US Strategies for Climate Change Adaptation: Forest Scientists, Managers, and Stakeholders




PINCHOT INSTITUTE FOR CONSERVATION

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US planning for climate change adaptation in forest management is in the early stages

- Four major factors:
  - Insufficient **local information** on climate change effects
  - **Uncertainty over magnitude** of potential effects on ecosystem structure, function, and processes
  - Lack of **institutional capacity** (staff, funding)
  - Previous **absence of policy mandate** to incorporate climate change into operations of federal land management agencies

Forest Service Strategic Framework For Responding to Climate Change

Version 1.0

October 2008

National Roadmap for Responding to Climate Change - 2010

- Implementation Guidelines
  - Assess current risks, vulnerabilities, gaps in knowledge
  - Engage internal resources and external partners in development of options and solutions
  - Manage forest resources for resilience in terms of human communities as well as natural systems


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Calgary
Lake Louise


the YELLOWSTONE to YUKON Region
NUNAVUT
OGILVIE MTNS
MACKENZIE MOUNTAINS
NORTHWEST TERRITORIES
YUKON
YUKON TERRITORY
NAHANNI
MUSKWA-KECHIKA
BRITISH COLUMBIA
ALBERTA
Y2Y
BANFF & THE CANADIAN ROCKIES
WATERTON GLACIER FLATHEAD
MONTANA
WASHINGTON
IDAHO
OREGON
NORTHERN RANGE & YELLOWSTONE PLATEAU
JACKSON HOLE & THE WIND RIVER RANGE
WYOMING
EIGHT AREAS OF THE YELLOWSTONE TO YUKON REGION FEATURED IN THE EXHIBIT
Yellowstone to Yukon Region
Highway 3
Yukon
Nahanni
Muskwa-Kechika
Banff & the Canadian Rockies
Glacier, Waterton, Flathead
Yellowstone Plateau & Northern Range
Jackson Hole & the Wind River Range

The Northern Appalachian/ Acadian Ecoregion

Québec

New Brunswick

Prince Edward Island

Maine

Nova Scotia

Vermont

New Hampshire

New York

Atlantic Ocean

Two Countries, One Forest Conservation Initiative

Science-Management Partnership

1. Increase awareness of basic climate change science and ***integrate*** that with knowledge of local resources
2. Evaluate ***sensitivity*** of natural resources to climate change
3. Develop and implement ***options*** for adapting resources to climate change
4. Monitor ***effectiveness*** and make adjustments

Science-Management Partnership

Options

1. ***Resistance***: maintain values and ecosystem services in their present condition
2. ***Resilience***: enhance capacity of ecosystems to withstand or absorb effects without loss of key processes or functions
3. ***Response***: assist transitions to future states by mitigating or minimizing disruptive outcomes
4. ***Realignment***: use restoration to sustain ecosystem processes and functions through continuing changes in climate

The Olympic Peninsula Climate Change Case Study

1. Develop understanding of regionally applicable climate change science and potential impacts
2. Develop specific strategies and actions for climate change adaptation

Focus on four main areas:

- Forest vegetation management
- Wildlife habitat management
- Fish habitat management
- Hydrology and roads management



Process for each focus area:

1) Literature review and sensitivity assessment
2) Review of current management practices and constraints
3) Development of adaptation plans of action through collaborative workshops

Adapting Forest Vegetation Management to Climate Change

ISS004-E-10921

www.gly.uga.edu/railsback/CO3/CTW.html

Key vegetation sensitivities:

- Sensitive community types:
  - Subalpine and alpine meadows
  - Rare and relic high elevation species
  - Wetlands, bogs, and fens
  - Sitka spruce rainforests
- Changing ecological processes:
  - Natural disturbances (fire, insects, drought)
  - Phenology: patterns of migration and flowering
  - Regeneration

Goals for forest vegetation management

- Maintain functioning ecosystems
- Maintain biodiversity
- Increase ecosystem resilience
- Increase capacity to restore forest lands after large disturbances

Adaptation priorities for forest vegetation management

- Increase thinning
  - Reduce competition in young growth
  - Maximize tree growth and vigor
  - Maximize tree species diversity and retention of minor tree species
  - Decrease forest density to increase drought resilience and promote shade intolerant species (white pine and red cedar)

Adaptation priorities for forest vegetation management

- Maintain a tree seed inventory with high quality seed for a range of species
- Develop a gene conservation plan for long-term storage of *ex situ* seed collections
- Identify areas for *in situ* gene conservation

Adapting Wildlife Management to Climate Change

Adaptation goals for wildlife habitat management

- Increase collaboration between Olympic National Forest, Olympic National Park, and private lands on:
  - Managing fire
  - Controlling invasive species
  - Monitoring

Adaptation priorities for wildlife habitat management

- Increase wildlife habitat resilience by:
  - Planting native species that will respond favorably to climate change
  - Protecting headwater streams to increase connectivity and protect cold water flows
  - Restoring degraded sites
  - Creating wetlands

Adaptation priorities for wildlife habitat management

- Monitoring:
  - Prioritize monitoring of species most likely to be impacted by climate change
  - Conduct surveys to obtain baseline information, locate potential migration corridors, and determine when population changes are occurring
  - Survey post-fire regeneration for invasive species

Adaptation priorities for wildlife habitat management

- Add a “climate layer” to the 10-year land and resource management plans
- Initiate a public outreach program to explain reasoning behind climate change adaptation strategies

Adapting Fish Habitat Management to Climate Change

Adaptation Goals for Fish Habitat Management

- Recognize that existing channel conditions may not accurately represent future conditions
- Monitor for early indications to determine how quickly climate-related changes are occurring
- Use this information to set management priorities

Adaptation Priorities for Fish Habitat Management

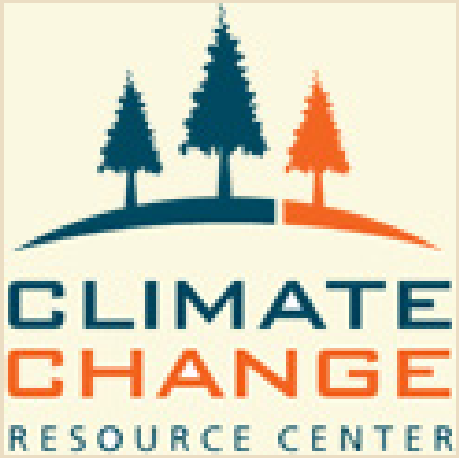
- Prevent the loss of headwaters habitat
- Restore habitat in degraded headwater streams that are expected to retain adequate summer stream flow
- Restore watershed processes and functions, and create diverse habitat
- Control spread of exotic species, through monitoring and public education

Adapting Road Management to Climate Change

Adaptation Priorities in Road Management

- Prioritize road system risks; roads adjacent to streams are most vulnerable to damage
- Consider whether road relocation is the best option in terms of future expense

Climate Change Resource Center
USDA Forest Service



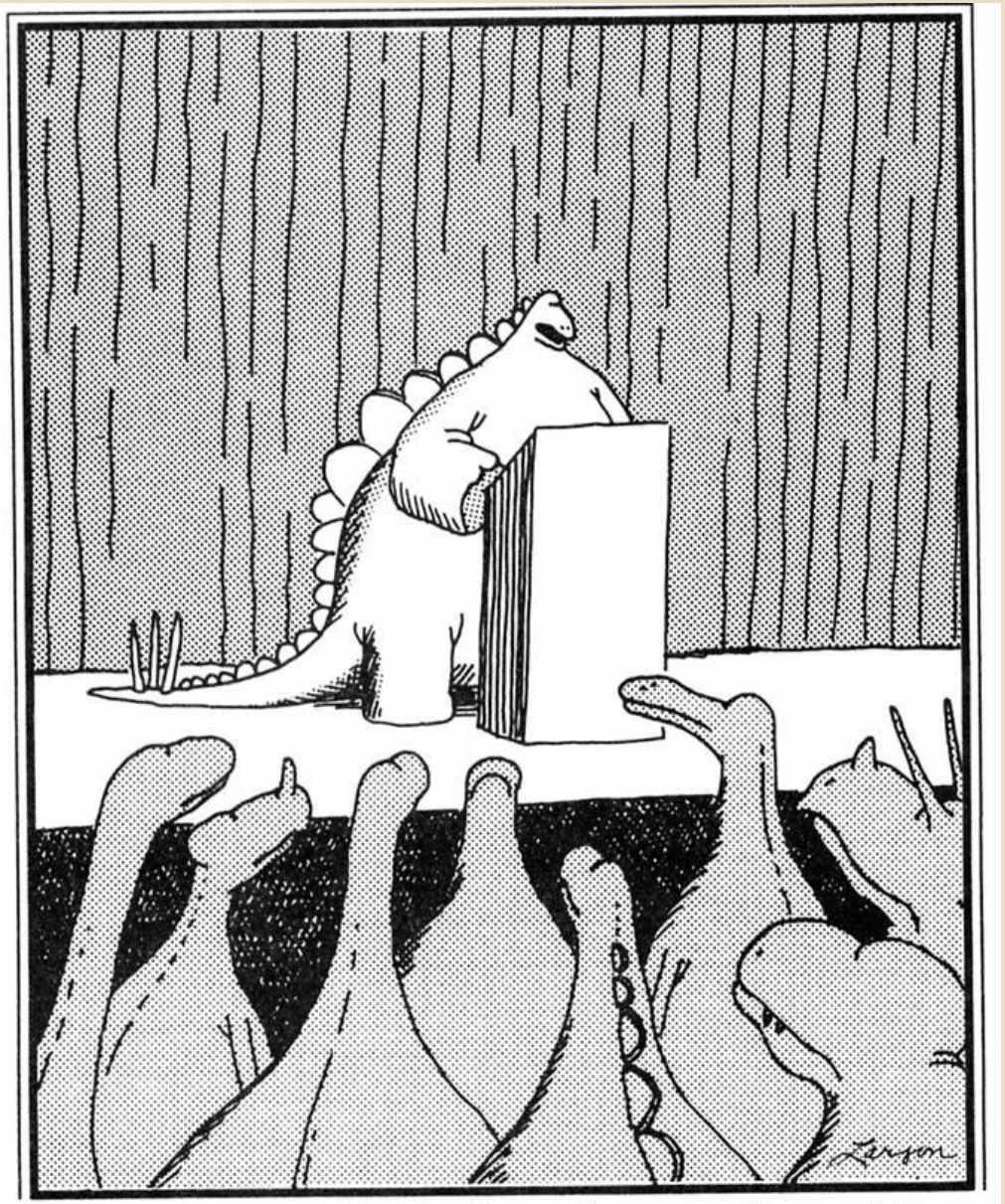
http://www.fs.fed.us/ccrc

Information and tools for land managers

PINCHOT INSTITUTE FOR CONSERVATION

Center for Climate Change Adaptation and Forests

- International center for facilitating research, communication, planning, and policy development on forest management adaptation to climate change
- Reduce vulnerability of natural and human systems to climate change effects through anticipation, preparation, and timely action
- Maintain ecological health and productivity of forest ecosystems, and key values—water resource protection, biodiversity, fiber, bioenergy



"The picture's pretty bleak, gentlemen. ... The world's climates are changing, the mammals are taking over, and we all have a brain about the size of a walnut."