

Canaries, Frogs, Scorpions, Senators ... *and Alaska* **

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** The views expressed herein are mine and do not represent those either NCAR or the NSF

21st Century

TIME

Could the
21st Century
Become
"The Climate Century"

?

**SuperStorm '93:
storm of the century**

The Superstorms of
1993 and 1949

Mars Superstorm:
Aug. 14th & 15th?

Superstorm Sweeps Over England

**The 10-12 November 2001
Balearic Superstorm**

*Was there a supercyclone
in Orissa? Yes*

Worst storm in a century
leaves damaging scar
(Australia 2003)

**Supercyclone
in Orissa**

Global Warming and
the Superstorm

**Mega Cyclone in
Orissa (1999)**

**Hypercane: Hurricane
from Hell**

**Superstorm: Winds hit
225 mph**

**Supercyclone narrowly
misses northern
Australia**

The coming global
Superstorm

Increase in Extreme
Weather events -
mega hailstorms

Geophysical Activity
During Two
Superstorms

**The 1993 Superstorm Cold
Surge: Frontal Structure,
Gap Flow, and...**

**Jupiter: 300-year
old "Hypercane"**

The March 1993 Superstorm
Cyclogenesis: Incipient Phase Synoptic

Super-intense hurricanes

Supercane
Isabel

**Massive storm called
a "Hypercane"**

January 1988 Ice Storm
of the century devastates northcountry

Superstorm: Isabel strengthens
into second major hurricane of
the year

Note: These weblines were taken from the Internet

Oman, NCAR (2004)

Metaphors (and analogies) we live by

- **Canaries**

• *Like canaries in a coal mine, our northernmost Americans are the first to face the alarming challenges of global warming*
(CHARLES WOHLFORTH, *On Thin Ice*)

Frogs

Well the idea that you can induce a frog to remain in boiling water if you start it off in cold water is not true biologically ...

The metaphor lies in the frog's ability to escape from the container: if there's no way out, then the frog's fate is a foregone conclusion.

Scorpions

Scorpion: Hellooo Mr. Frog! Would you give me a ride on your back across the river?

Frog: How do I know that if I do it you, you wont try to *kill* me?

Scorpion: Because if I try to kill you, then I would die too, because I can't swim!

Senators & Congresspeople

Short term benefits vs. long term costs

e.g., that means fund more research, not action

Aspects of Climate

- **Climate variability**
 - **Seasonal to inter-annual**
- **Climate change**
 - **“Deep” climate change**
 - **New global climate state**
- **Extreme meteorological events**
- **Seasonality**

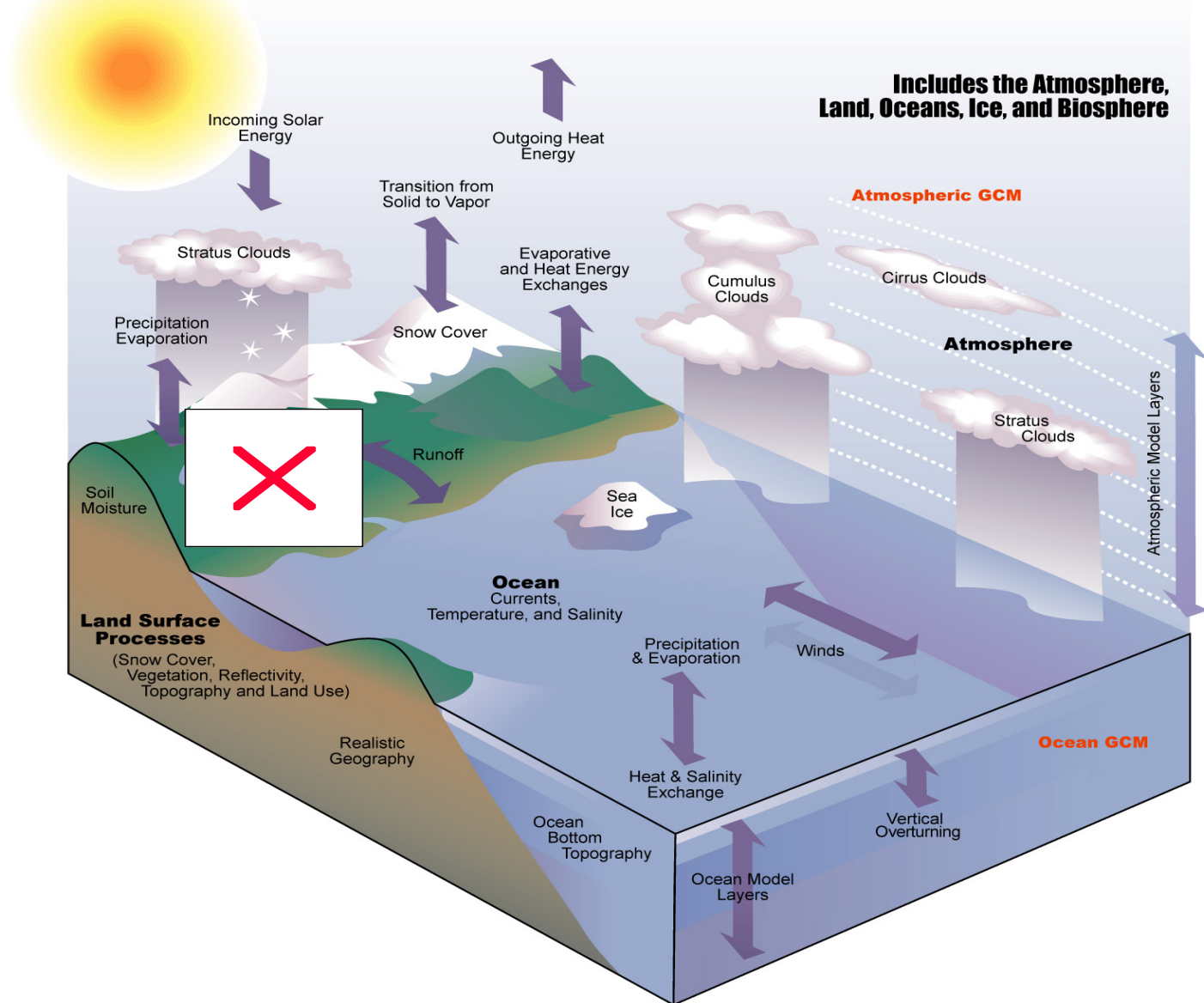
What is “climate information”?

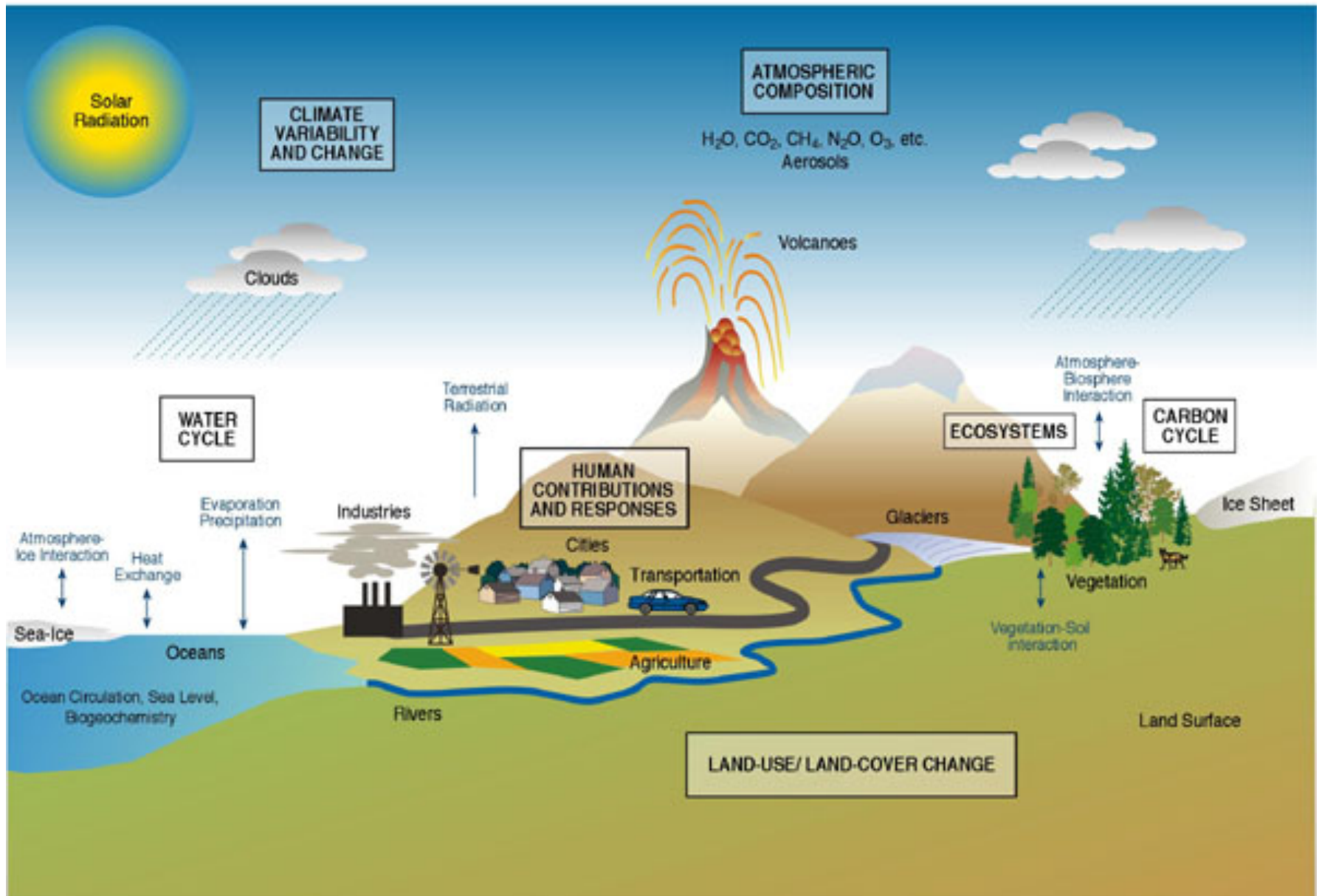
- What *scientists* mean by climate information
(climatology, observations, forecasts, etc.)
- What / mean by climate information
(climate science, impacts, policy, ethics & equity)

Climate science & education includes:

- **Understanding the Climate System**
- **Understanding its components**
- **Accepting society as a component**
 - Along with...
ocean, atmosphere, vegetation, ice, etc.

Modeling the Climate System

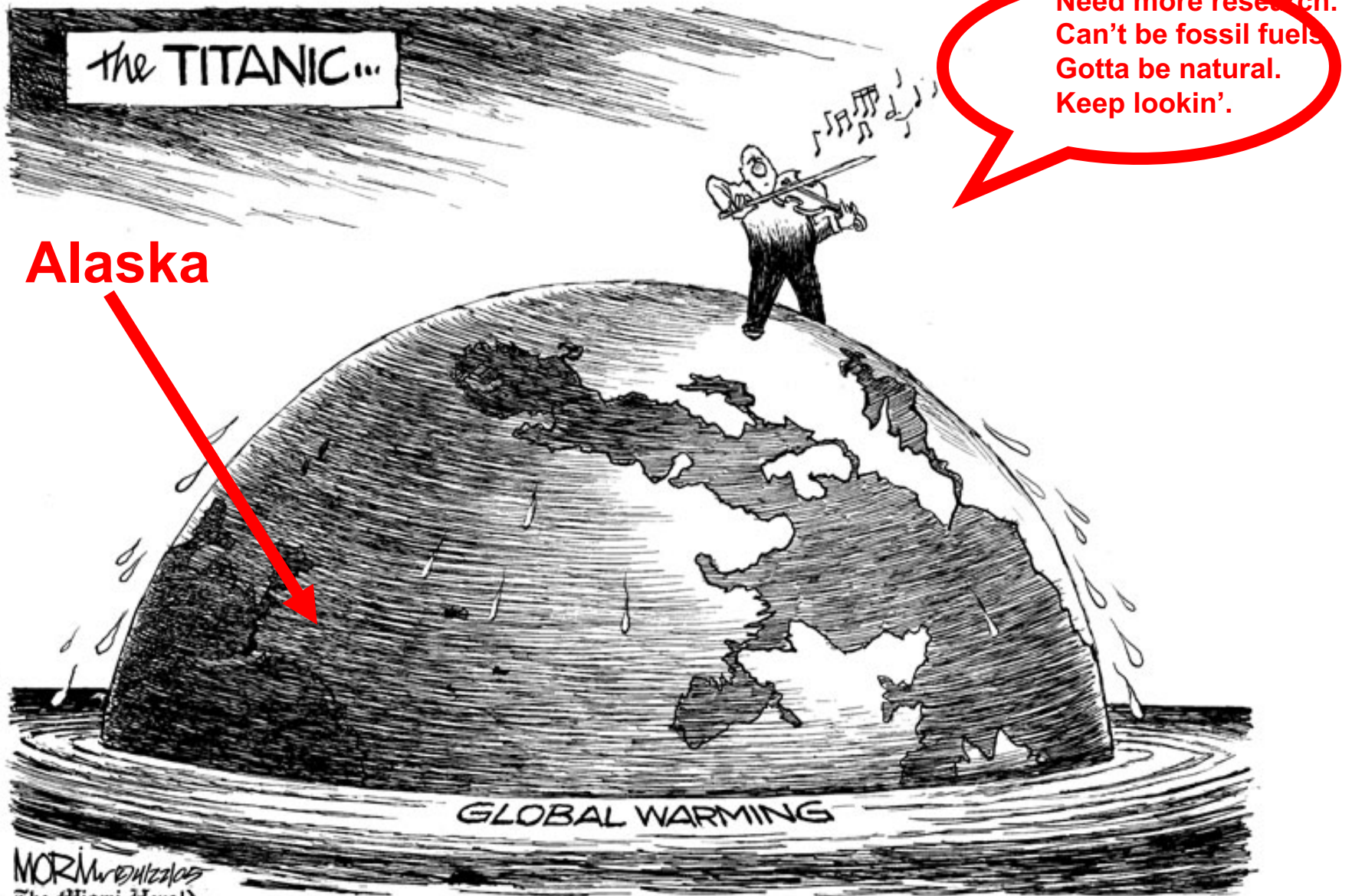




Veni! Vidi! but, Vici?

(I came! I saw! But I, conquered?)

- **We know what global warming is doing to Alaska**
 - **We have a good idea of what it will do to Alaska**
 - **Scenarios proposed in the 1980s for the Arctic**
- 1. What is left to know?**
 - 2. Who needs to be convinced?**
 - 3. Are Alaskans convinced?**
 - 4. What to do?**



Alaska

Need more research.
Can't be fossil fuels
Gotta be natural.
Keep lookin'.

What ever happened to the "Precautionary Principle?"

Better safe than sorry.

MORIN
The Miami Herald
CWS/INYS

Jim Morin, USA "THE TITANIC"

Connecting the dots

... But first you need to see the dots!

- Evidence exists that climate has changed in Alaska and that change is having an impact on living things
- Need to connect the physical, biological and societal aspects of global change
- Why are we separating out “human dimensions”?
- The problem should drive the inquiry, not the academic disciplines or the models

Creeping Environmental Changes**

- **Creeping rate of change**
 - **Incremental**
 - **Slow onset**
 - **Low grade**
 - **But ... Cumulative**
- **Major changes apparent only over time**

****Societies are also changing**

Creeping vs. abrupt change

- Pick your poison !
- Pay now or pay later?
- **Is there a cigarette analogy here?**



Why talk about Creeping Environmental Problems?

- To **reduce uncertainty** about rates and processes of change
- **improve societal responses** to them
- To **improve an understanding of rates** of change and the processes that drive them
- To **underscore human aspects** of environmental change
- To **highlight importance of early warning systems**

A Societal Problem

- Rates and Processes are often as important as the Magnitude of change. However,



- Fast rates

- Cause alarm
- Less time to plan & act



- Slow rates

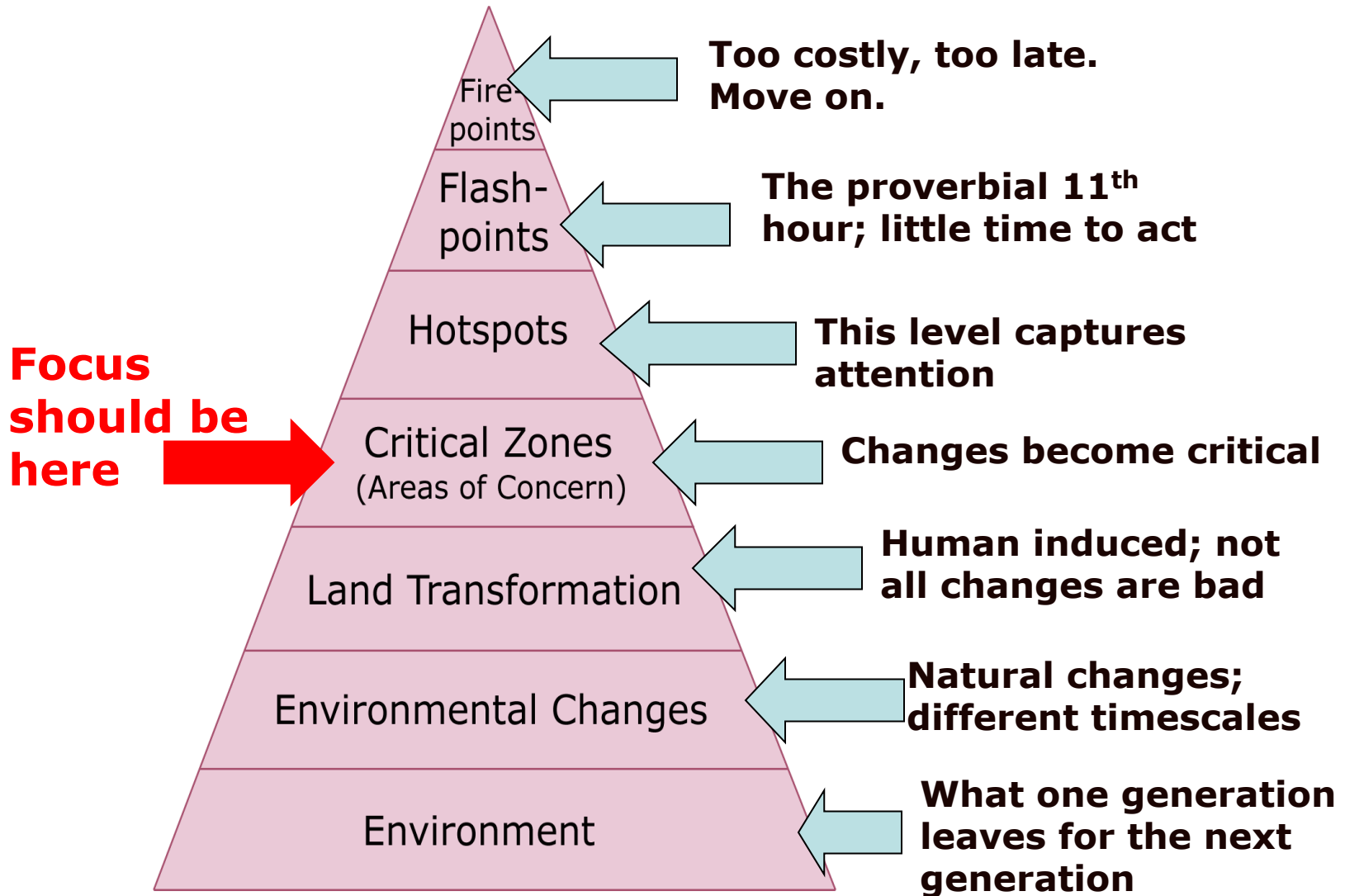
- Generate laissez-faire attitude

Creeping environmental problems

- Air pollution
- Acid Rain, Global warming
- Ozone depletion
- Tropical deforestation
- Soil erosion
- Water quality & quantity
- Marine pollution, etc.
- Wetland loss; Mangrove destruction
- Glacier retreat
- Waste disposal/landfills
- Nuclear waste
- People moving into marginal lands

Melting Glaciers





Weblines on Global Warming and Alaska

Baked Alaska -
environmental effects
of global warming in Alaska

Global Warming vs. Alaska

**Global Warming Is
A Costly Reality In Alaska**

Williams:
Feeling the heat:
Global warming in Alaska

**Alaska Feeling Impact
of Global Warming**

Global Warming,
an Ecosystem Shift,
and Sharks in Alaska

**Is Global Warming
Killing the Polar Bears?**

**Global warming interferes
with Alaska oil drilling**

Global Warming:
Will You Listen Now, America?

Alaska the 'poster state'
for climate concerns

Alaska a laboratory on global warming

Studies Find More Model Weaknesses;
No Global Warming in Alaska

Alaska Melting -
Global Warming, Climate Change

**The impact of global
warming in North America**

Vanishing Alaska

Is Warming Causing
Alaska Meltdown?

Alaska's
not-so-permanent frost

Alaska is Ground Zero
for Global Warming Studies

**Global Warming: Reasons for
skepticism about greenhouse warming?**

Alaska Warned: Don't Become Florida ?

Global Warming Endangers
an Alaskan Eskimo Village

**Arctic Inuit
sue US government
over global warming pollution**

**Inuit Group Confronts
Global Warming Threat**

Hotspots definition *(mine)*

- **A place or activity of interest to people**
 - A government, group or individual
- **where the trend of human interactions with the environment is considered adverse**
- **to the sustainability of an ecosystem**
 - or the human activities dependent upon it.

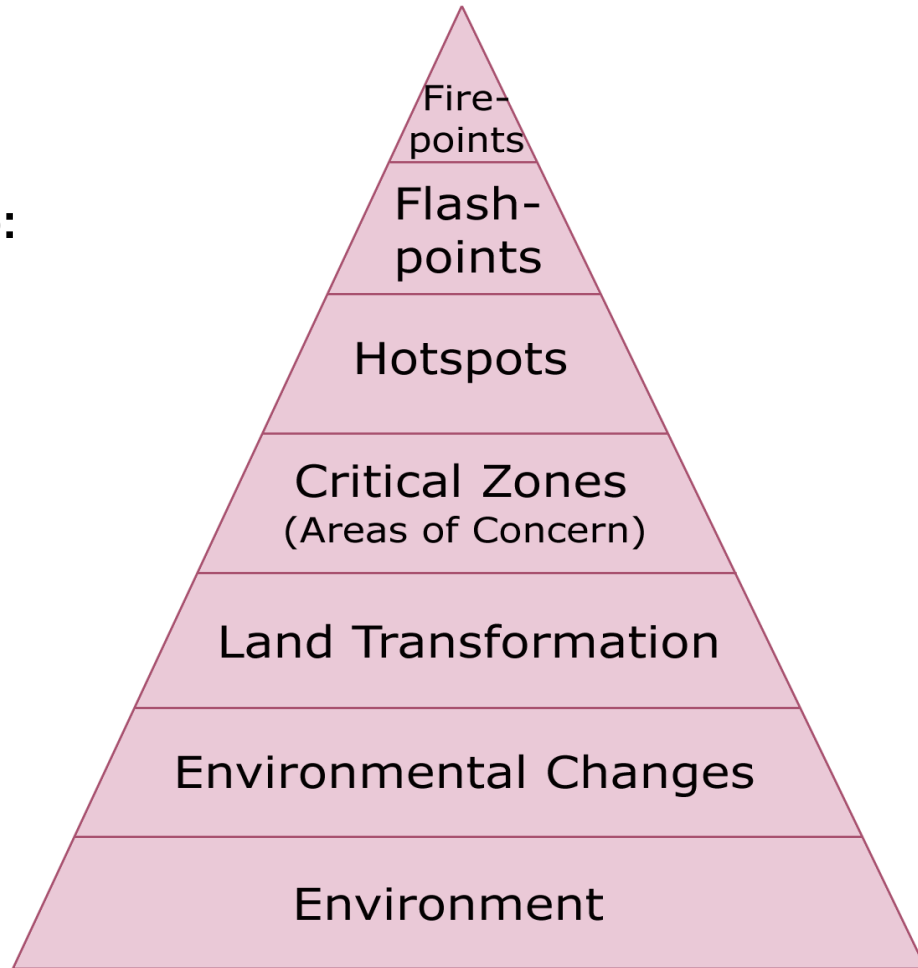
What about ... climate-related hotspots?

- **These would involve the usual list of climate anomalies and extremes of regional concern**
 - **Seasonal anomalies that affect human activities and ecological processes**
 - **Frequency, magnitude and duration of**
 - **Drought**
 - **Floods**
 - **Fires**
 - **Shifting locations of vectors: locust, others**
 - **Severe weather (rain, snow, wind, heat, etc.)**
 - **Dust storms**

Is Alaska a laboratory ... for the lower 48 on global warming?

Where is Alaska with regard to:

- Forests
- Glaciers
- Pests
- Seasonality
- Permafrost
- Native flora and fauna



Hotspots identification and monitoring as early warning of unwanted adverse changes to the environment

- Early warning of a hotspot as an event
- Early warning of a hotspot as process
- Introduction to the notion of...

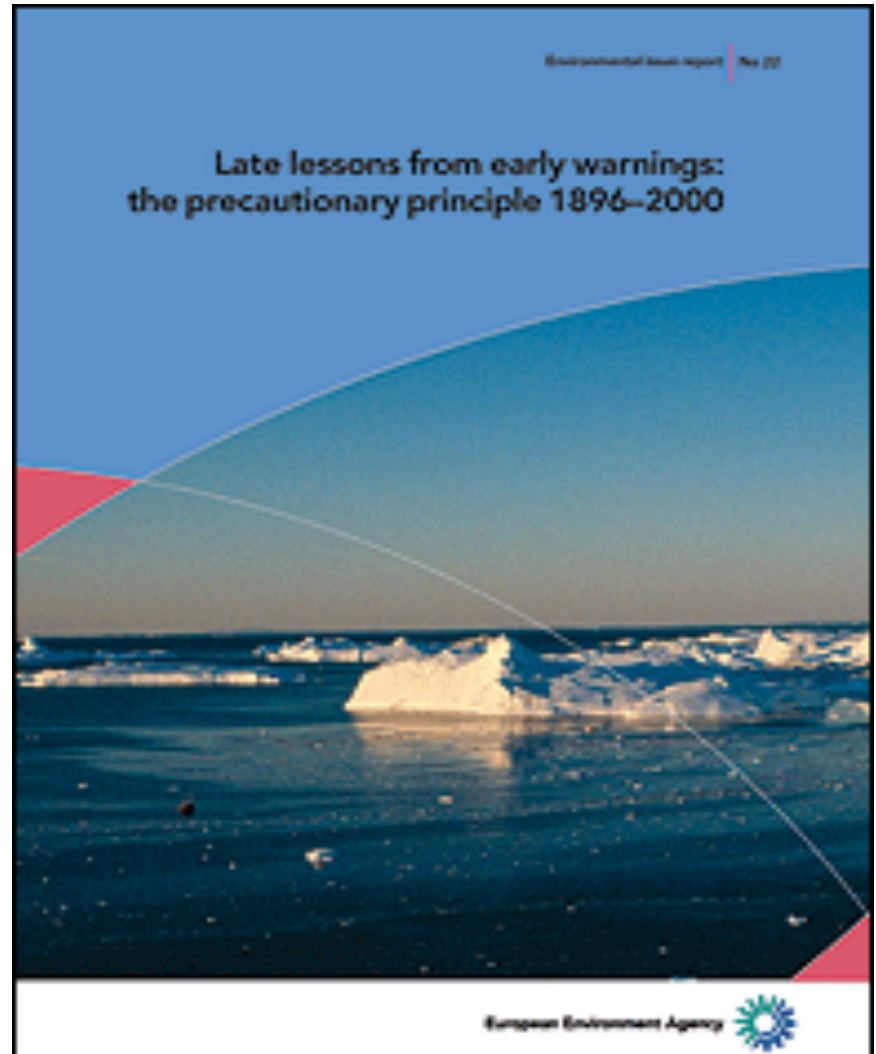
foreseeability

Late lessons, early warnings

“déjà vu all over again”

- **European Environment Agency (EEA)**
 - Identified several examples of late lessons but early warnings
 - **Based on the “PRECAUTIONARY PRINCIPLE”**
 - Is global warming going to be another one?
 - Is Alaska going to be a text book case study of a late lesson with early warnings.

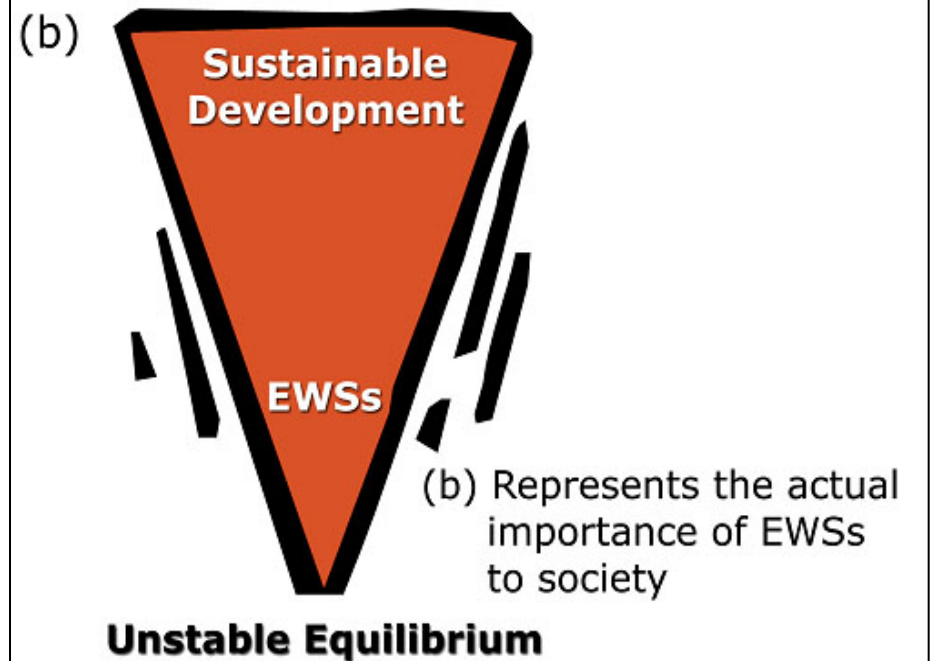
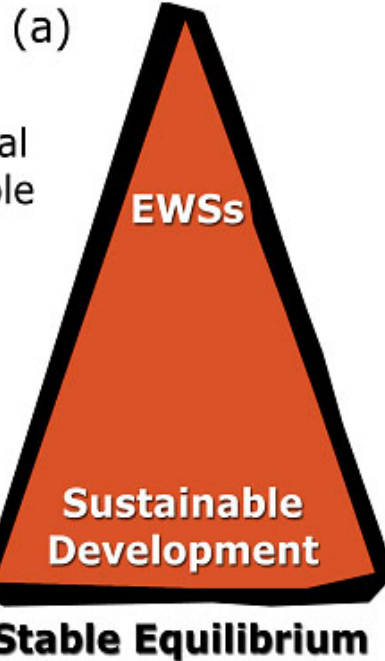
There's not enough 'looking back' in order to look ahead!" Use analogues !!



Why an Interest in Early Warning?

- **for a “heads-up”; “surprise avoidance”**
- **provide ample lead-time for response to threat**
- **It is the ‘responsible thing’ for a government to do**
- **The need for early warning varies from user to user**

EWSs more important than some governments might realize



“Walking on two legs”

science and society

- In 1970s: “Science for the People”



Campaign button considered radical at the time

- In 2000: Science with the People”

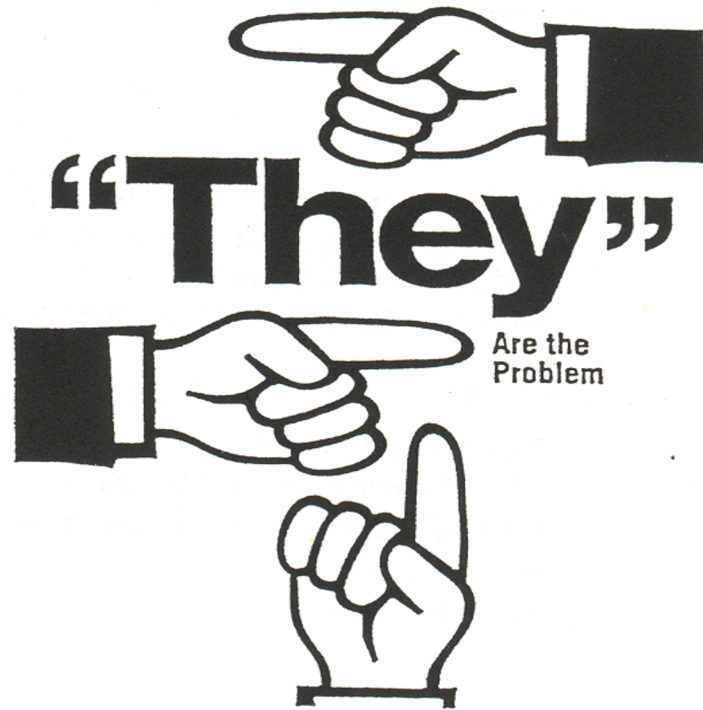


Uppsala Universitet: Field Season 1999 Sharing Science with the People (called stakeholders)

The future has arrived earlier than expected

- **Many impacts scenarios about global warming have already played out in reality.**
- **For example, cutting down trees on mountain slopes yield similar results:**
 - **soil erosion, mudslides, rapid runoff, silting up of stream water, sediment loading of dams and reservoirs, etc.**
- **Some environmental changes worked well while others did not.**
- **A key question: do we need new scientific assessments of every potential environmental impact? B**
 - **Can't we learn from human-induced environmental changes that have already shown their impacts elsewhere on the globe?**

A new role for climate... a scapegoat for societal problems



Nobody wants to take the blame!

“you can’t go home again”

1. “You can’t go home again” suggests that you can’t recover the past.
2. Return to an earlier CO₂ level will not necessarily return to the climate once witnessed at that level.
3. The amount of CO₂ now in the atmosphere commits us to global warming for the 21st century



A “loss of weight” analogy