

Climate Change Adaptation

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A Changing Climate

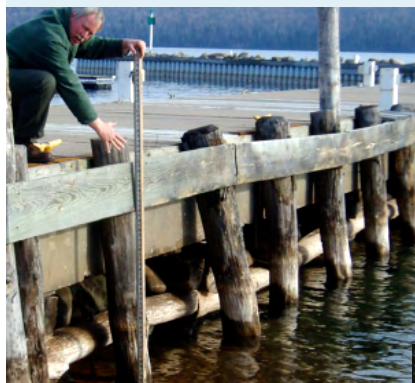
Air temperature

Water temperature

Precipitation

Sea/Lake level change

Water chemistry



Climate change is affecting all ecosystems and will continue to do so for centuries to come, so...

We need to *incorporate climate change into long-term planning*

- **Minimize** risk of wasting time, money, and effort
- **Maximize** likelihood of success



Responding to Climate Change

Mitigation is what we do to decrease the potential of climate change itself.

Adaptation is how we prepare for and respond to the changes that we are already experiencing/expected to experience.

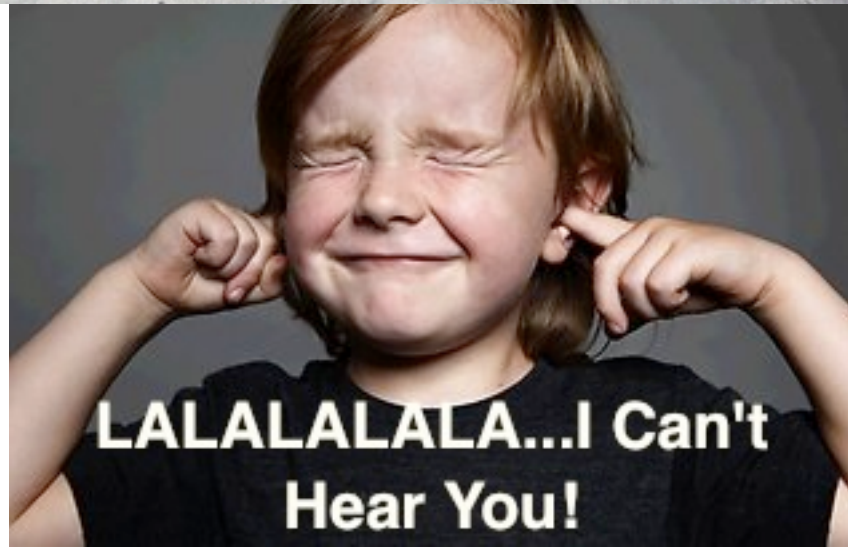


Third Response



**KEEP
CALM
AND**

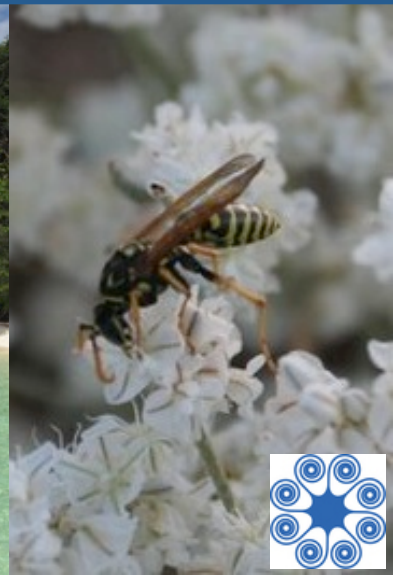
**BURY YOUR HEAD
IN THE SAND**



**LALALALALA...I Can't
Hear You!**

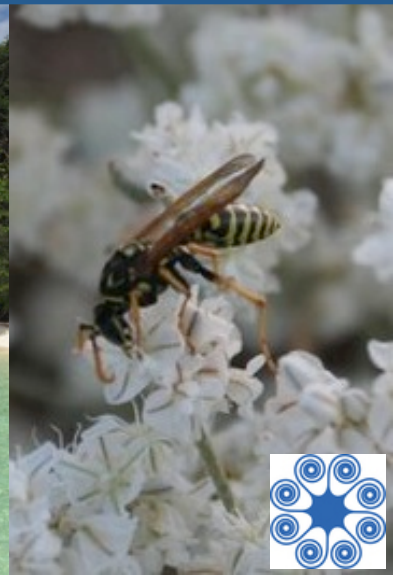


What are all the changes that will happen and how can I respond?



What are all the changes that will happen and how can I respond?

What do I do, and how should I adjust that for the reality of climate change?



Adaptation

$$\text{Vulnerability} = \text{exposure} + \text{sensitivity} - \text{adaptive capacity}$$

↓ *Exposure*

↓ *Sensitivity*

↑ *Increase adaptive capacity*



Vulnerability



Adaptation Options



Resistance



Resilience



Response

What are climate adaptation actions?

Actions that explicitly incorporate climate change and aim to alleviate the impacts of climate change by increasing resilience and/or decreasing vulnerability.



Resistance

- Manage forest vegetation and reduce fire severity and patch size
 - ➔ Thin and plant disturbance-resilient species; promote resilient species with fire (prescribed/natural)

Resilience

- Increase/enhance water storage; maintain sufficient water supply to meet demand
 - ➔ Mirror natural process (e.g., beavers); Use artificial storage infrastructure (e.g., water towers)

Response

- Facilitate change to desired assemblages; promote connected landscapes
 - ➔ Plant climate-resilient species; Identify and protect wildlife corridors to facilitate migration

Managing land at the Alligator River NWR



Sea Level Rise, Δ Hydrology

Actions

- Restoring oyster reefs
- Using water control structures
- Planting salt- and flood-tolerant vegetation



Reducing non-climate stressors in the Estero de Limantour watershed



Flooding, Δ Hydrology, Δ Species movement

Actions

- **Dam removal**
- **Restoration of natural ecological processes and functions**



Example: Salmon



- Altered stream flows
- Altered timing and intensity of seasonal flooding (more in fall and winter, less in spring and summer)
- Increased severe floods
- Warming stream temperatures



Example: Salmon



- Altered stream flows
- Altered timing and intensity of seasonal flooding (more in fall and winter, less in spring and summer)
- Increased severe floods
- Warming water temps
 - Increase riparian vegetation for shading to minimize water temp increases
 - Restore connectivity by removing dams and other stream blockages
 - Limit water withdrawals
 - Decrease land-based pollution



Key Considerations

1. Failing to include climate change in your work means your work is vulnerable
2. Identify a clear purpose or goal (e.g., reduce vulnerability of existing management action, minimize effects of climate change on target species, etc.)
3. Context matters: YOU are an expert on your region/species/processes/mandate
4. Consider short-, medium-, and long-term time scales
5. Pay attention to unintended consequences/effects on other sectors
6. Be creative!



State of Adaptation



- Survey practitioners and assess adaptation efforts
- Develop case studies
- Synthesize trends, opportunities, and challenges
- Connect people to case studies, synthesis reports, and other resources to share lessons learned and build the adaptation field



"[This effort] provides an opportunity to share local knowledge to address climate change."
~ Gregory J. DuCote, Louisiana Department of Natural Resources

"The field is young. Case studies provide concrete examples of what works & doesn't."
~ Noah Matson, Defenders of Wildlife



Climate Adaptation Knowledge Exchange

www.CAKEx.org

Why Make a CAKE?

- Everything we do is vulnerable to climate change but few people know what to do about it
- Adaptation is a rapidly developing field
- We are spending more time **reinventing**, not enough **innovating**



Sponsors, Partners, and

Contributors: Kresge Foundation, Wilburforce Foundation, Data Basin, EBM Tools Network, Model Forest Policy Program, Northern Institute of Applied Climate Science, NCAnet, Integrated Data Management Network, USGS, and many more!

Why Join CAKE?

- **Explore** projects, people, and resources on the map
 - Map, text, and keyword searches
- **Publish and promote** your work on climate adaptation
- **Get advice** from adaptation experts
- **Request information** from your colleagues (advice, connections, training)

Questions?

