

## Putting Uncertainty in Context

Dr. Jennie Hoffman, Directing Scientist

EcoAdapt



---

---

---

---

---

---

---

---

*Climatic change is affecting all ecosystems, and will continue to do so for centuries, so...*

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

---

---

---

---

---

---

---

---

Ecosystem responses

Climate models

Hydrologic & Vegetation Models



---

---

---

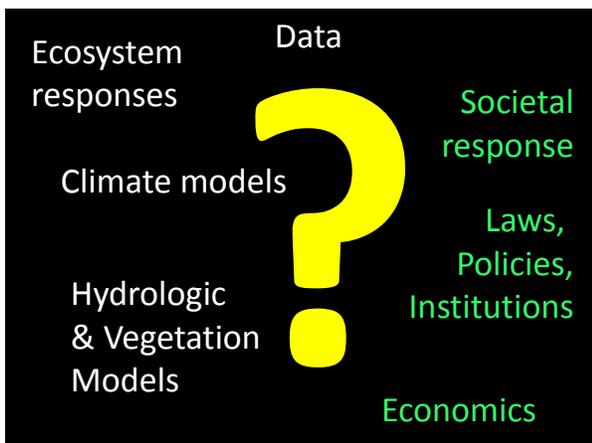
---

---

---

---

---



---

---

---

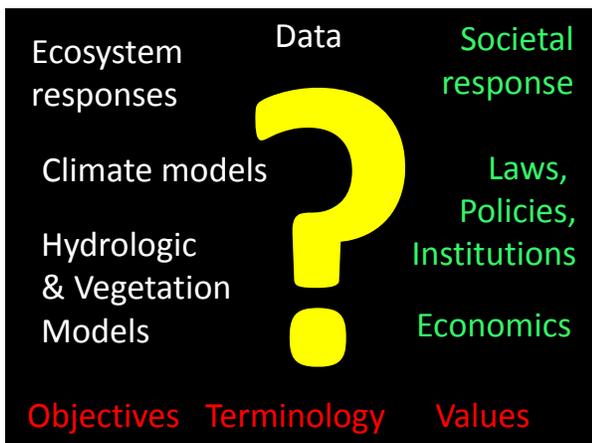
---

---

---

---

---



---

---

---

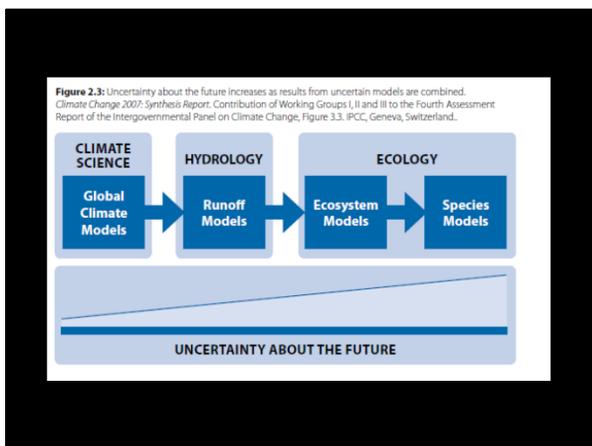
---

---

---

---

---



---

---

---

---

---

---

---

---

**Responses to uncertainty**

---

---

---

---

---

---

---

---

**Responses to uncertainty**

- Ignore it/wait until it disappears/pretend you can get rid of it

---

---

---

---

---

---

---

---

**Certain: death and taxes**  
**Uncertain: everything else**



---

---

---

---

---

---

---

---

## Reducible vs. irreducible uncertainty

- Future greenhouse gas emissions  
vs
- How global temperatures respond to increases in GHG concentration  
vs
- How global precipitation regimes respond to increases in GHG concentration



---

---

---

---

---

---

---

---

## The allure of downscaling

Beware spurious precision!

---

---

---

---

---

---

---

---

**May I have the ability to reduce the uncertainties I can, the willingness to work with the uncertainties I cannot, and the scientific knowledge to know the difference.**

*Joe Barsugli, Cheis Anderson, Joel Smith and Jason Vogel*

---

---

---

---

---

---

---

---

## Responses to uncertainty

- Ignore it/wait until it disappears/pretend you can get rid of it
- Understand it

---

---

---

---

---

---

---

---

## Known unknowns vs. Unknown unknowns



- Known unknowns
  - Scientific: Lake level changes, temperature change
  - Sociopolitical: Land use changes, boss's mood
- Unknown unknowns: New technologies, ecosystem tipping points, political revolution

---

---

---

---

---

---

---

---

## Directionality vs. magnitude

- All climate models say things will get warmer; they disagree on just how much warmer
- Models disagree on whether things get wetter or drier overall



---

---

---

---

---

---

---

---

## Controllability

- Whether or not to buy a car
- Greenhouse gas emissions
- Massive methane belch from the deep sea



---

---

---

---

---

---

---

---

## Uncertainty as information

Being uncertain is not the same as knowing nothing

---

---

---

---

---

---

---

---

## Responses to uncertainty

- Ignore it/wait until it disappears/pretend you can get rid of it
- Understand it
- Surf the wave!
  - Adaptive management
  - Scenario planning
  - Risk management



---

---

---

---

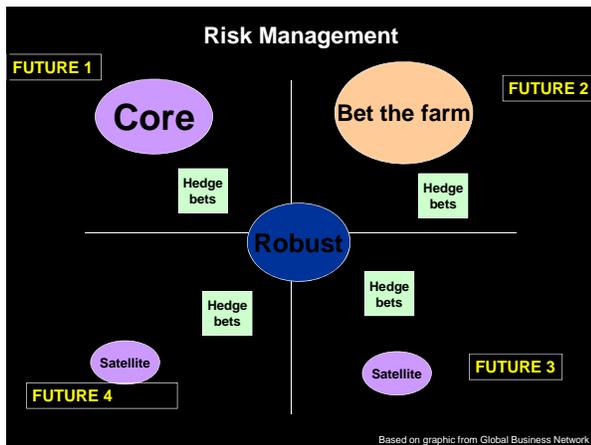
---

---

---

---





---

---

---

---

---

---

---

---