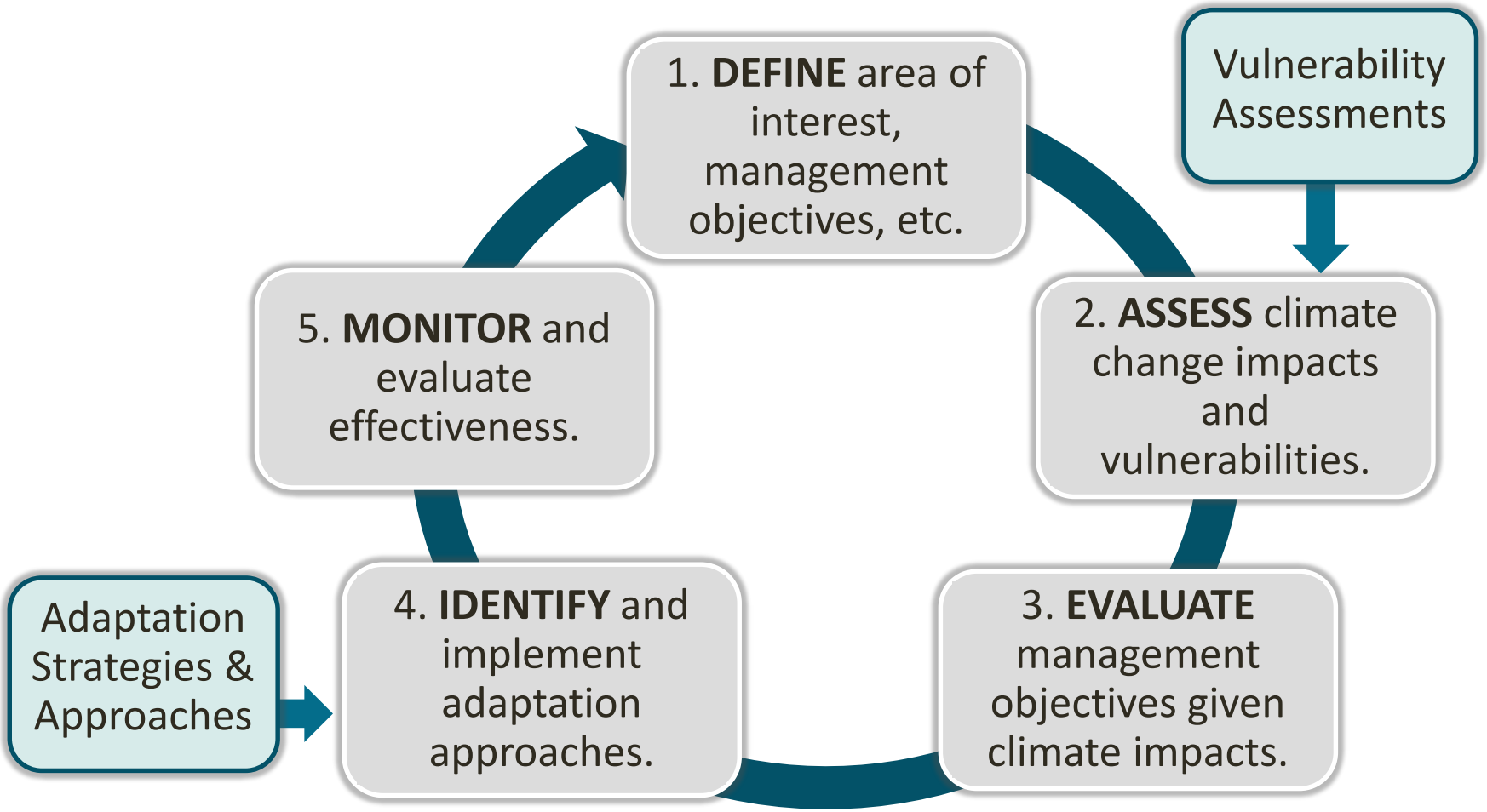


Swanston et al. 2016; http://www.fs.fed.us/nrs/pubs/gtr/gtr_nrs87-2.pdf

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

Key Question:

- Where are you working?
- What are your management goals and objectives for this area?

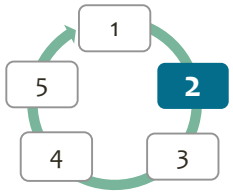
INTRODUCTIONS

- Walk the rest of us through what your project is about (location, ecosystem types, key goals/objectives)
  - A few *brief* comments, please!

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

Key Question:

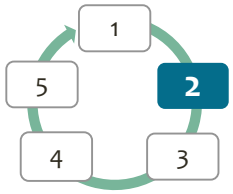
- How might the area be uniquely affected by climatic change and subsequent impacts?
- How might regional impacts be different in the project area?



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

Regional Impact	Local Considerations
Winter low temperatures may increase.	
Summer high temperatures may increase.	
Heavy rain events could increase the frequency and severity of flooding events.	
Increases in precipitation could lead to increased soil moisture in the winter and spring.	
Decreases in summer or fall precipitation could lead to decreases in soil moisture later in the growing season.	
Severe thunderstorms with heavy winds may become more frequent in the future.	
Winter storms may become more intense.	
Many trees at the southern end of their natural or planted range are expected to experience a decrease in habitat suitability.	
Many trees at the northern end of their natural or planted range are expected to experience an increase in habitat suitability.	

- Circle your top 5 impacts

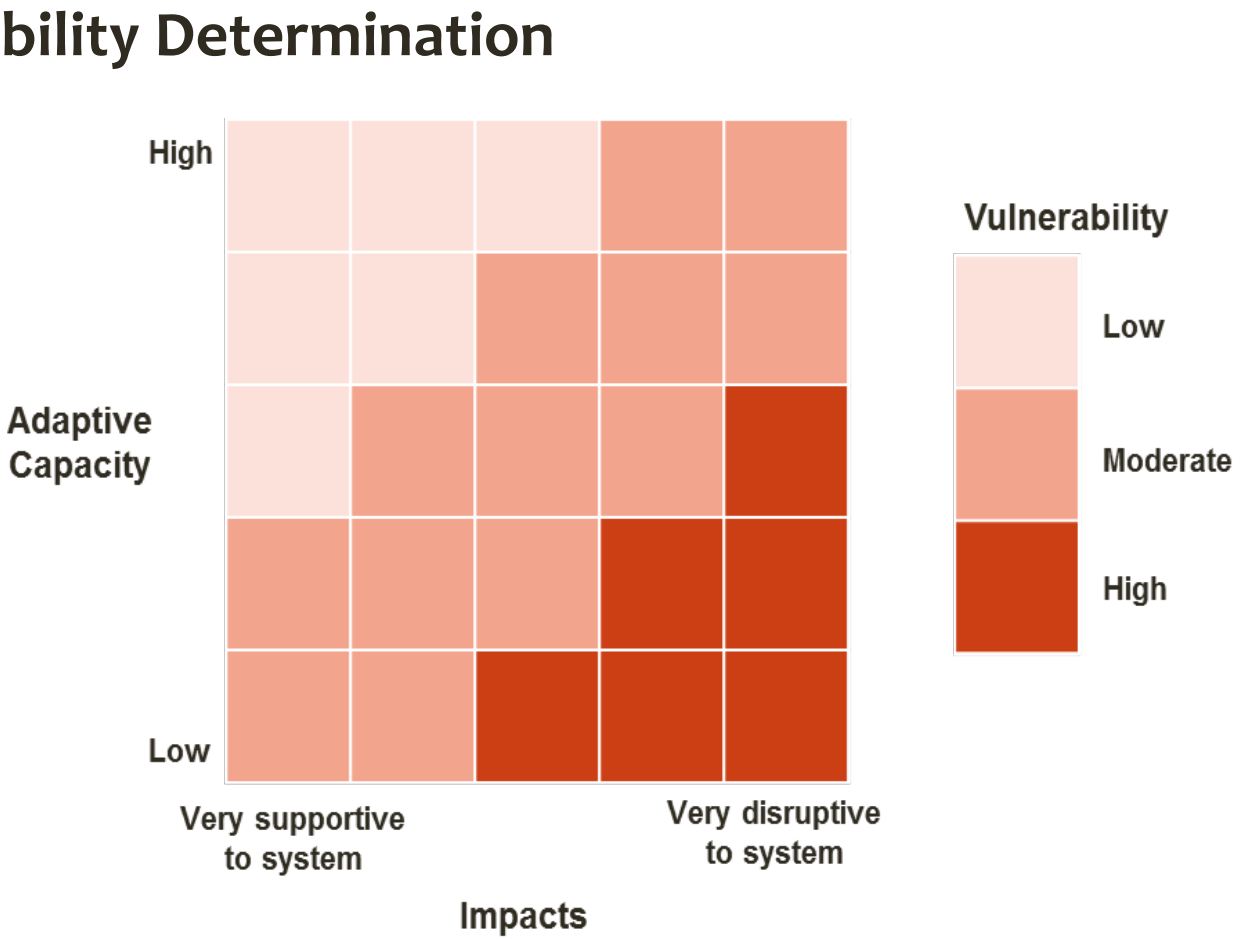


Step 2: ASSESS site-specific climate change impacts and vulnerabilities.

Adaptive Capacity Factors	**Answer**	
Is the species composition sufficiently diverse? (ie. no overabundance of a particular family, genus or species)	YES	NO
Is there a high level of genetic/seed source diversity within the tree species planted in your area?	YES	NO
Are species or genotypes arranged spatially (either naturally or artificially) across your area to reduce high concentrations of one type in a particular location (e.g. alternating street tree species within a block or between blocks)?	YES	NO
Do you have a high diversity of age classes in your tree canopy?	YES	NO
Are the trees in the area generally in good health/free of damage?	YES	NO
Is your area currently overseen by a tree board and/or department staffed with forestry professionals?	YES	NO
Is a tree care ordinance or planting list in place that is sufficiently flexible to allow for adjustments in species in light of climate change?	YES	NO
Are current nursery suppliers able to provide a wide mix of species and cultivars?	YES	NO
Does your area have a current and comprehensive tree inventory?	YES	NO
Does your area currently have a disaster recovery/response plan?	YES	NO
Are the majority of trees in the area receiving routine care and maintenance?	YES	NO

- Circle your top 5 adaptive capacity factors

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

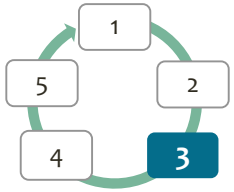


STEP 3

Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Key Question:

- What management challenges or opportunities might occur?
- Can current management meet management goals?
- Do goals need to change?

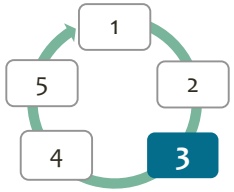


Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Purpose:

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

Can current management achieve goals?



Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Sub-areas, Management Objective

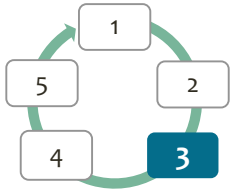
Challenges

Opportunities

Feasibility under Current Management

Other Considerations

From Step 1



Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Management Objective

Challenges

Opportunities

Feasibility under Current Management

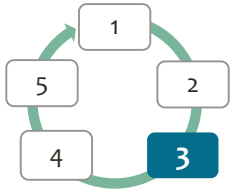
Other Considerations

How climate change impacts and vulnerabilities may make it more difficult to achieve the objective.

For example:

- *Reduced suitable habitat for target species*
- *Reduced window for prescribed fire.*
- *More watering required to establish young trees*

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



Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Management Objective

Challenges

Opportunities

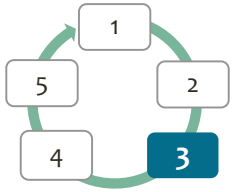
Feasibility under Current Management

Other Considerations

How climate change impacts and vulnerabilities may make it easier to achieve the objective.

For example:

- *Reduced competition*
- *Increased growth*
- *Climate conditions more in line with target species*



Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Management Objective

Challenges

Opportunities

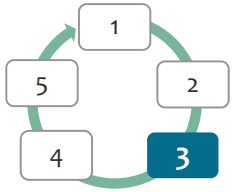
Feasibility under Current Management

Other Considerations

Is current management adequate for meeting the objectives given climate change?

High: we can do it!
Opportunities> Challenges

Low: We'll need more resources or effort.
Challenges>Opportunities



Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Management Objective

Challenges

Opportunities

Feasibility under Current Management

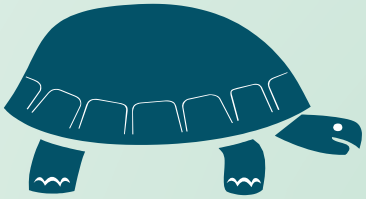
Other Considerations

Social, administrative, financial, or other factors that also affect the ability to meet the objectives.

For example:

- *Rare species or high social value – we'll manage for it regardless*
- *Best chance of success – go for the long shot*

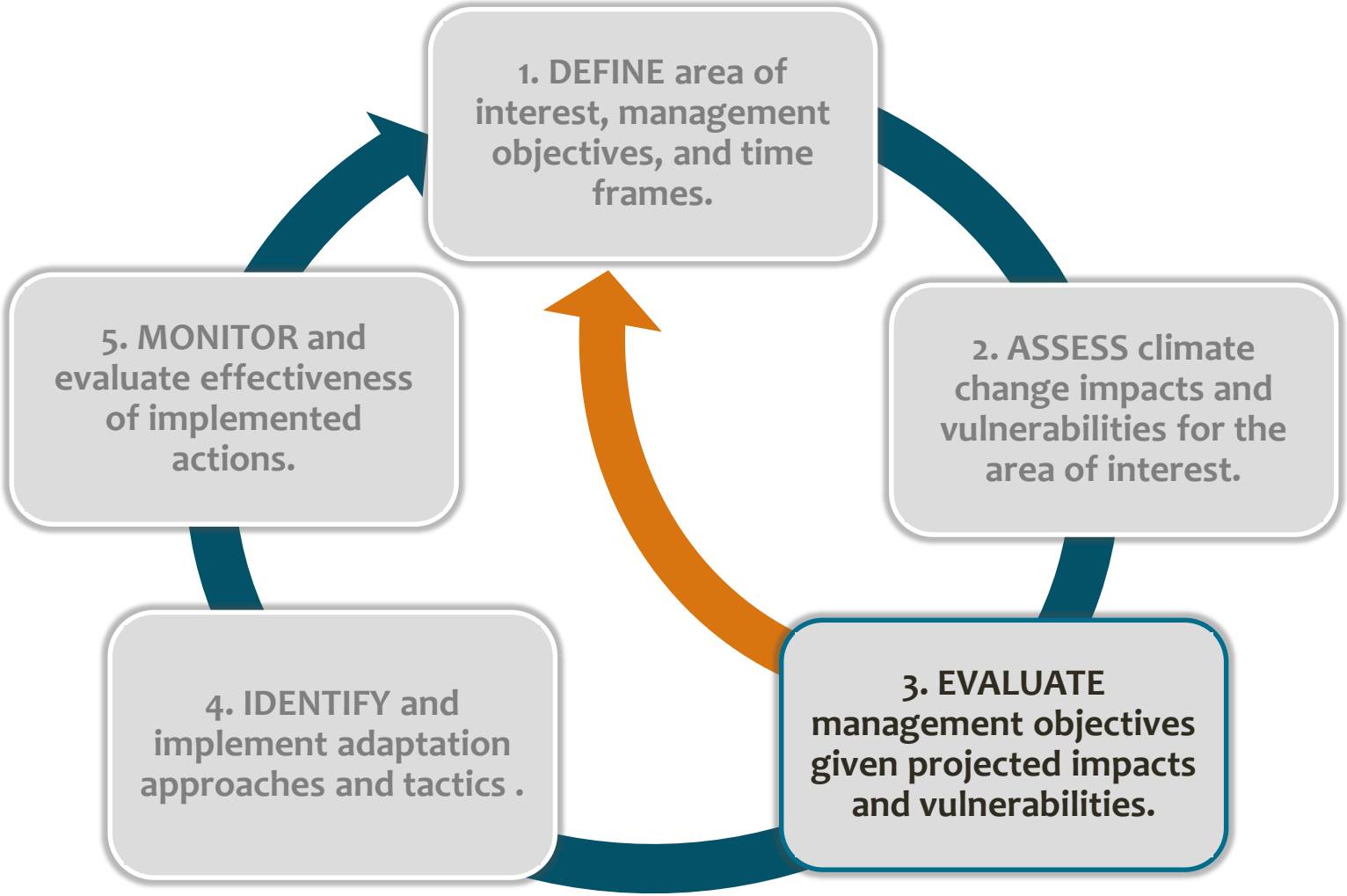
Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.



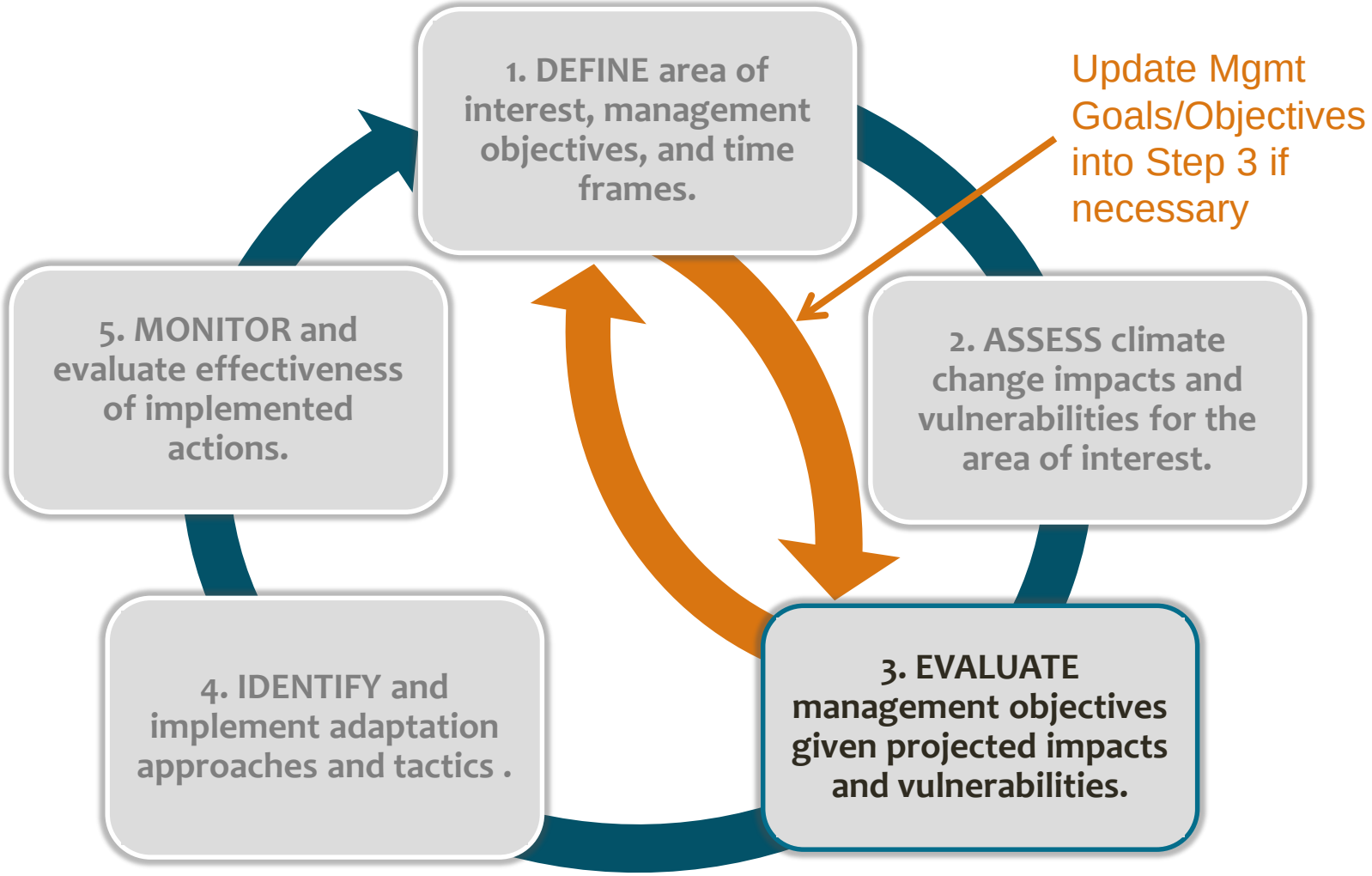
Slow down!

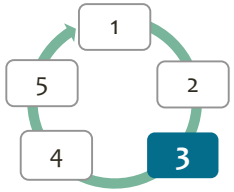
Are you going to continue with these management objectives?

Workbook Cycle: Step 3



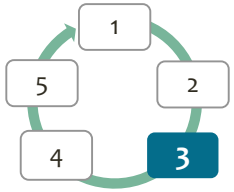
Workbook Cycle: Step 3





Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

- **What management challenges or opportunities might occur?**
- **Can current management meet management goals?**
- **Do goals need to change?**



Step 3: EVALUATE management objectives given projected impacts and vulnerabilities.

Mgmt. Obj.	Challenges	Opportunities	Feasibility of Meeting Obj. (Current Mgmt)
• Manage invasive species.	• Increased range of southern invasive species • Longer growing season for invasive species.	• Some invasive species might be negatively impacted • Increased opportunity for additional control methods	• Medium

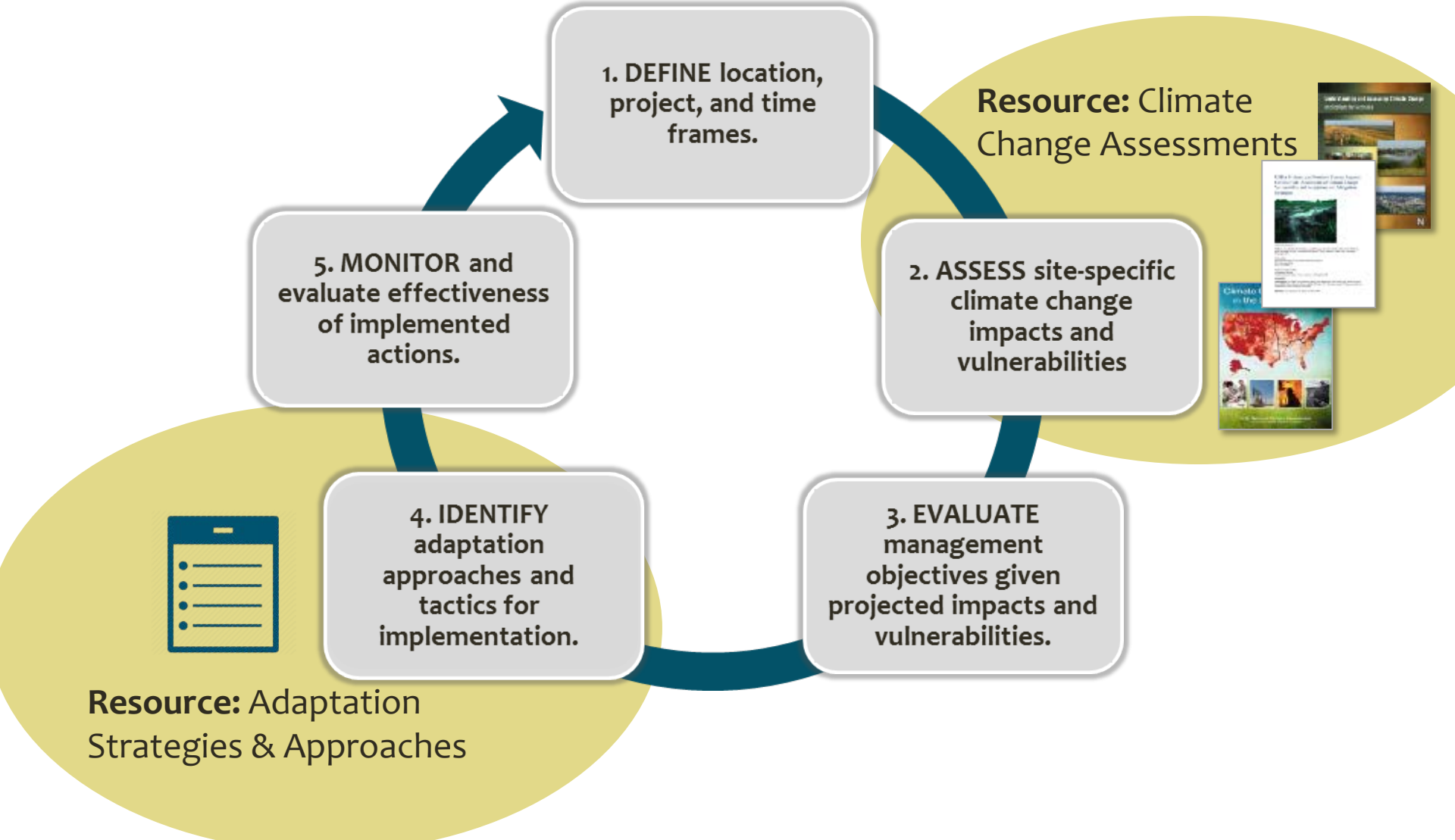
STEP 4

Step 4: IDENTIFY adaptation approaches and tactics for implementation.

Key Question:

- What actions can enhance the ability of the project area to adapt to anticipated changes and meet management goals?

Adaptation Workbook Process



BRIEF RE-CAP

What actions can be taken to

enhance the ability of a system to cope with change

and

meet your goals and objectives?

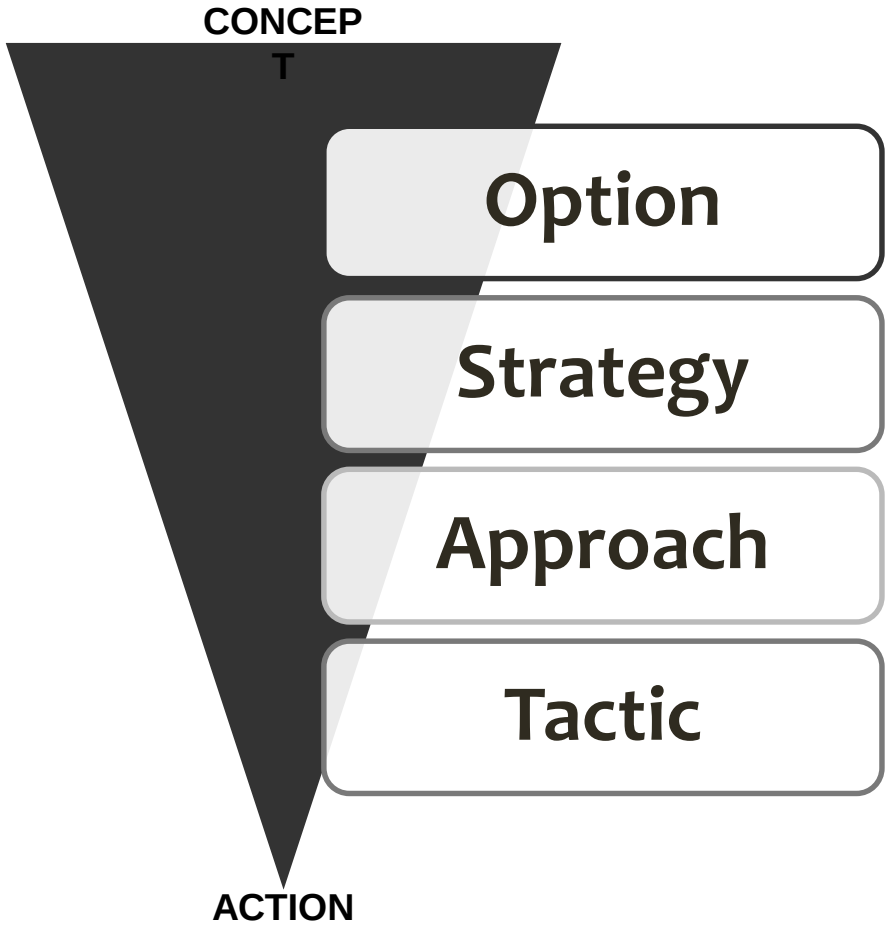
Actions for Adaptation

Adaptation actions are designed to specifically address climate change impacts & vulnerabilities in order to meet climate-informed goals/objectives.

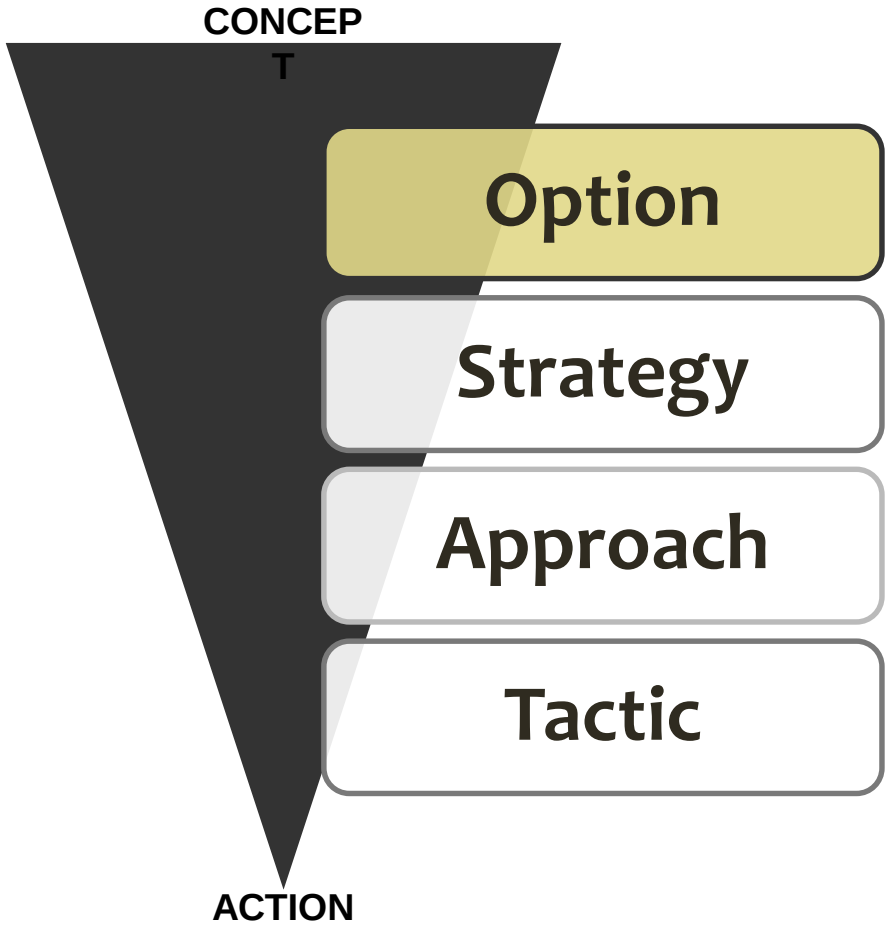


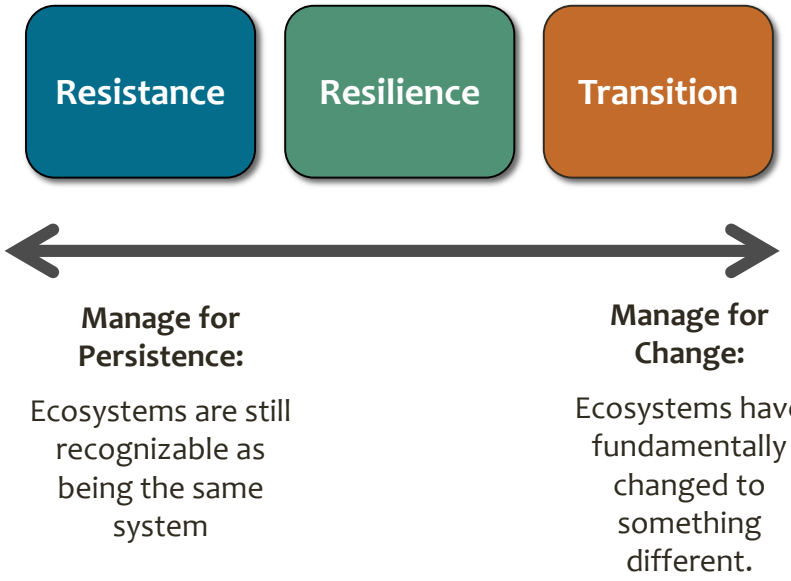

Actions might be the same/similar to what you're already doing, but its necessary to explore potential modifications to address climate change.

Adaptation Strategies and Approaches



Adaptation Strategies and Approaches





When you might emphasize…

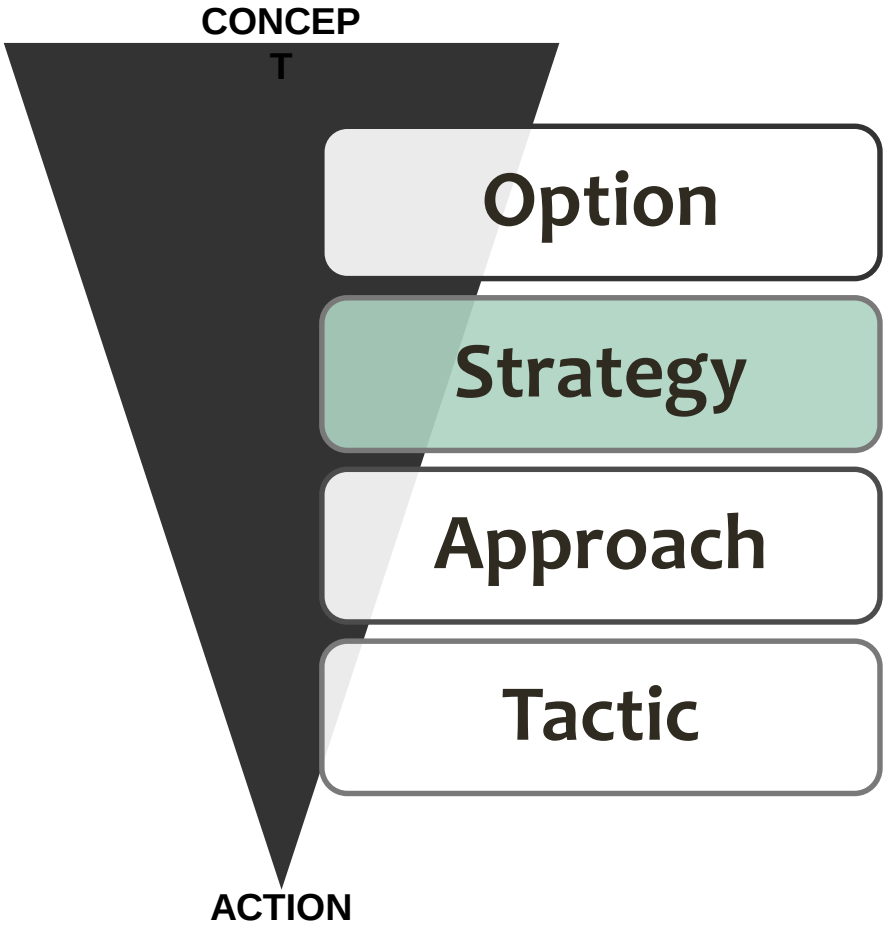
Persistence (Same/Similar)

- High economic or social value associated with current condition
- Inherent ability to buffer changes
- Highly vulnerable, but place represents best chance of success

Change (Future-adapted)

- High likelihood that current conditions will fail, making change is necessary
- Changes are already occurring, and can be enhanced
- Good opportunity to try something new

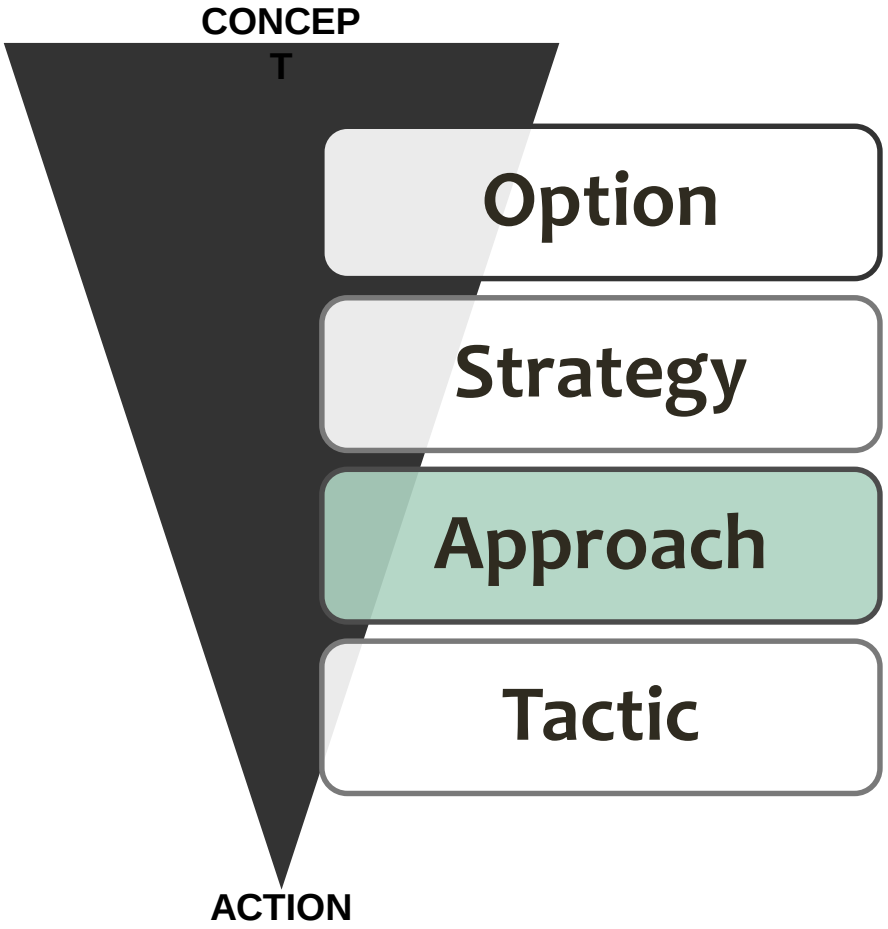
Adaptation Strategies and Approaches



Broad adaptation responses

- *Sustain fundamental ecological functions*
- *Reduce the impact of existing biological stressors*
- Reduce the risk and long-term impacts of severe disturbances.
- *Facilitate community adjustments through species transitions*

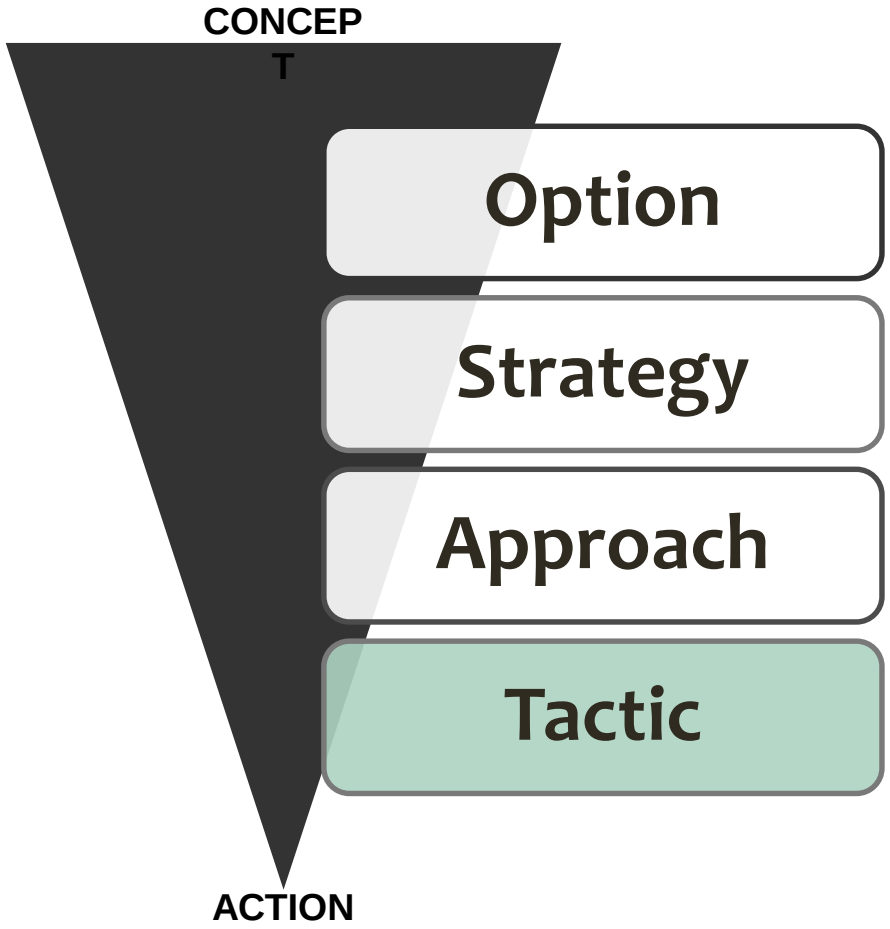
Adaptation Strategies and Approaches



More specific actions

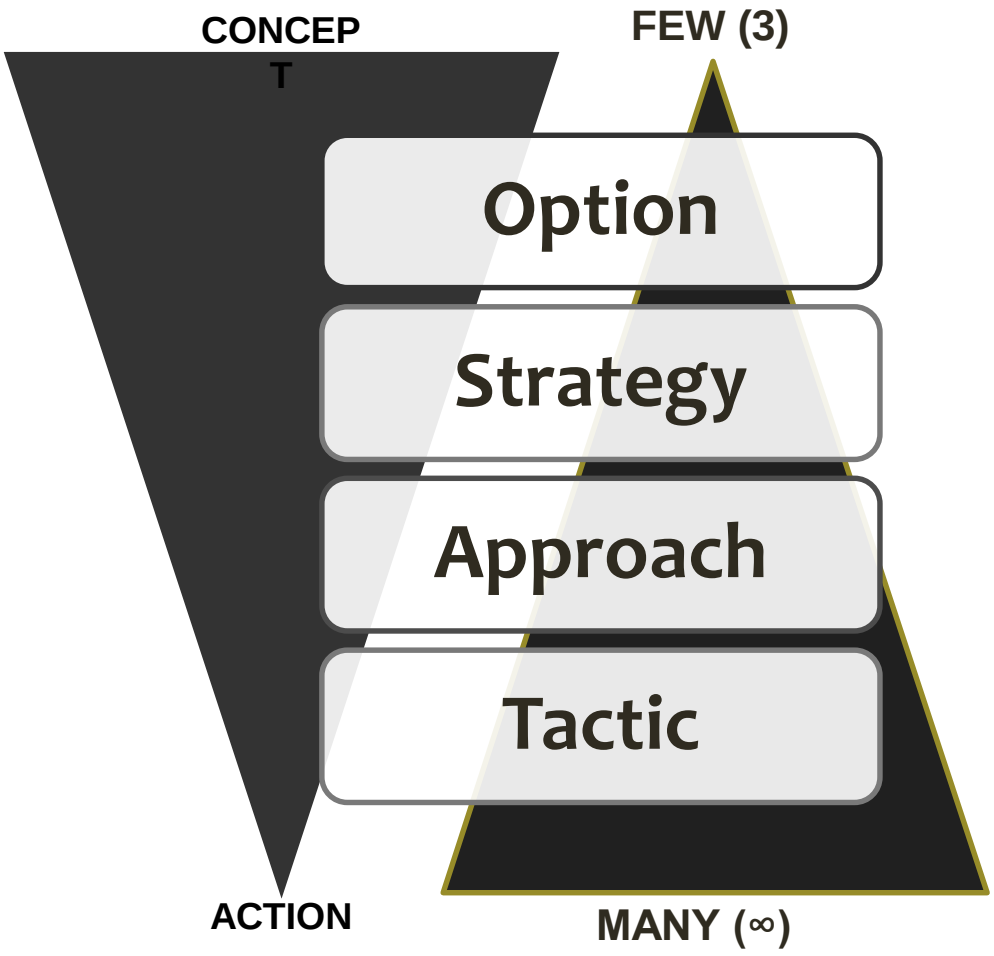
- Manage for species or genotypes with wide moisture and temperature tolerances.
- Introduce species that are expected to be adapted to future conditions.
- Move at-risk species to locations that are expected to provide habitat.

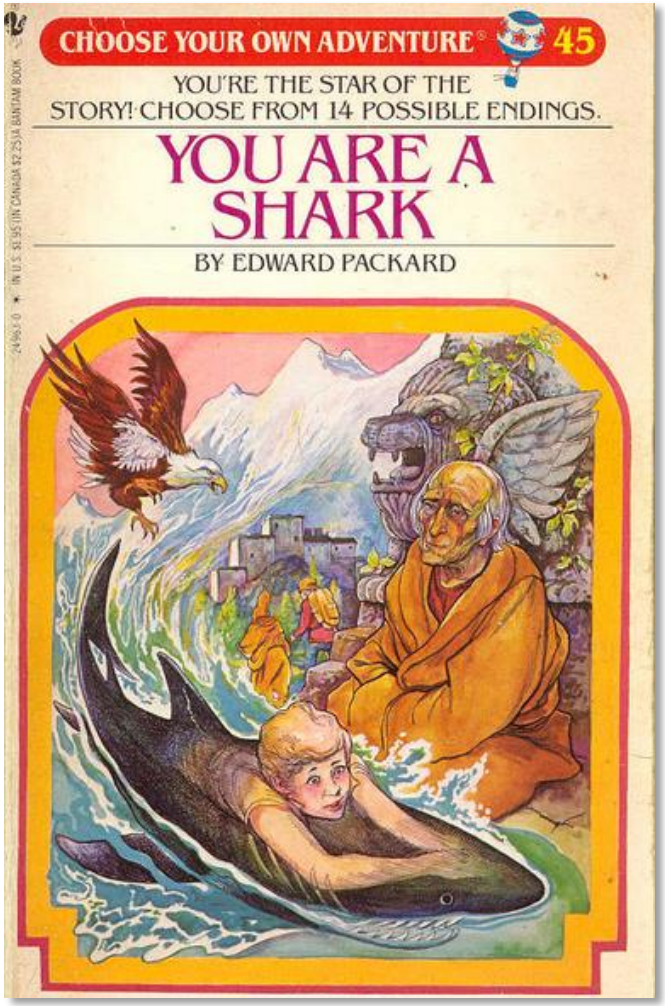
Adaptation Strategies and Approaches



Prescriptive actions selected by producer that are designed for individual site conditions and management objectives

Adaptation Strategies and Approaches





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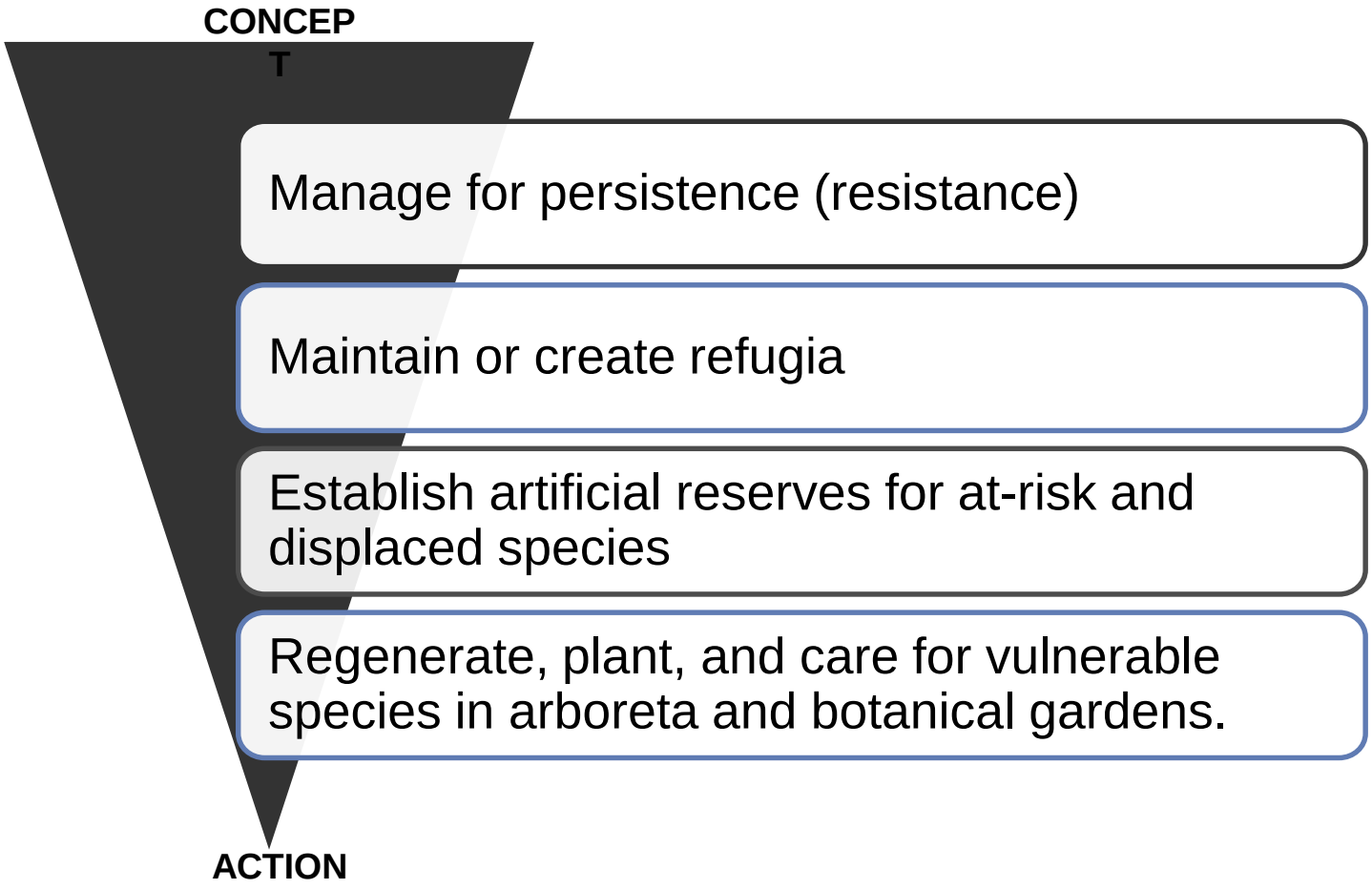

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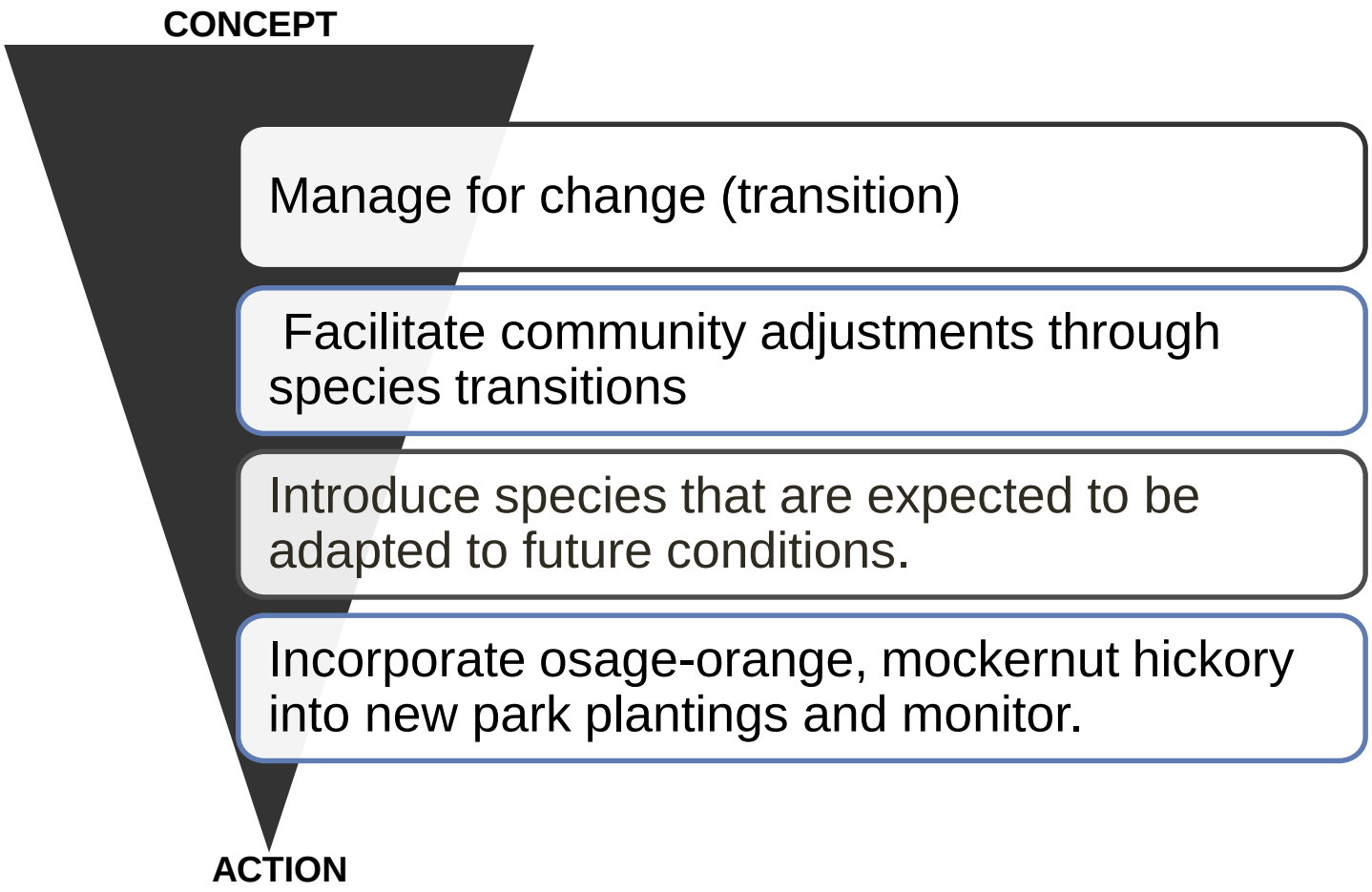

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Key Question:

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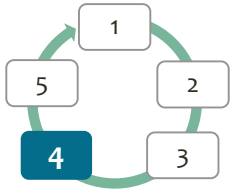


Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

Adaptation Approach

Tactic

Time Frame

Benefits

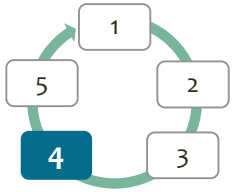
Drawbacks and Barriers

Practicability

Recommend Tactic?

Select from the menu of adaptation strategies and approaches.

Pick any that seem to make sense and help address the challenges identified in step 3.



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Adaptation Approach

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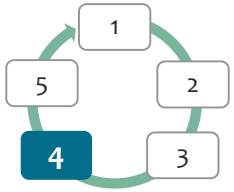
Recommend Tactic?

How the adaptation approach will be implemented.

For example:

- *Restore fire through low-intensity prescribed burn every 3-5 years*
- *Increase genetic diversity by acquiring seed from one seed zone south*

Note: There may be multiple approaches for a single tactic, or vice versa.



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Benefits

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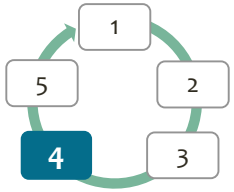
Recommend Tactic?

Timing for the tactics

For example:

- *Summer 2014*
- *Winter 2013-2016*
- *Within 3 years of…*
- *After…*



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Adaptation Approach

Tactic

Time Frame

Benefits

Drawbacks and Barriers

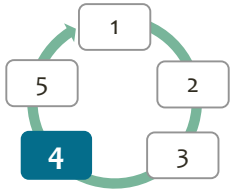
Practicability

Recommend Tactic?

Why it's good

For example:

- *Addresses biggest or multiple challenges*
- *Cheap, easy*
- *Co-benefits*
- *Likely to succeed*



Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

Adaptation Approach

Tactic

Time Frame

Benefits

Drawbacks and Barriers

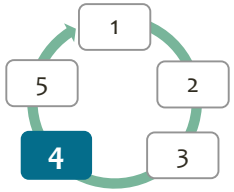
Practicability

Recommend Tactic?

Why it's not so good

For example:

- *Negative side effects*
- *High cost or effort*
- *Social, financial, or other barriers*
- *Uncertainty of success*



Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

Adaptation Approach

Tactic

Time Frame

Benefits

Drawbacks and Barriers

Practicability

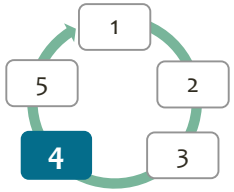
Recommend Tactic?

Is it both effective and feasible?

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.*



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Adaptation Approach

Tactic

Time Frame

Benefits

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Practicability

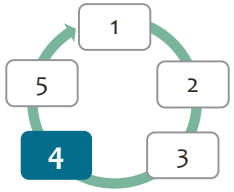
Recommend Tactic?

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*



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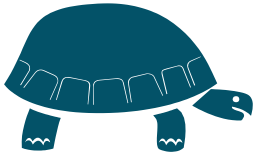
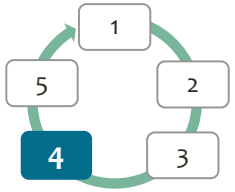


Slow down!

Are you going to continue with the adaptation tactics that have been selected?

Re-cap

- Best management principles, but applied in the context of climate change
- Hierarchy helps organize and justify adaptation actions
- Menu allows user to pick and choose actions that are relevant to their situation
- Managers design tactics to suit particular needs



Step 4: IDENTIFY and adaptation approaches and tactics for implementation.

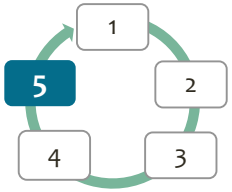
Adaptation Approach	Tactic	Consider:	Recommend Tactics?
• Maintain or restore hydrology	• Create an incentive program that encourages residents and businesses to install infiltration practices • Adopt ordinances that require development plans to mimic predevelopment hydrology	• Benefits • Drawbacks/ Barriers • Practicability	Yes
• Prevent the introduction and establishment of invasive plant species and remove existing invasives	• Expand funding to remove shrub honeysuckle and other invasive species through volunteer workdays and contracted removal • Arial photography to map honeysuckle.		Yes

STEP 5

Step 5: MONITOR and evaluate effectiveness of implemented actions.

Key Question:

- How do we know if the selected actions were effective?
- What can we learn from these actions to inform future management?



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Adaptation Monitoring Variable

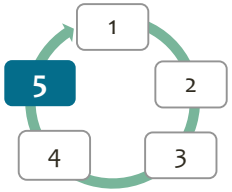
Criteria for Evaluation

Monitoring Implementation

What you're monitoring or measuring.

For example:

- *Percentage success at 1, 2,5, and 10 years after planting.*



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Adaptation Monitoring Variable

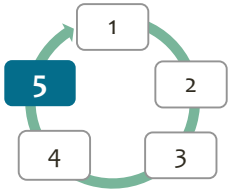
Criteria for Evaluation

Monitoring Implementation

Evaluation of success

For example:

- *60% survival of non-local genotypes*



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Adaptation Monitoring Variable

Criteria for Evaluation

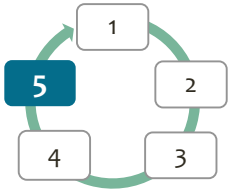
Monitoring Implementation

How the monitoring will actually get done.

Note: use existing monitoring when possible

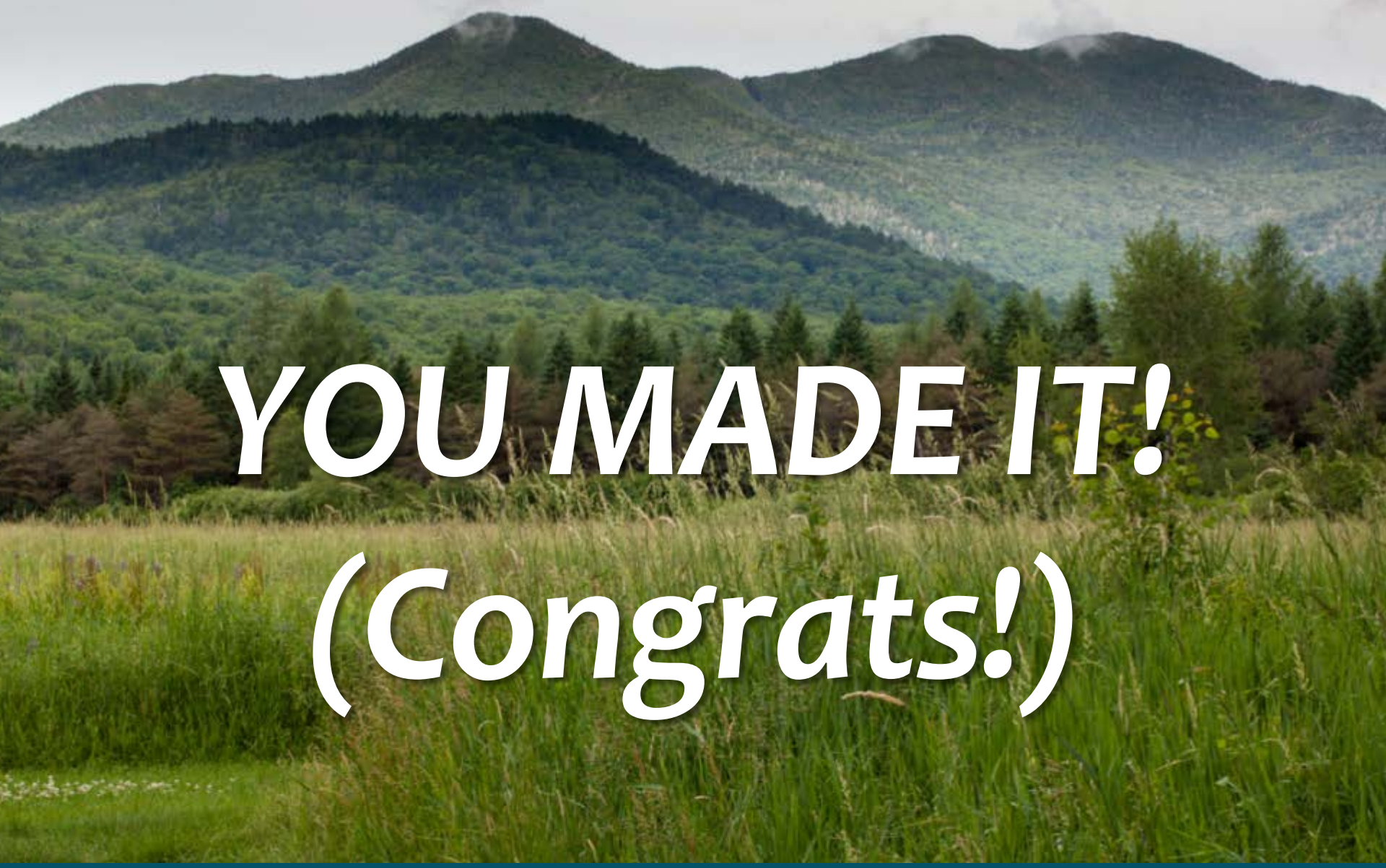
For example:

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



Step 5: MONITOR and evaluate effectiveness of implemented actions.

Monitoring Variable	Criteria for Evaluation	Implementation
Number of acres of honeysuckle	Reduce acres of honeysuckle by XXX percent	Aerial surveys every 3 years


YOU MADE IT!
(Congrats!)

TO-DO LIST:

You folks:

- Evaluations (please!)
- Can we have a copy of your Workbook?
- Keep moving these ideas forward!
- Follow up with questions or ideas
- Can we share your idea on www.ForestAdaptation.org?

NIACS:

- Share contact list & presentations from today
- Check in soon!
- Other ideas?

Thanks everyone!