Climate Change Response Framework

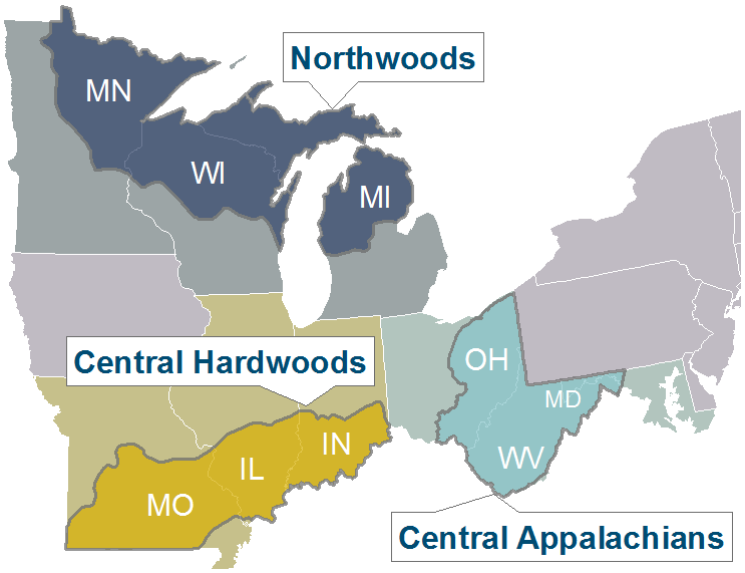
Vulnerability Assessments for Forest Ecosystems

Vulnerability is the degree to which a system is susceptible to, and unable to cope with, adverse effects of climate change, including climate variability and extremes. The identification of vulnerable species and ecosystems in the near term is a critical step in long-term planning. Some forests may exhibit substantial and long-term declines in vigor and productivity as a result of climatic changes; these forests may be considered vulnerable even if they show some resilience in community composition. Other forests are more clearly vulnerable as ecosystem function or community composition is severely altered.

Vulnerability is a function of a system's exposure to climate change, its sensitivity, and its adaptive capacity.

Vulnerability assessments are being developed for three regions in the eastern US. Each vulnerability assessment is tailored to meet the needs of a particular region while maintaining a consistent approach and format across assessments. The vulnerability assessments:

- focus on forest ecosystems within a region defined by a combination of ecoregional and political boundaries
- address vulnerabilities of individual tree species and forest or natural community types within each region
- use gridded historical and modeled climate change information as well as two different approaches to modeling impacts on tree species
- rely on a panel of scientists and managers with local expertise to put scientific results in context



Assessments include 7 Chapters:

1) ***The Contemporary Landscape*** describes existing conditions, physical environment, ecological character, and social dimensions of the assessment area.
2) ***Climate Change Primer*** contains background on climate change science, projection models, and impact models. It also describes the techniques used in developing climate projections.
3) ***Observed Climate Change*** describes trends in records of past climate.
4) ***Future Climate Change*** presents statistically downscaled climate projections at the regional scale.
5) ***Impacts on Forests*** summarizes results of modeling climate change effects on tree species distribution and forest ecosystem processes.
6) ***Forest Ecosystem Vulnerability*** synthesizes the potential effects of climate change on forest ecosystems and outlines key changes to ecosystem stressors, responses to those stressors, and vulnerabilities.
7) ***Implications for Forest Management*** describes implications for recreation, timber production, wildlife habitat, and many other secondary vulnerabilities, and ongoing research in those focus areas.

For more information on this project, visit: www.climateframework.org

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A Process for Assessing Forest Ecosystem Vulnerability (Chapter 6)

Ecosystem vulnerability is assessed by a panel of experts using the process described below. Experts were selected for their knowledge and experience in the ecosystems being assessed and represented a variety of disciplines, including hydrology, plant physiology, silviculture, wildlife management, soil, understory plant communities, and other interrelated components of the ecological system.

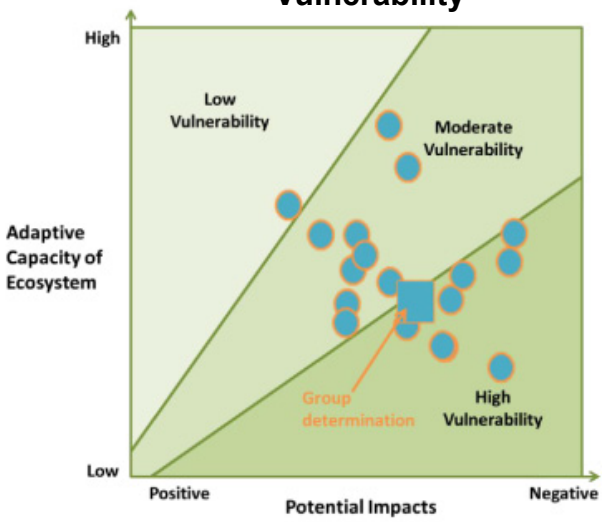
The panel assessed vulnerability using carefully defined concepts:

Potential impacts are the direct and indirect consequences of climate change on systems and could be harmful or beneficial to an ecosystem. Impacts are a function of a system's exposure to climate change and its sensitivity to any changes.

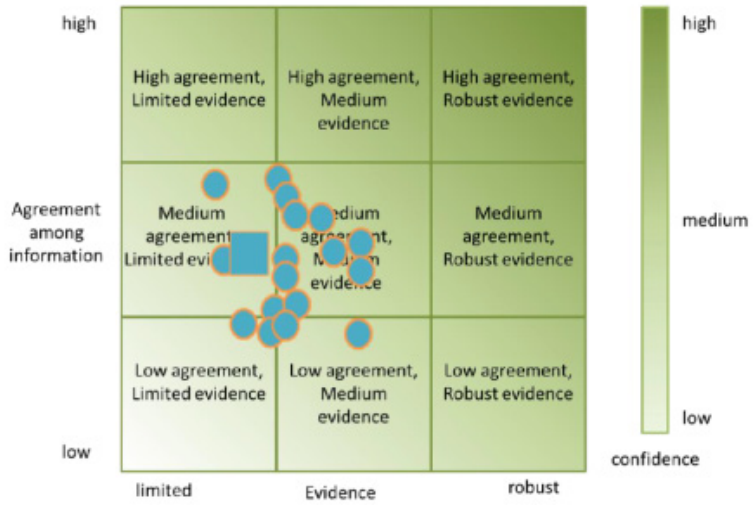
Adaptive capacity is the ability of a species or ecosystem to accommodate or cope with potential climate change impacts with minimal disruption.

The panel draws heavily on information included in chapters 1-5 and other information to assess potential impacts, adaptive capacity, and overall vulnerability of forest ecosystems to climate change. Each expert assesses vulnerability of an ecosystem based on impacts and adaptive capacity. Experts discuss these individual assessments before reaching group consensus on vulnerability and confidence in available information.

Vulnerability



Confidence Rating



Central Appalachians Climate Change Response Framework

The Central Appalachians assessment is one of five currently underway.

Assessment area

Ecological Provinces 221 and M221 in Ohio, West Virginia, and Maryland

Milestones

- Model results available in Winter 2013

  Climate Change Tree Atlas: A species distribution model is assessing potential changes in suitable habitat (Louis Iverson, US Forest Service, Northern Research Station)

  LANDIS-PRO: A process model is simulating interactions, disturbance, and management to assess changes in biomass (Frank Thompson, US Forest Service, Northern Research Station)

- Expert panel in Spring 2013
- Working draft of the vulnerability assessment in Summer 2013

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