Adapting your work to climate change: A Framework

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Point of Clarification

• **Mitigation** is what we do to decrease the potential of climate change itself.
  
  \[ \text{GHG emissions} = \text{a safe car on a good road} \]

• **Adaptation** is insurance given a non-zero probability that climate change will have an adverse affect on your investment.
  
  \[ \text{limiting the impacts} = \text{wearing a seatbelt} \]
Goals

• Understand tools for assessing climate sensitivity of species and habitats;
• Identify habitat restoration focus areas, techniques & projects to address climate change;
• Recognize examples ‘climate-change resilient’ restoration;
• Learn a process you can replicate at home;
• Develop strategies to address climate change in your own existing/planned restoration project.
Approach

- Gather new information
- Synthesize your existing knowledge
- Apply to your daily work
- Work with colleagues
- Create better long-term outcomes that incorporate the reality of climate change
“Houston, we’ve had a problem.”

-Jack Swigert
Astronaut, Apollo 13
Reserves for Endangered Species

Sea Level Rise, ↑Storm Intensity
Restoration

Warming water, range shift
Restoration

Sea Level Rise, ↑Storm Intensity
Water Allocation

Altered precipitation patterns

![Graph showing annual flow volume from 1890 to 2010 with marked drought periods: Early 20th Century Drought, 1930s Drought, Mid-Century Drought, Early 21st Century Drought. The graph indicates variations in flow volume during these periods.](image)
Improving water quality

Synergistic effects

![Graph showing survival percentage against arsenic levels with low and high UV conditions.](image-url)
Climate change is affecting all ecosystems, and will continue to do so for centuries, so…

• We need to *incorporate climate change into long-term planning*
  – **Minimize** risk of wasting time, money, and effort
  – **Maximize** likelihood of success
Today

• Learn about:
  – Change expected in the PNW (and Pacific Islands)
  – The basics of climate models
  – Tools that are available to assess species and habitat sensitivity and vulnerability

• Apply this to your own work
• Begin to explore what you can do about it!
<table>
<thead>
<tr>
<th></th>
<th>Question</th>
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<tbody>
<tr>
<td>1</td>
<td>What is your organizational mission or project objective? <em>What are you trying to do?</em></td>
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<tr>
<td>2</td>
<td>How are you trying to achieve this goal? <em>(Strategies, approaches, patterns)</em></td>
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<td>3</td>
<td>How might climate change affect your likelihood of success?</td>
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<tr>
<td>4</td>
<td>What can you do to increase your likelihood of success given these climate change effects?</td>
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“Don’t Panic.”

-Douglas Adams

Hitchhiker’s Guide to the Galaxy
But what can I do about climate change?
Adaptation Options

Vulnerability

Resistance  Resilience  Response

For more on this, see the 3 Little Pigs Advice Column on www.cakex.org
Climate change is complicated, I don’t know what’s going to happen!

How can I possibly know what to do?
Should I take my umbrella?
Reducing vulnerability

Vulnerability = exposure + sensitivity - adaptive capacity

↓ Reduce exposure

↓ Sensitivity

↑ Increase adaptive capacity
EcoAdapt’s Five Tenets of Climate Savviness
1) Protect adequate and appropriate space for a changing world

Plan spatially, think temporally!

- Refugia
- Gradients (Latitudinal/Elevational)
- Heterogeneity
- Gene flow/Connectivity
- Inclusion of other changes in the watershed/landscape/seascape
2) Reduce non-climate stresses

- Invasive & Pest Species
- Pollution & Habitat Degradation
- Agriculture & Habitat Fragmentation
- Unsustainable Harvest
3) Manage for Uncertainty
4) Reduce local and regional climate change
5) Reduce Greenhouse Gas Emissions

Resilience options have limits, some systems are very limited

Polar habitat, high elevation habitat, oceans…
Manage water resources for Greater Yellowstone

Warmer temperature, altered precipitation

Solutions!

• Install and manage snow fences
• Reintroduce beavers
• Work with external partners to reduce water extraction
Protecting Coral Reefs

Warming waters, ocean acidification, synergasms

Solutions!

Great Barrier Reef: Reducing nutrient outflow to decrease synergistic effects between poor water quality and climate change

Florida Keys: Created Action Plan to reduce additional stressors, prioritize protection of resilient locations, restore reefs with resistant strains, demand action on mitigation
Managing Fisheries

Temperatures, Acidification, Existing Management

Solutions!

“If you don’t know, don’t go”
Closure of rapidly changing regions, especially those lacking management plans
Protecting Snow and Ice

Warming air temperature, changing precipitation

Solutions!

• Cover glaciers with insulating blanket during summer months
• Reduce disturbance of glaciers
Building Infrastructure

- Build on coasts planning for sea level rise
- Build roads planning for beach migration

↑ temperature, altered rainfall, existing codes

Solutions!

- Build on coasts planning for sea level rise
- Build roads planning for beach migration
“There is no box.”

-Amory Lovins
CAN MAKE ADAPTATION HAPPEN
Tomorrow

• Learn about:
  – Cold water species sensitivity
  – Invasive species and climate change

• Develop strategies to address your own work’s vulnerabilities to climate change
Creating Climate Savvy Restoration

- Is your approach vulnerable?
- Does your correction reduce vulnerability?
- Is it feasible?
  - Are there barriers? Can you overcome them?
- What do you need to make it happen?
  - Resources, partners, conviction
- What are the steps to implementation?