



Climate Panel Brief



Re-Framing Management Strategies in the Face of Climate Change

National Leadership Team Meeting
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Tipping point: We are managing forests within a human-dominated climate system

- 20th Century: 1.3°F rise in global average temperature; warming after 1960s driven by anthropogenic greenhouse gases (0.32°F/decade last 30 yrs)
- 21st Century: projected 2.0 to 11.5°F rise in global average temperature above current by 2100; projected CO₂ 250-700 ppm increase above current by 2100 depending on global choices
- Novel environmental stressors interact with climate effects: Air and water pollution, habitat fragmentation, invasive species, resource exploitation, altered disturbance regimes

Current management paradigms have limited value given anticipated levels of uncertainty and change

- Historic Range of Variation: Past is a poor reference for current or future conditions
- Natural Range of Variation: Unknown fundamental niche space of species
- Ecological Sustainability: Current interpretations overly static for dynamic reality
- Managing for disturbance directly: Climate changes exacerbate conditions, complicating strategies and creating need for institutional capacity beyond expectation

Adaptation and mitigation are complementary approaches to resource management in the context of climate change

- Adaptation strategies aim to maintain ecosystem function as climates change. They improve the capacity of forest ecosystems to accommodate changes in climates and environments and seek to minimize abrupt (catastrophic) responses.
- Mitigation strategies aim to reduce greenhouse gas emissions. In forestry, they take advantage of carbon-cycling functions of forests and grasslands to bank (sequester) carbon and to pump carbon out of the atmosphere

Faced with the expectation of change and uncertainty, managers have three overall choices for planning

- No anticipatory plans or actions taken
- Incorporate climate-smart actions after disturbance
- Plan in advance for anticipated changes

Creating climate-smart management plans for specific landscapes involves setting local adaptation and/or mitigation goals, selecting from a toolbox of practices, and planning for flexibility

- Role of climate and vegetation models: be aware of their assumptions and uncertainties relative to the geographic scale of management and the risks and sensitivities of management goals

Adaptation options

- Create and increase **Resistance** to changes (forestall effects, but beware: "paddling upstream")
- Promote **Resilience** to ongoing changes and climate-related disturbances (lower pending stresses, but beware: diminishing capacity to maintain as conditions change over time)
- Enable **Response** of resources to change, especially seeking to minimize catastrophic transitions (consider "eggs in one basket" versus "bet-hedging" approaches)
- **Realign** conditions that are far out of NRV to current and anticipated future dynamics

Mitigation options

- **Reduce** atmospheric greenhouse-gas concentrations through emission-reduction and carbon-sequestration practices
- **Reduce** ecological footprint through green-energy practices

Overall

- Set **Priorities**; Practice **Triage** when appropriate

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