

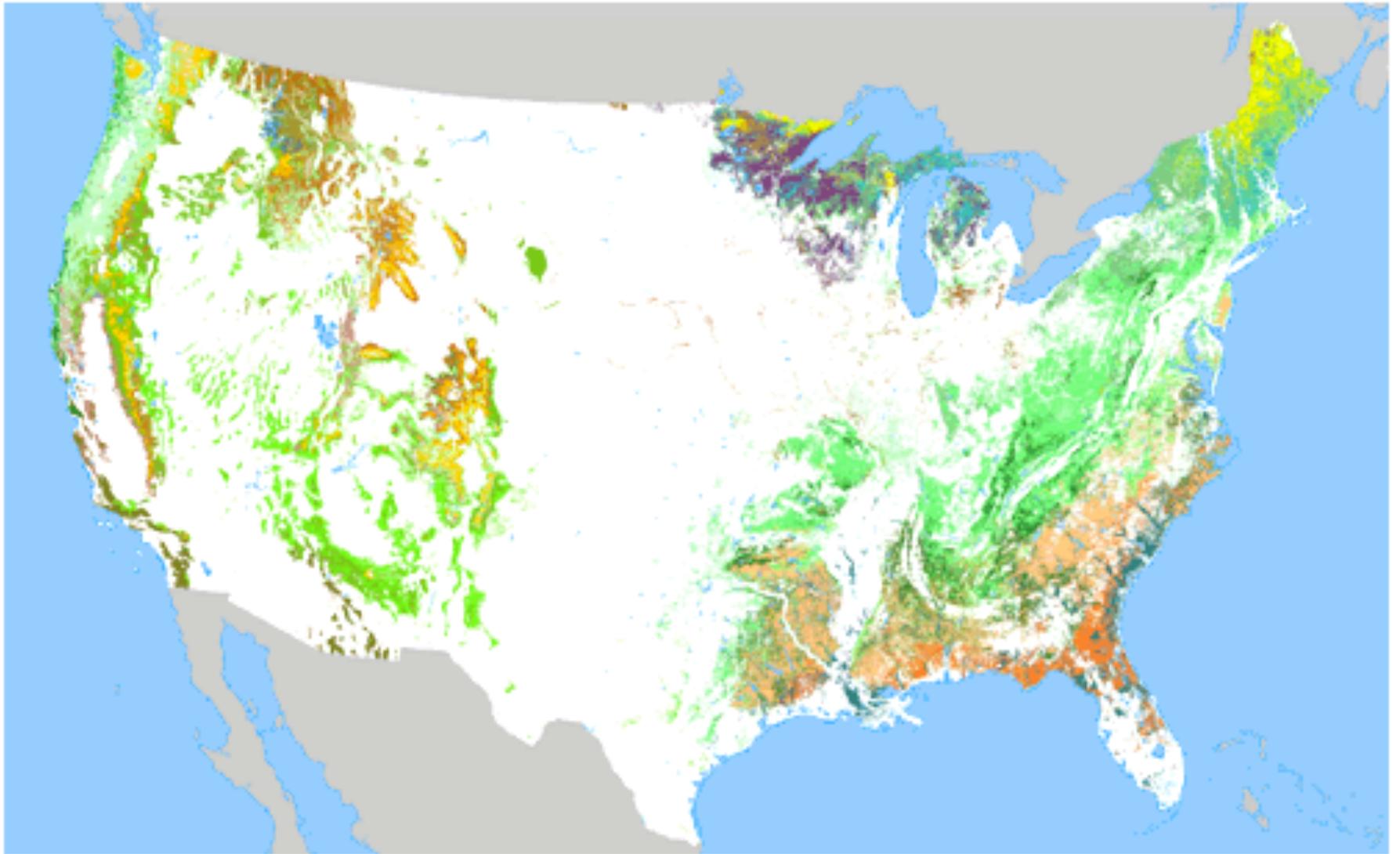
Adapting to Climate Change in US Forest Sector

FCWG Adaptation Funding Dialogue
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Forest Sector Is Complex

- Forest Ecosystems
- People and Organizations



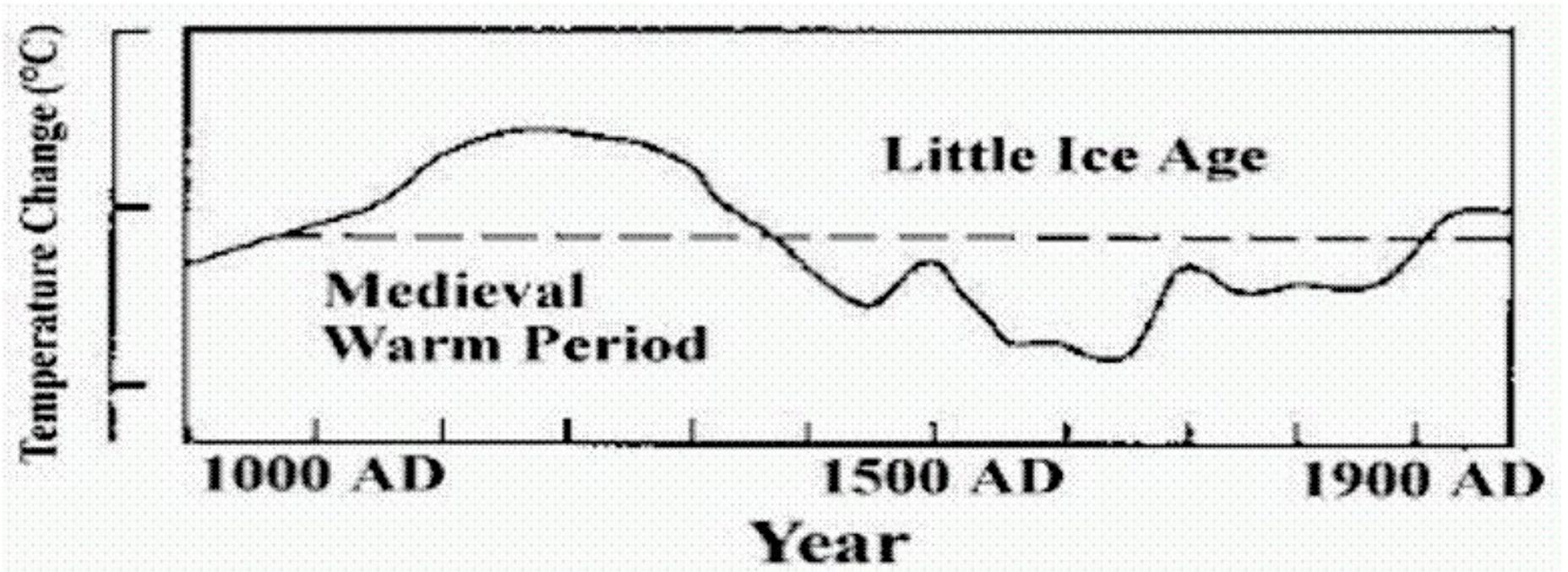
People and Organizations

- Forest Managers
- Regulators, Policy Makers
- Hikers, Birdwatchers, Loggers, etc.
- Scientists
- Forest-based Communities
- Forest-based Businesses
- Agencies, Universities, NGOs
- Etc.

Drivers of Change in Forest Sector

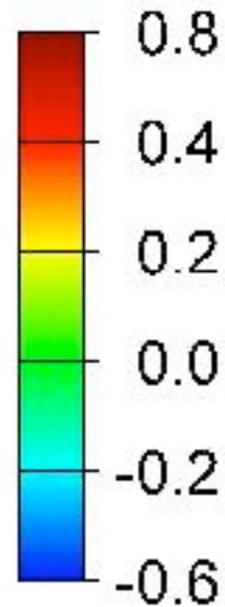
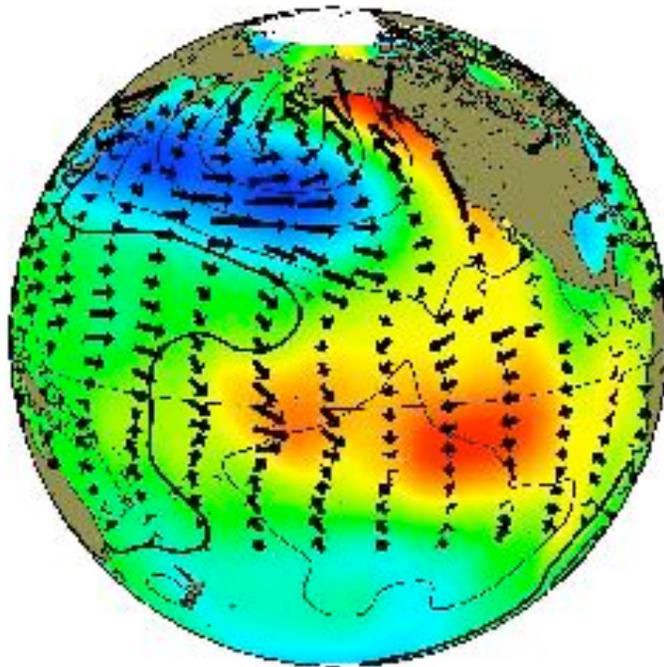
- **Climate variability**
- **Climate change**
- **Natural succession**
- **Insects**
- **Disease organisms**
- **Invasive species**
- **Etc.**
- **Logging**
- **Agriculture**
- **Human settlements**
- **Forest management**
- **Markets**
- **Policies**
- **Etc.**

Climate System Is Complex and Dynamic

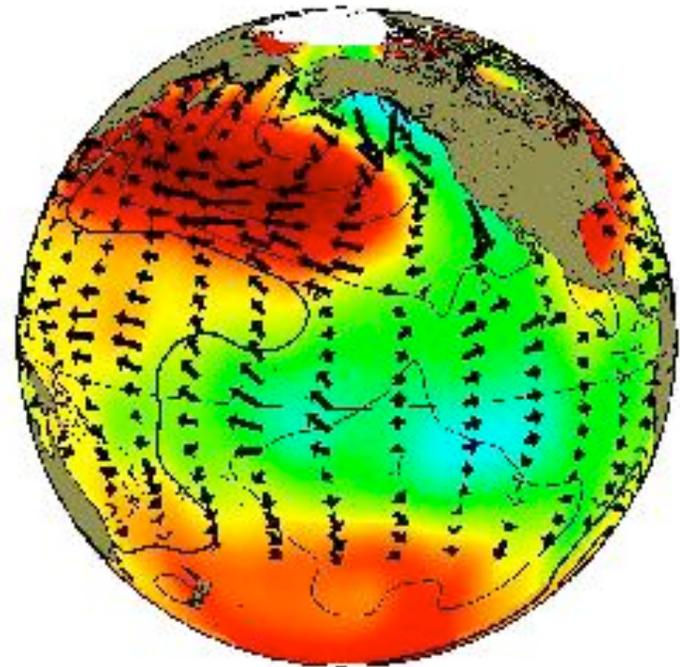


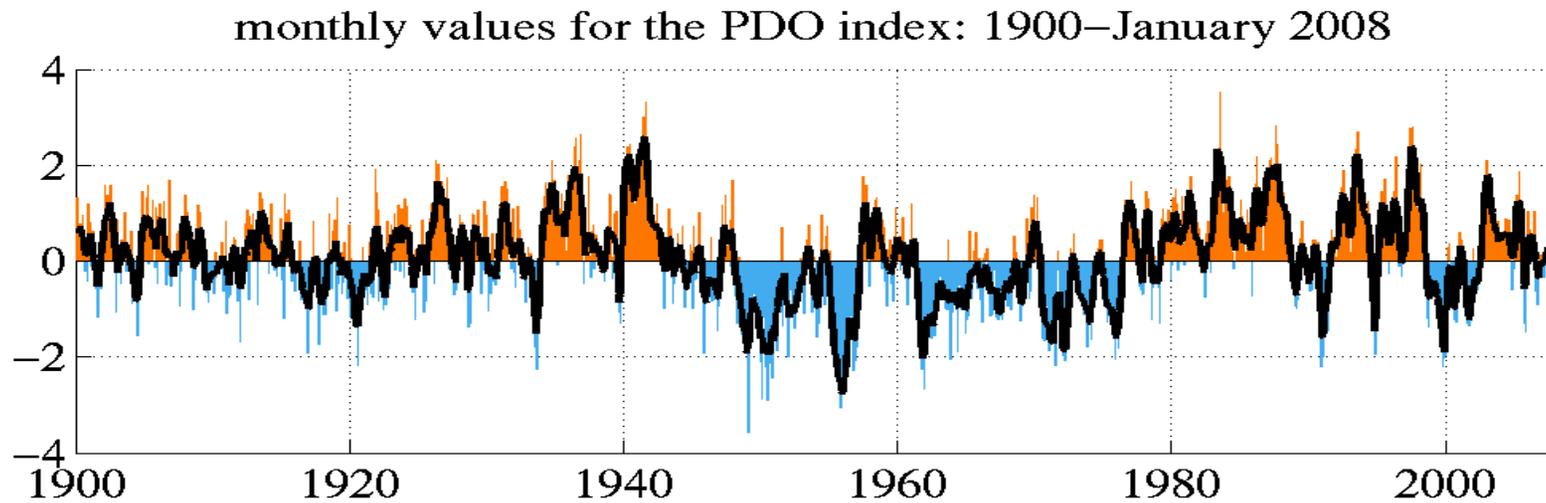
Pacific Decadal Oscillation (PDO)

Warm Phase



Cool Phase





<http://jisao.washington.edu/pdo/>

Climate change happens

**Sometimes the changes
are large and have major impacts**

- **Climate-Driven Ecosystem Succession
in the Sahara: The Past 6000 years**

***Science* 9 May 2008 Kropelin et al.**

Insights from IPCC

- In agriculture and forestry sectors, recent climate change has been “*of limited consequence*” compared to other factors.
- Science has very limited ability to separate and quantify the relative contributions of climate and other factors to observed changes in forest ecosystems.

Insights from IPCC

- Model-based projections of climate change and its impacts are very uncertain at regional and sub-regional scales that are most relevant to impact assessment.
- Scenarios \neq Forecasts

Insights from IPCC

- Under some scenarios, current levels of adaptive capacity will not be sufficient to prevent significant negative impacts on biodiversity and the many goods and ecosystem services that forests provide.

Insights from IPCC

- Substantial progress has been made in defining mechanisms of climate change impacts on forest ecosystems.
 - In general, impacts depend on ecosystem-specific factors and their interactions.



Insights from IPCC

- Vulnerability to climate change impacts depends on:
 - exposure to climate change
 - ecosystem-specific factors
 - adaptive capacity

Insights from IPCC

- It is already possible to identify and mitigate some of the conditions that increase vulnerability to climate change in the forest sector. For example,
 - Stand conditions that predispose trees to damage by insects, disease, wildfire.
 - Insufficient access to capital, information, technology and other aspects of adaptive capacity.

Speculation

What are private forest managers thinking about climate change ?

- How to adapt to climate & energy policies ?
 - Biomass energy markets
 - Forest carbon credits
- Get involved in cap-and-trade debate ?
- Interested in risks of climate change *per se*, but more focused on other concerns.
 - Markets, regulations, invasive species, etc.



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What are public forest managers thinking about climate change?

- How to adapt to climate & energy policies ?
- Compared to counterparts in private sector, generally more attentive to risks of climate change *per se*.
- Searching for new management options for conserving forests and biodiversity threatened by invasive species, climate change, etc.



**Barred Owl-Spotted Owl
Interactions**

Practical Options ?

- Push ahead with developing Sustainable Forest Management as platform for managing change and reconciling the needs and interests of diverse stakeholders in the US forest sector.
 - Hypothesis: reconciliation will increase adaptive capacity.

Practical Options ?

- Continue modernization of Forest Inventory and Analysis (FIA)
 - Early detection of change is an important element of adaptive capacity.

Practical Options ?

- Increase adaptive capacity through investments and innovation in science, policy reform, community forestry, etc. For example:
 - Evaluate mid-range climate forecasts with respect to reliability and utility to forest managers.
 - Design forest-based mitigation projects in ways that enhance adaptive capacity.

Conclusions

- Complexity of natural and human systems:
 - stymies quantification and predictability of climate change impacts.
 - provides many different pathways to adaptation.

Conclusions

- Adaptation to climate change requires knowledge and consideration of ecosystem-specific factors such as:
 - knowledge and uncertainty about dimensions of climate change and their interactions with forest ecosystems.
 - other drivers of change in forest sector such as invasive species, laws, markets, etc.