Project Resilient Adaptation

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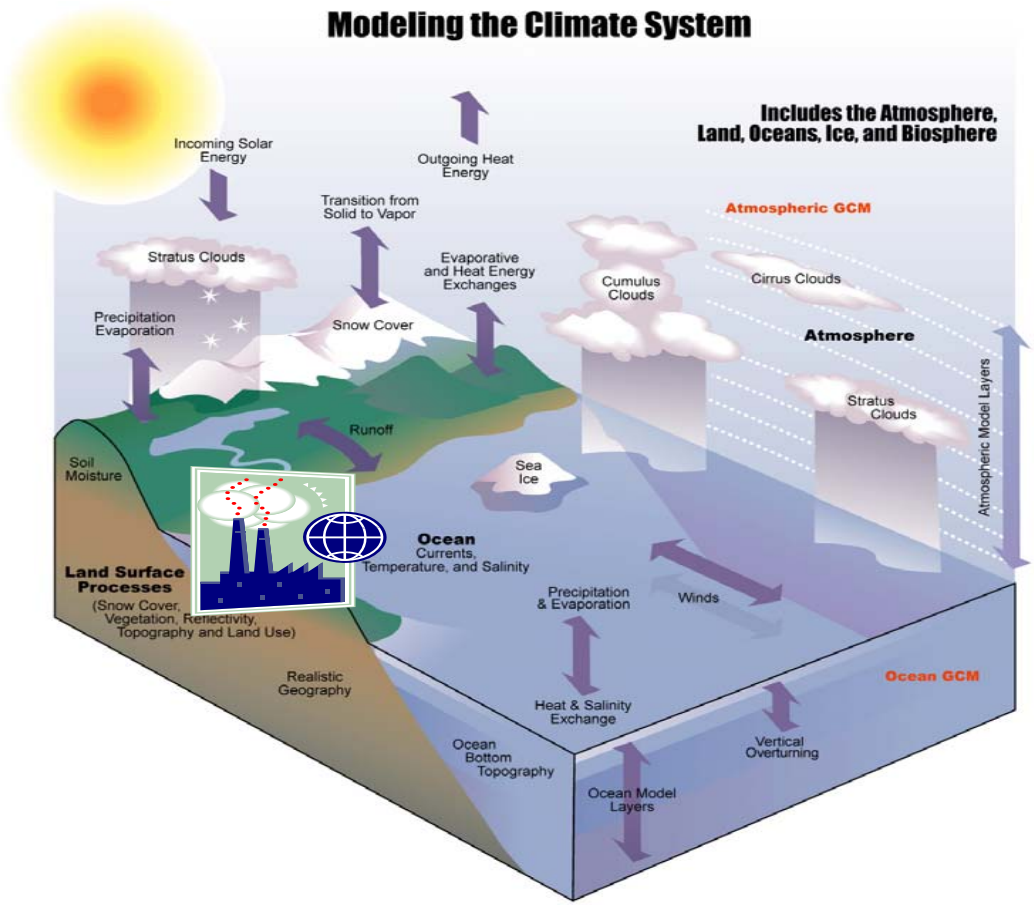
Humans and the Climate System

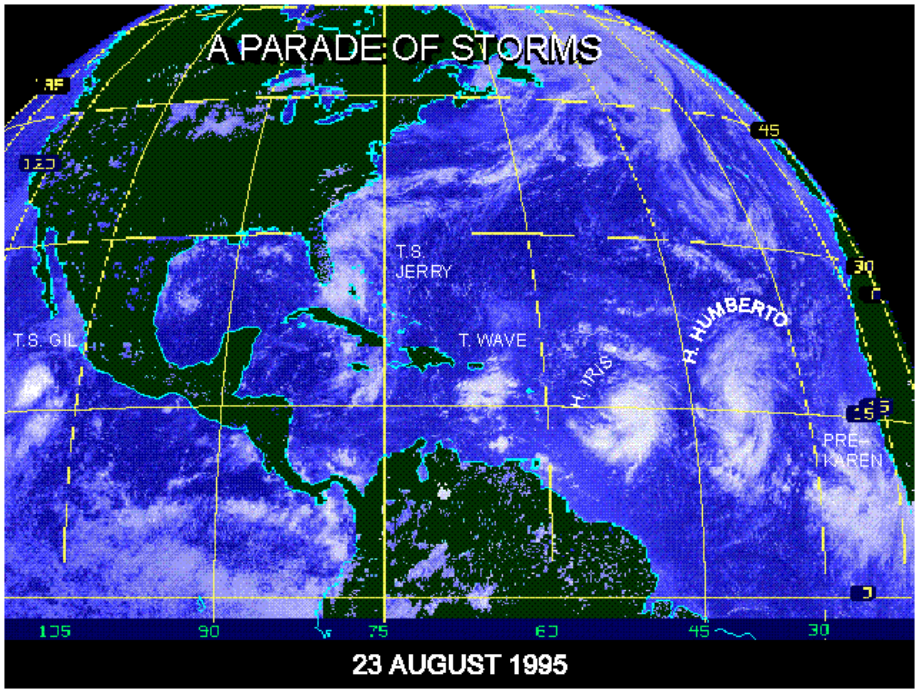
Society is a part of the climate system and not apart from it

- Anthropocene?

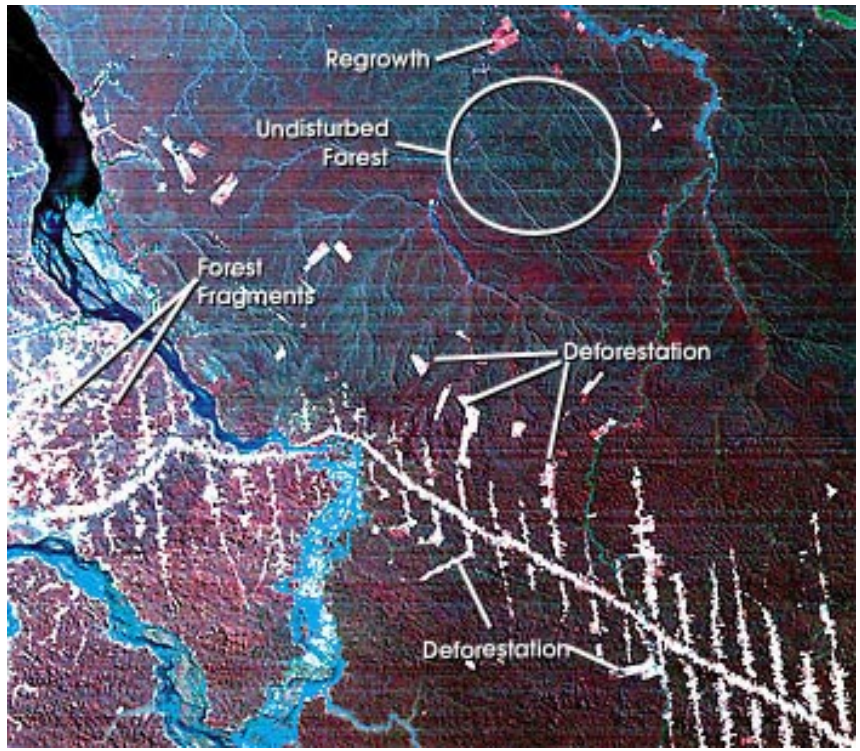


Climate Change Impacts on the United States, USGCRP, 2000

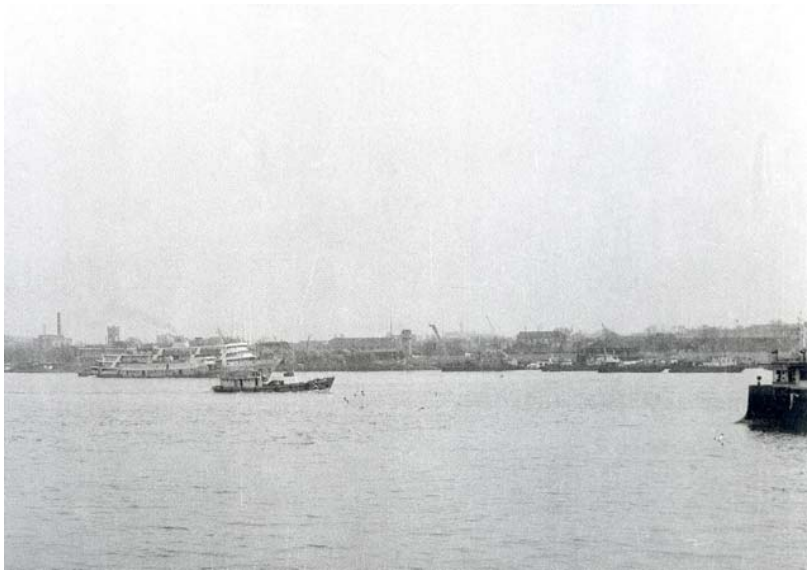
Physical changes are to be expected



Societal changes are also to be expected



Shanghai Harbor



1988

2004

“4 Laws of Ecology”

1. **Everything is connected to everything else.**

2. **Everything has to go somewhere, or there is no such place as “away.”**

3. **Everything is always changing.**

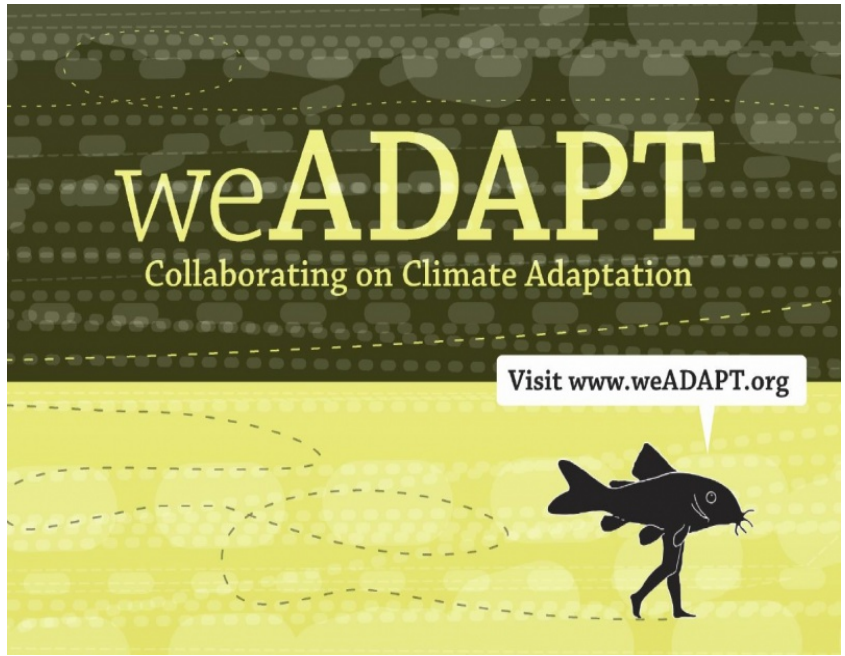
4. **There is no such thing as a free lunch.**

Citarum River, Indonesia
rekkerd.org/img/random/citarum_pollution.jpg

Could these also be the 4 Laws of the Atmosphere?

Defining adaptation

- **Adaptation* comprises knowledge in terms of …**
  - **Anticipation (what to expect)**
  - **Attention (what to look for)**
  - **Response (what to do)**



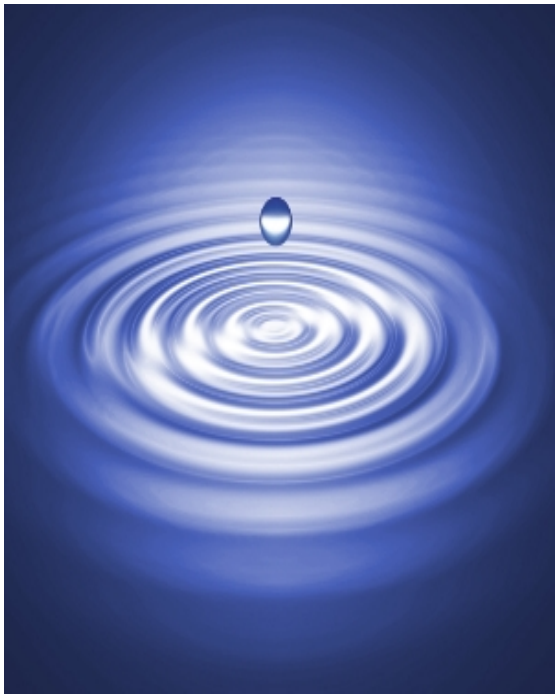
www.weADAPT.org

*[Grotan et al 2008]

Adaptation definitions

- A change in structure, function, or behavior by which a species or individual improves its chance of survival in a specific environment.
- The process of change to better conform with environmental conditions or other external stimuli.
- the process of making adjustments to the environment in order to survive.
- To adjust to new conditions

Mitigating the impacts of adaptation to climate change



- **Adaptation is really an on-going process --- not just a one-time event.**
- **Each adaptive strategy or tactic will generate its own set of impacts.**
- **We must identify second- and third-order impacts of adaptation … and prepare for them.**

Definitions of Resilience

- The ability to withstand the consequences of an incident
- The power of recovery to original shape and size after removal of the strain which caused the deformation
- The capacity to adapt without harm

Resilient adaptation

as a “social invention”

- “Flexible intervention”
- Plasticity
- Can enhance Stability
  - while coping with changes in Resilience

Resilient Adaptation … in theory and in practice

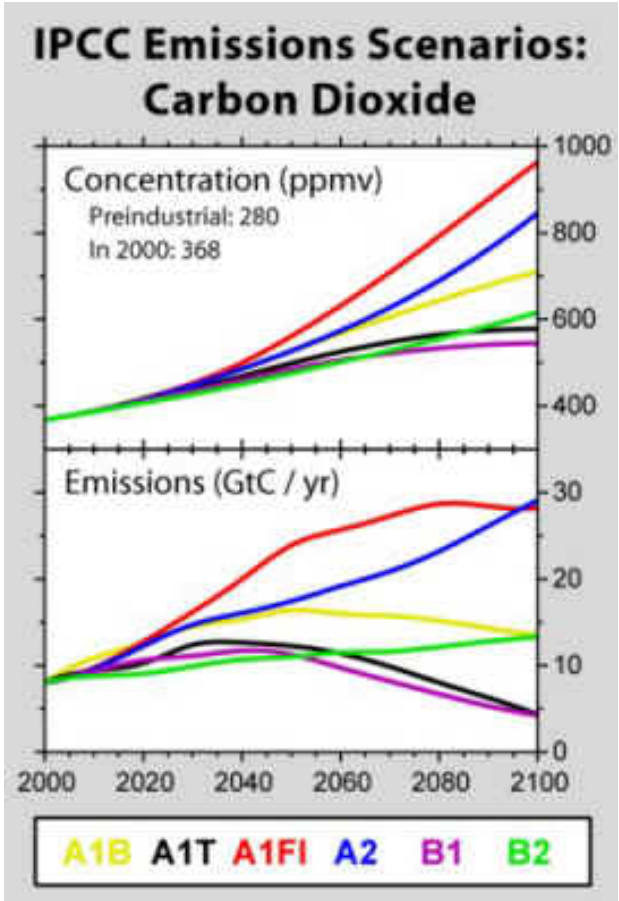
- **What it ought to be …**
  - *Resilience* represents ‘the manifestation of positive adaptation despite significant life adversity’” (S. Lothar, Ed. 2003. Resilience & Vulnerability. Cambridge U.P.)

- **What it is …**
  - Dynamic
  - Exogenous factors (uncontrolled)
  - Changing outcomes

Trading off Resilience:

Demise of the Aral Sea, Central Asia (1960-present)

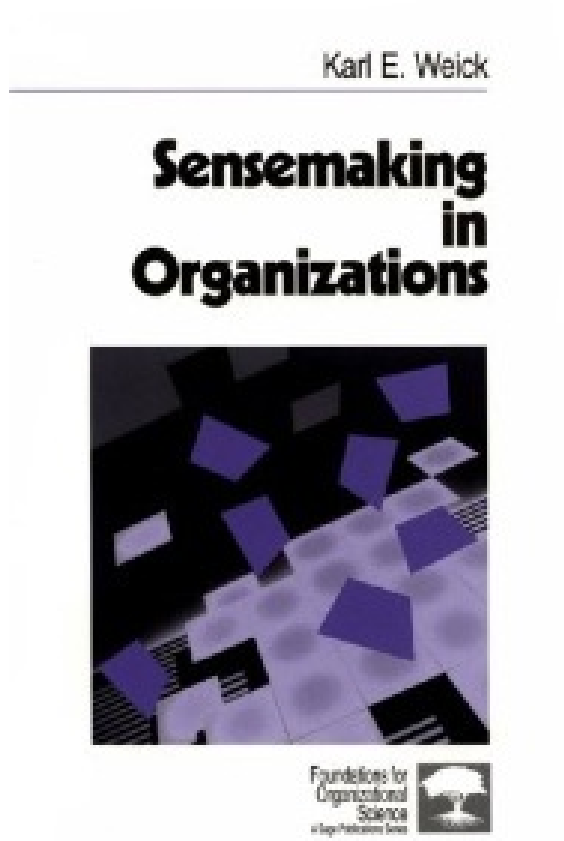
What's needed **in the face of a changing and uncertain climate and its impacts?**



- **Sensemaking**
- **Improvization**
  - **Dynamical**
  - **Perceptiveness**
  - **Imagination**
  - **Resourcefulness**
- **Constant awareness**
- **Foreseeability**
  - **Anticipatory**
- **Innovation**
- **Flexibility**
- **Not bound by rigid standards**
- **Adjustability**

“Sensemaking”

- Sensemaking: the ability and process of creating enhanced situational awareness and understanding
  - under conditions of high complexity, time pressure, and uncertainty, …
  - to anticipate trajectories and
  - enable collaborative planning and decision-making.
    - intuitive “process of structuring the unknown”
    - an intuitive reaction (to familiar or chaotic situations) [Weick et al, 2005]
    - In order to perceive, understand, and make sense of what is experienced
      - [Grotan et al, 2008]



Improvization*

- **Improvization is the “engine of resilience”**
- **Aspects of improvization are inherently part of resilience**
- **‘Interplay between action and interpretation”**
- **Improvization depends on the need for constant awareness and flexibility**
- **Improvization is a flexible behavior to achieve objectives in new ways**

*(Grotan, et al, 2008)

Examples of non-resilient adaptation

- **Hurricane Katrina**
- **Repopulating floodplains**
- **Deep wells in the Sahel**
- **Tropical deforestation**
- **Farmer movement of into the southern edge of the Sahara**

Yangtze Floods 1999:
Is this societal resilience?

Hurricane Katrina, 2005:
Is this societal resilience?

The concept of “climate proofing”

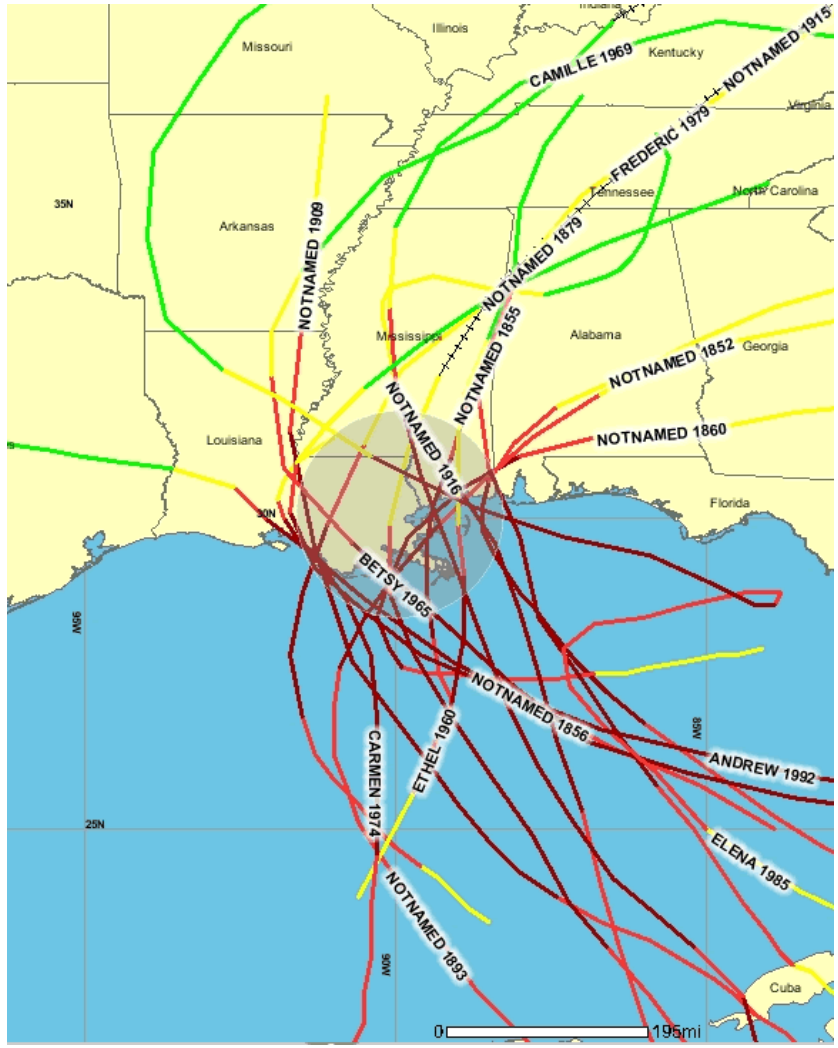
- **Similar to other idealistic goals, such as:**
  - Eradicating poverty
  - “No child left behind”
  - MDGs by 2015
  - Sustainable development
- **It is a ‘feel safe’ and ‘feel good’ concept**

www.grist.org/etc/gristlist/2005/12/09/

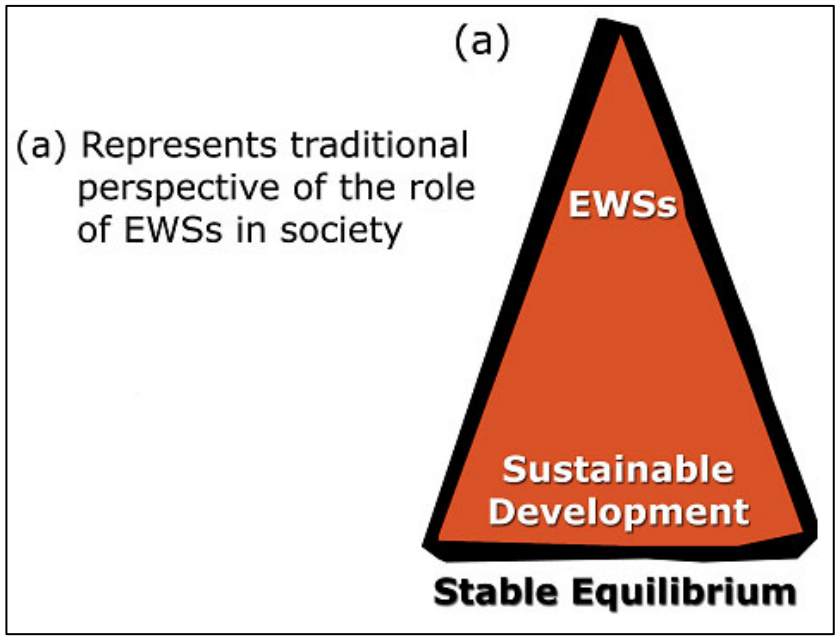
Climate surprises that shouldn't be surprising

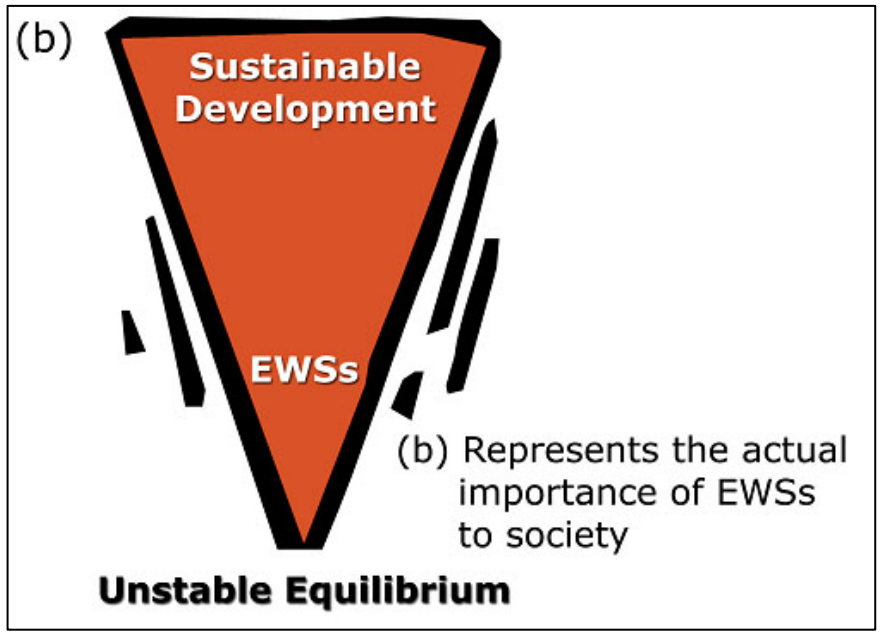
- "Unexpected" is a key element of"surprise"
- Yet, not all'surprises' are unexpected.
  - I was … semi-surprised
  - almost surprised
  - hardly surprised
  - a little surprised
  - somewhat surprised
  - sort of surprised

There are"knowable surprises"



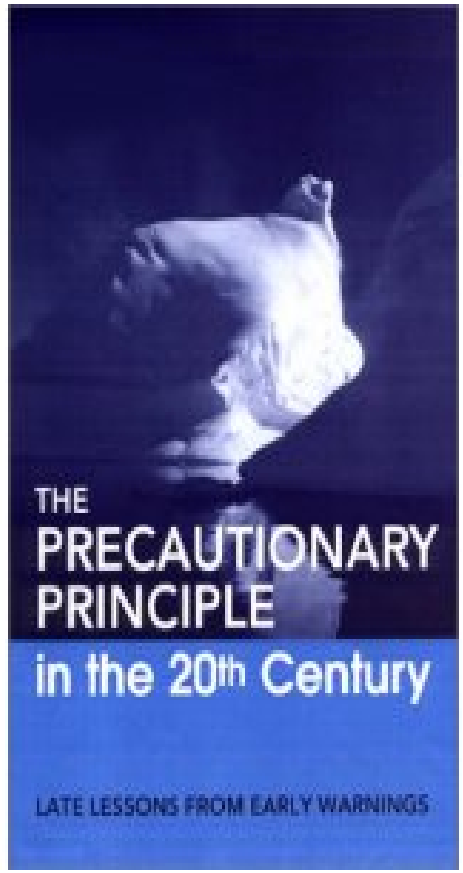
Heightened value of early warning systems





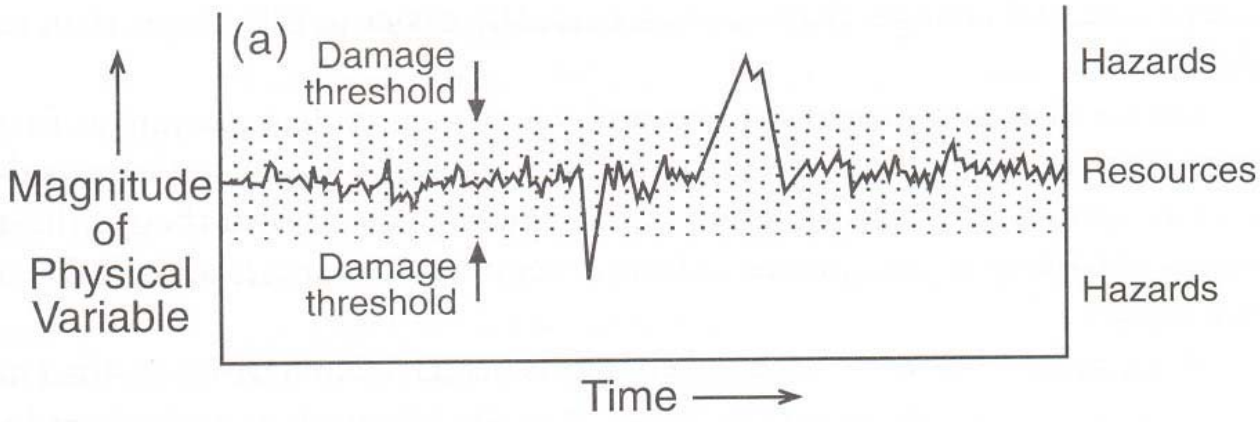
“Precautionary Principle”

- **“Governments should not use the lack of full scientific information as a reason to postpone action to prevent serious irreversible environmental damage.”**
  - » World Lake Vision Committee

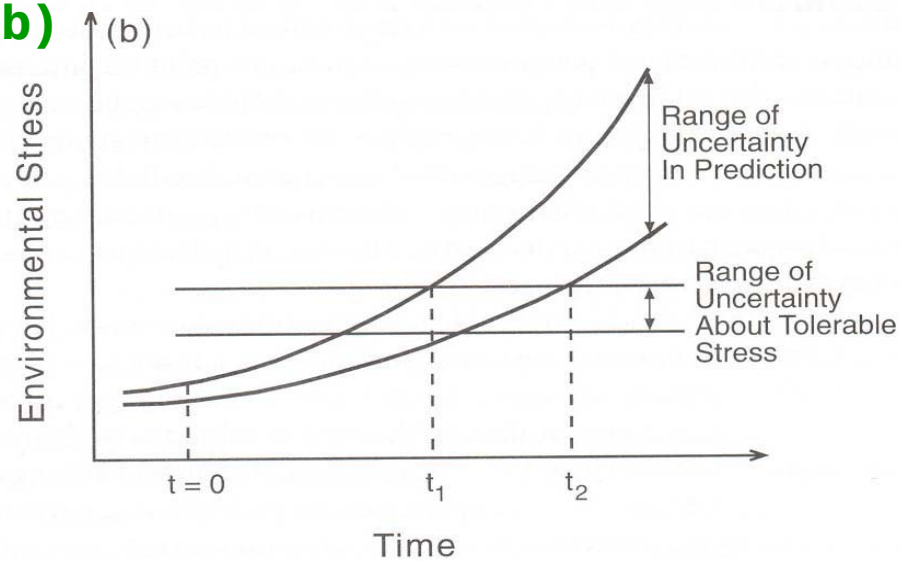


Types of hazards: quick onset (a) and creeping (b)

(a)



(b)

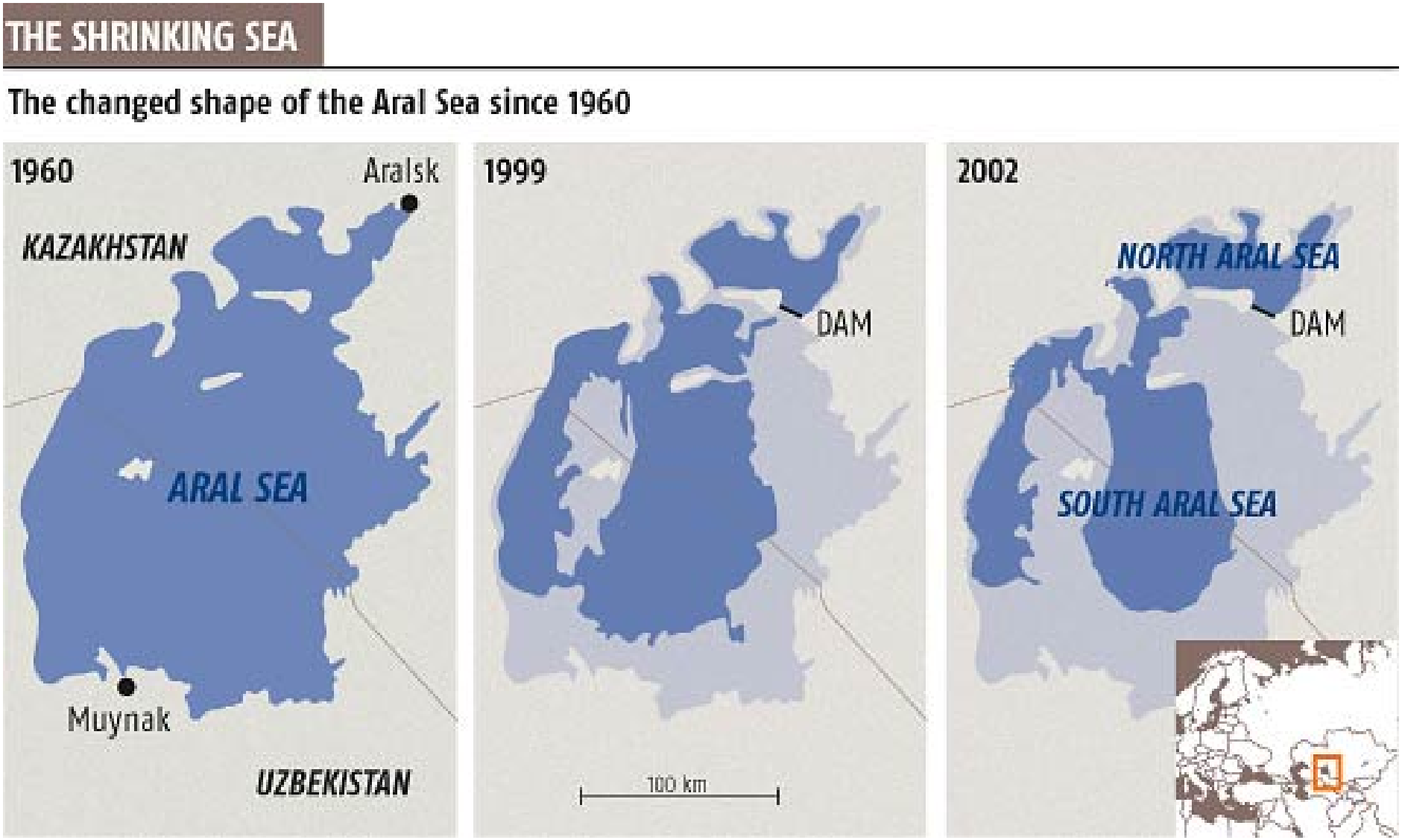


Many environmental problems are of the creeping kind

- Air pollution
- Acid Rain, Global warming
- Ozone depletion
- Tropical deforestation
- Soil erosion
- Water quality & quantity
- Glacier retreat
- Sea level rise
- Waste disposal/landfills
- Infectious disease spreading
- Nuclear waste
- Marine pollution, etc.

Aral Sea, Central Asia

A CEP example

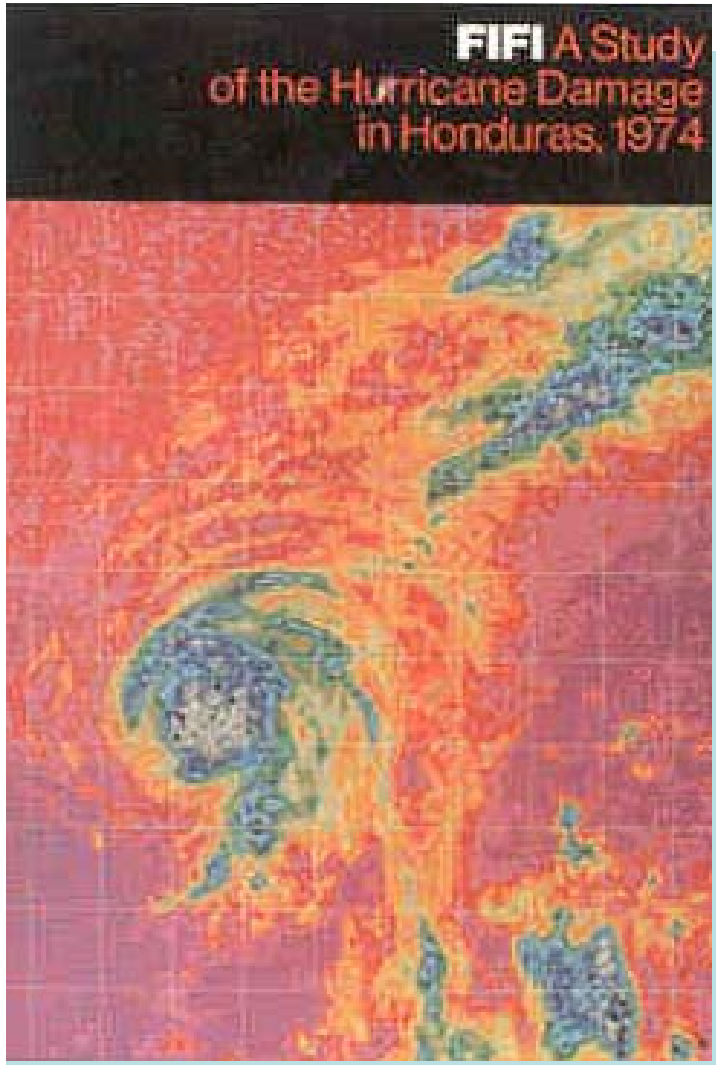


Resilient Adaptation … for CEPs

- **Adaptations to CEPs work in the short run**
  - **Will they work in the long run?**
- **Is there a need for a "competency assessment"**
  - **to evaluate the long term viability of the adaptation to a CEP?**

Hurricane Fifi, September 1974: A 'What if' Scenario

- Struck the north coast of Honduras
- Approximately 7000 dead
- 50% of agricultural land affected; 75% of banana plantations destroyed
- Not as powerful a hurricane as Mitch
- Different part of Honduras affected than by Mitch
- Banana exports dominated exports (33-50%); 90-95% of banana crop destroyed
- Threat of epidemic
- 60% of roads, bridges, rail, harbors, and airports destroyed
- Supply of drinking water and electricity completely interrupted



Hurricane Mitch 1998

Category 5 hurricane; heavy rains, floods, mudslides; affected Central America; in Honduras, 10,000 dead, 7000 missing, hundreds of thousands homeless; 80% of infrastructure damaged; banana plantations destroyed

Lessons learned vs. lessons identified

- **All Recommendations for change should come with Ramifications**

- **In order to alert decision makers to potential impacts of not following the Recommendations!**

- **“Health is more than just the absence of disease”**
  - (A. Martin and W. Wanjiku, 2005)

- **“Resilience is more than just the absence of disaster”**
  - (Michael Glantz, 2008)