Current state of knowledge and research on potential effects of climate change on forest economics

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Overview

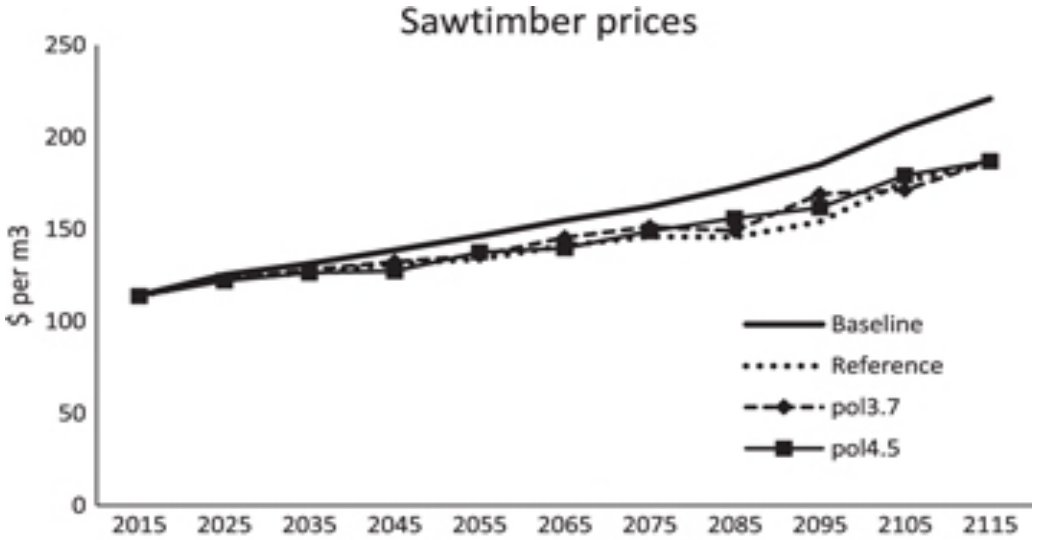
- Most research in NE/ME CC impacts on physical changes

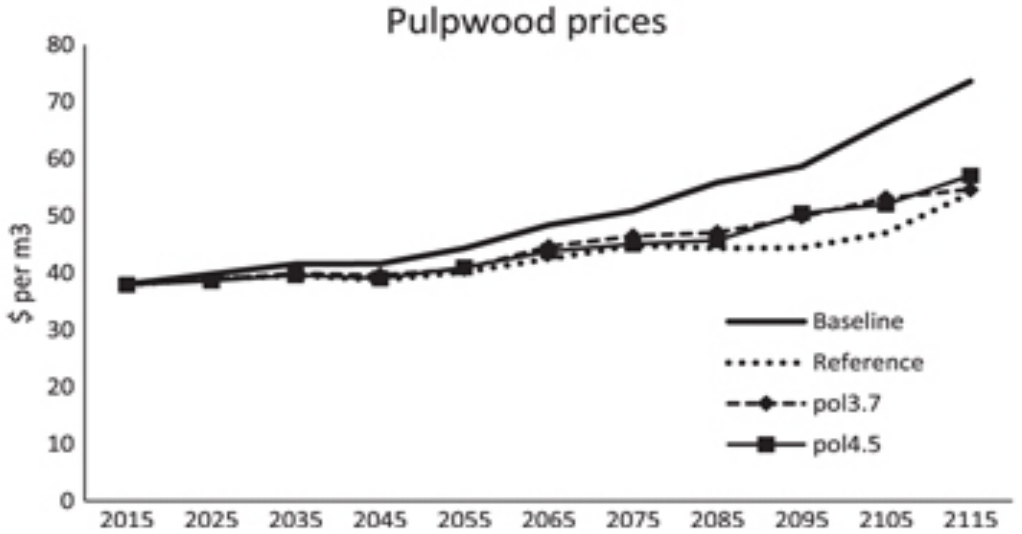
- CC impacts people and economies too
  - Forest productivity and species shift + changes in market demand
  - Management activities as form of adaptation

- Not just about impacts and adaptation. Forests have large mitigation potential too
  - Standing carbon, durable wood products, biomass-based energy

Current Knowledge

- Naively, can take estimated changes in forest productivity and species distribution to quantify economic impacts of CC
- However, more complex than that because humans can adapt. Thus, can utilize economic models to account for that.
- At present, more info available at national and global scale.

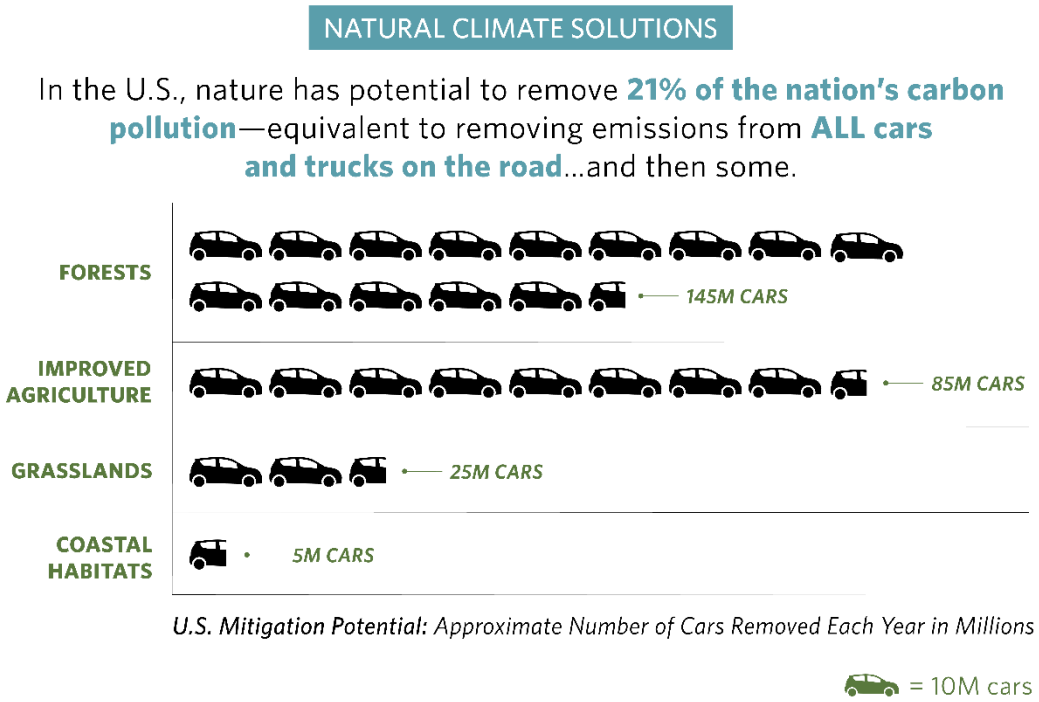


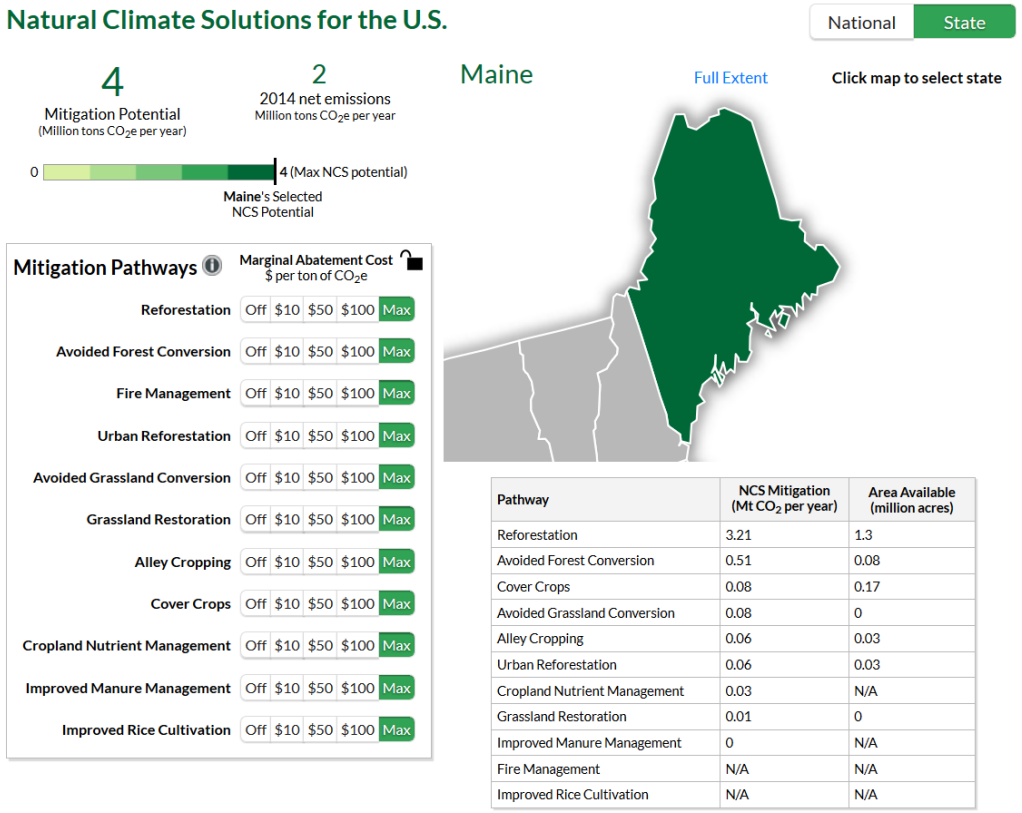


Source: Tian et al (2016)

Current Knowledge

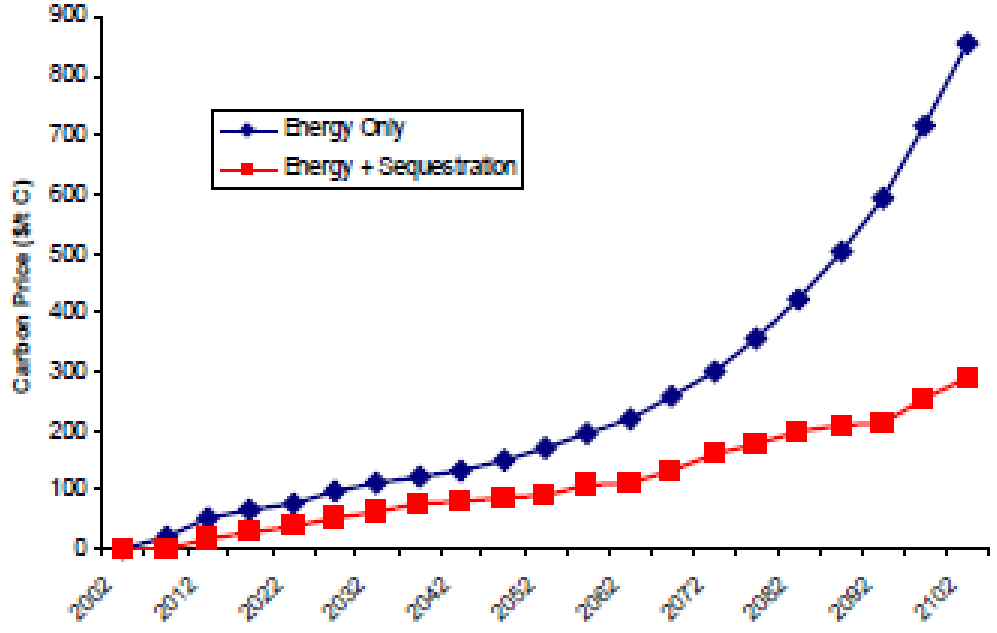
- Not just about impacts and adaptation. Forests also have large CC mitigation potential





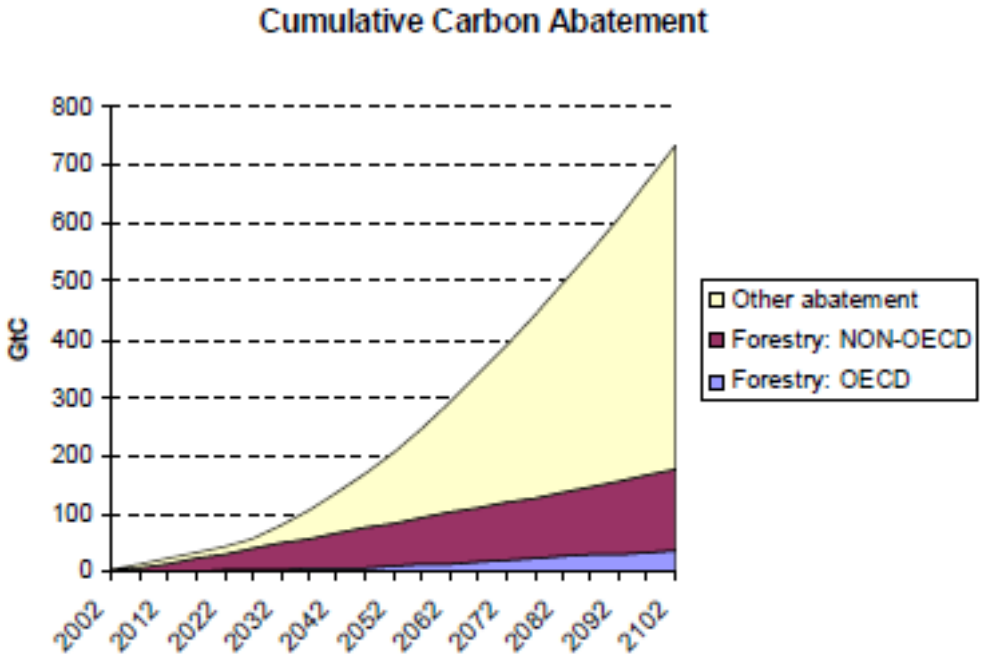
Pathway	NCS Mitigation (Mt CO_2 per year)	Area Available (million acres)
Reforestation	3.21	1.3
Avoided Forest Conversion	0.51	0.08
Cover Crops	0.08	0.17
Avoided Grassland Conversion	0.08	0
Alley Cropping	0.06	0.03
Urban Reforestation	0.06	0.03
Cropland Nutrient Management	0.03	N/A
Grassland Restoration	0.01	0
Improved Manure Management	0	N/A
Fire Management	N/A	N/A
Improved Rice Cultivation	N/A	N/A

Including incentives for forest carbon sequestration can reduce climate change mitigation policy costs by up to 50%



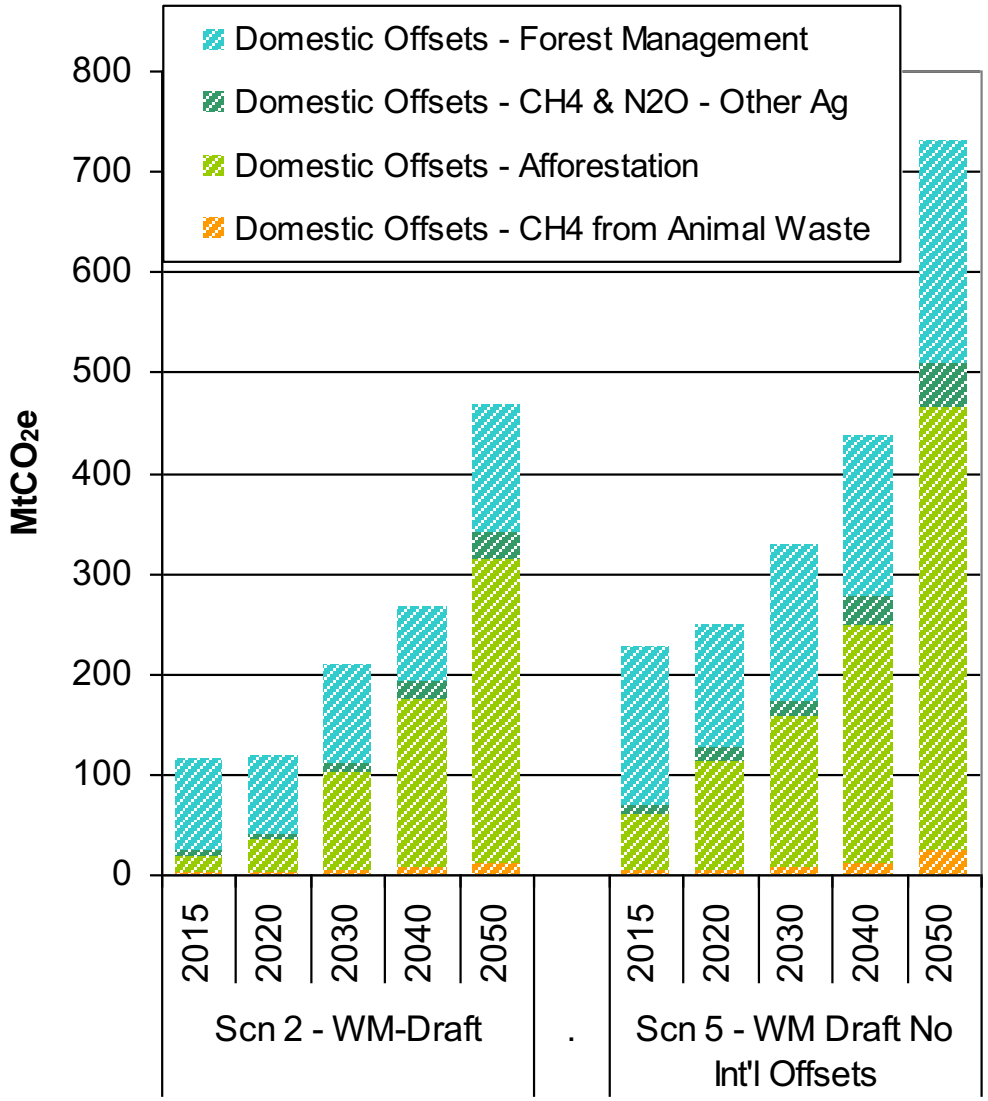
- Accounts for up to 30% of GHG abatement
- Most abatement from outside OECD

Analysis of costs to stabilize at 550 ppm CO2



Source: Tavoni, Sohngen, and Bosetti (2007)

…and most of the low-cost, land-based, GHG abatement is expected to come from improved forest management and planting more trees



- Maine stands to gain a lot from an **efficient climate policy** that incentivizes gains in **forest carbon sequestration**, particularly through improved **forest management**

- Maine could also potentially gain from an increase in market demand for **wood-based products, bioenergy, and biofuels, especially** if wood is recognized globally as a **low-carbon** and **sustainable** source

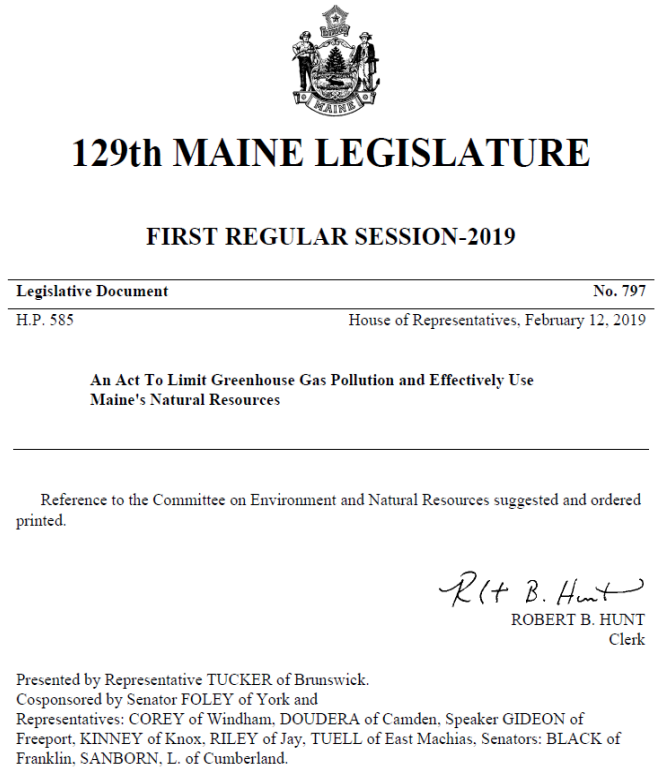
Source: EPA (2010) – Economic Analysis of Waxman-Markey Bill

Emerging Maine State Climate Policy

- Focus on Renewable Energy and Climate Mitigation
  - Governor Mills: 80% renewable energy by 2030, 100% by 2050
  - State recently joined U.S. Climate Alliance

- ~100 bills proposed in 129th Legislature, e.g.,
  - LD 797: 80% reduction in GHGs emissions by 2050.
  - LD 893: Update to 2004 Climate Action Plan

- How will forestry play a role?
- What about biomass energy?



129th MAINE LEGISLATURE

FIRST REGULAR SESSION-2019

Legislative Document **No. 797**

H.P. 585 House of Representatives, February 12, 2019

An Act To Limit Greenhouse Gas Pollution and Effectively Use Maine's Natural Resources

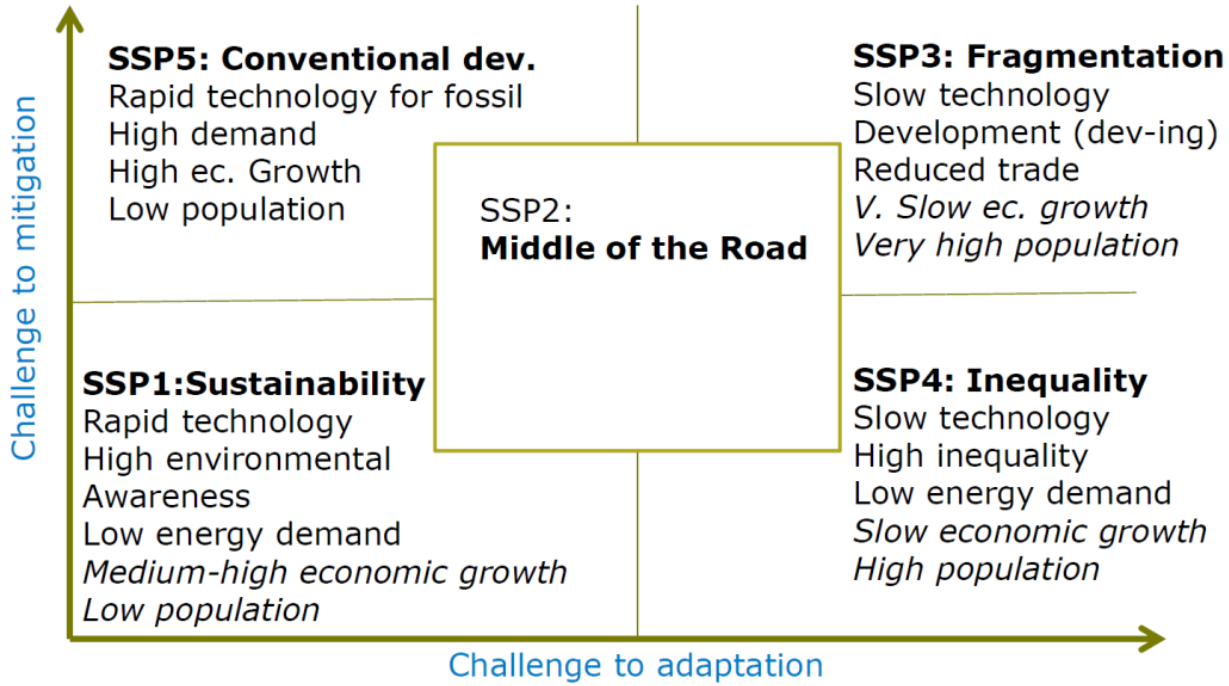
Reference to the Committee on Environment and Natural Resources suggested and ordered printed.

ROBERT B. HUNT
Clerk

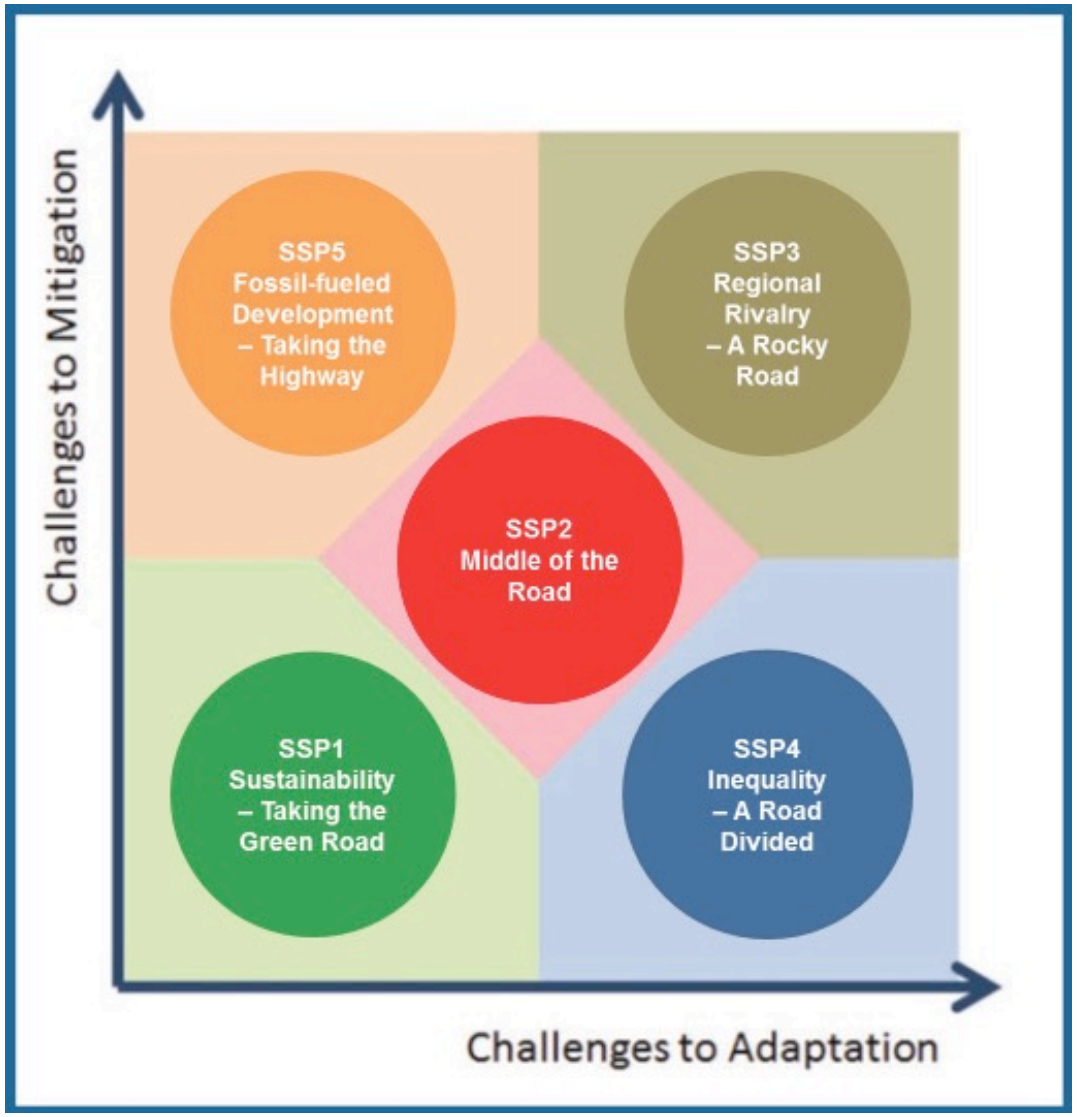
Presented by Representative TUCKER of Brunswick.
Cosponsored by Senator FOLEY of York and
Representatives: COREY of Windham, DOUDERA of Camden, Speaker GIDEON of Freeport, KINNEY of Knox, RILEY of Jay, TUELL of East Machias, Senators: BLACK of Franklin, SANBORN, L. of Cumberland.

Future Implications – Policy, Impacts, and Adaptation

- Lots of plausible futures depending on where society goes
- IPCC framework:
  - Physical Impacts → RCPs
  - Socio-economic impacts → SSPs
- Which pathway for Maine/NE/US?
- We live in a global world



Shared Socio-economic Pathways & Forest Area Change



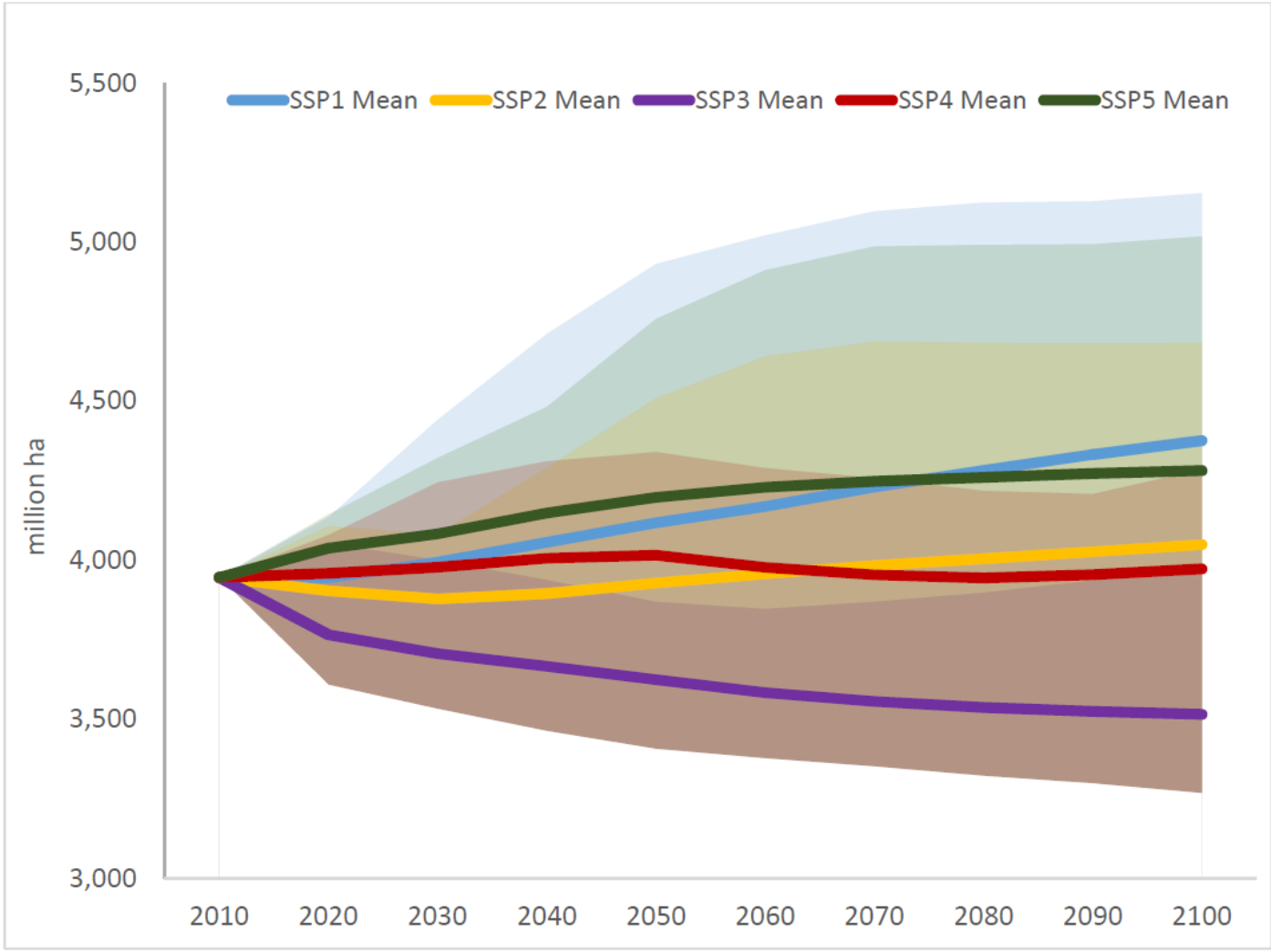
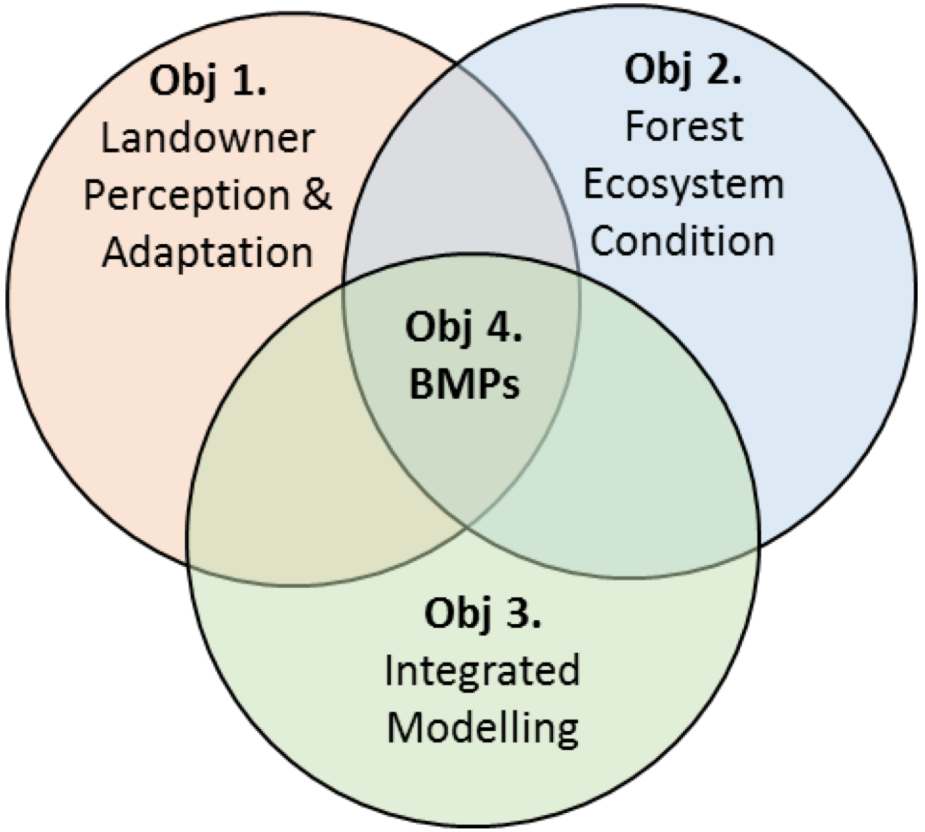


Figure 1. Popp et al. (2017) range of projected forest land cover for 5 SSPs, 2020-2100.

Research Examples

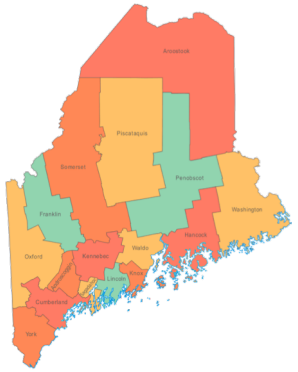
1. *Fostering Climate Change Resilience: A Socio-Ecological Forest Systems Approach*
2. Maine Forest Futures
3. Natural Climate Solutions



Project 1: Fostering Climate Change Resilience: A Socio-Ecological Forest Systems Approach

1. Risk Perceptions

2. Vulnerability assessment



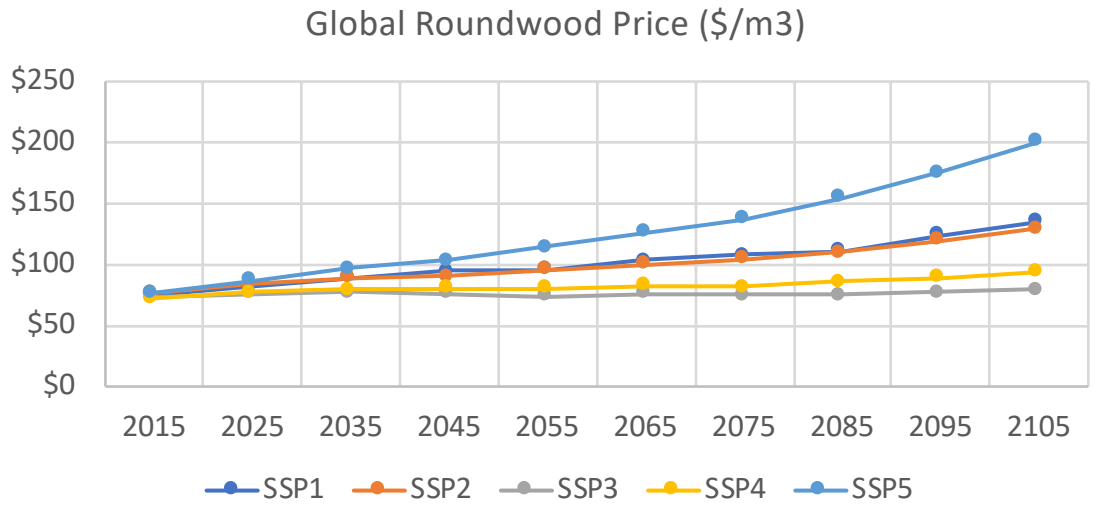
3. Participatory workshops

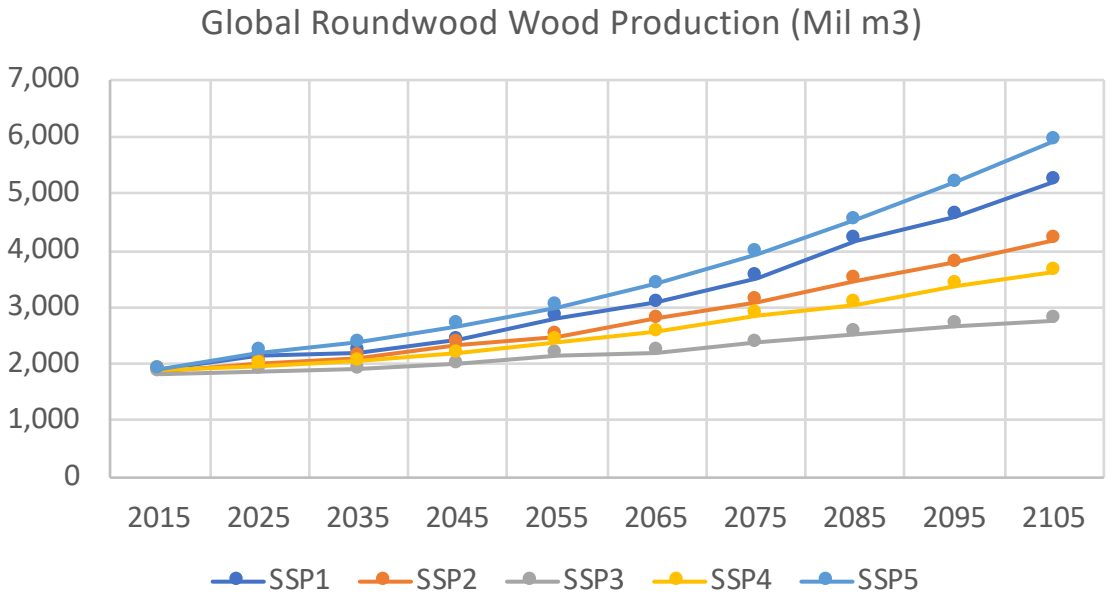
Mixed methods approach to combine **risk perceptions** and **climate change vulnerability** to conduct **stakeholder-driven workshops** and identify **best management practices** to **mitigate effects of CC**

Project 2: Forest Sector Pathways

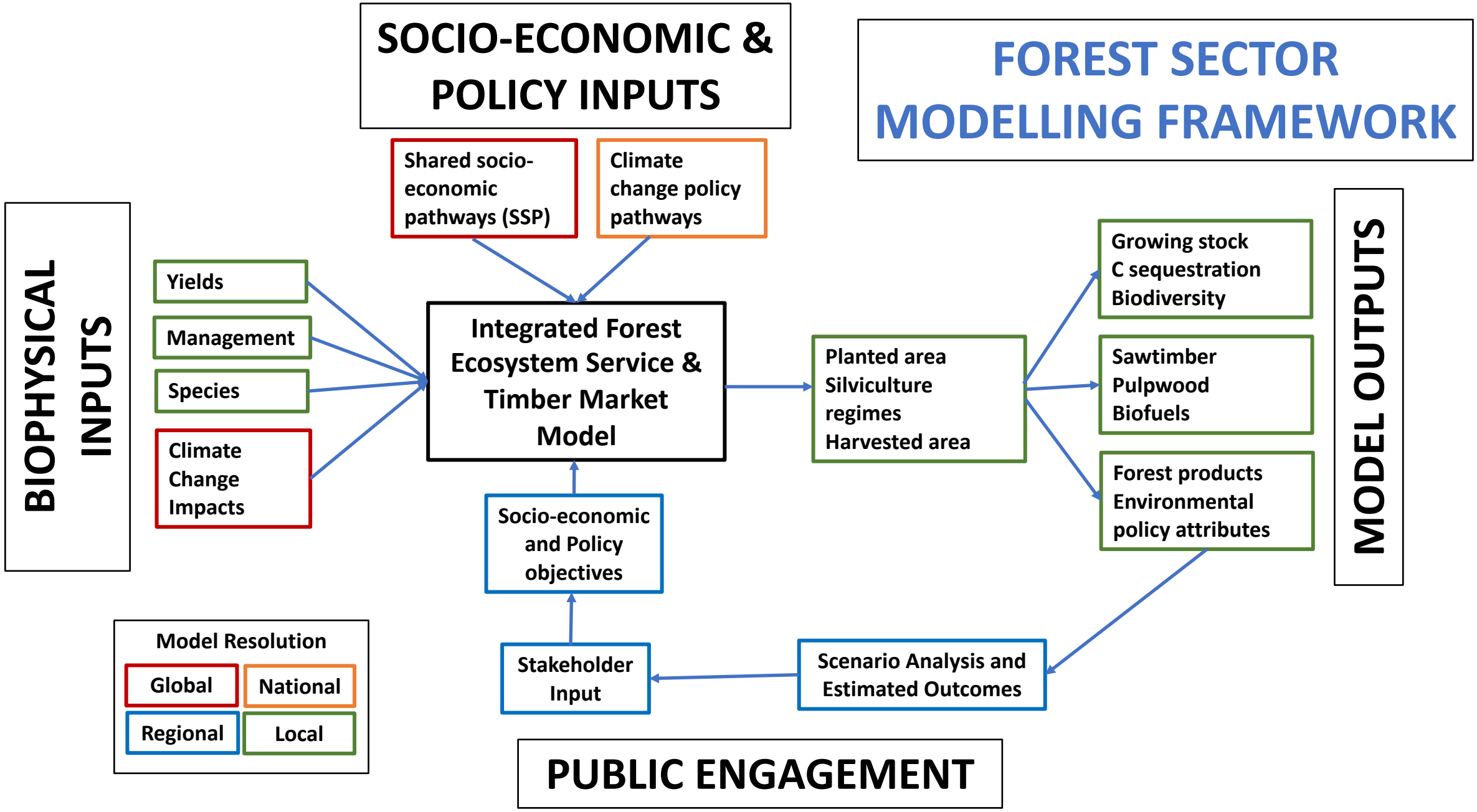
Dynamic timber supply model can be used to examine impacts of **five forest sector pathways** or alternative futures on **local, national, and global forest industry**. Key drivers include:

- Wood product demand
- Bioenergy demand
- Land use regulation
- Environmental policy
- Technological change
- Forest investment response





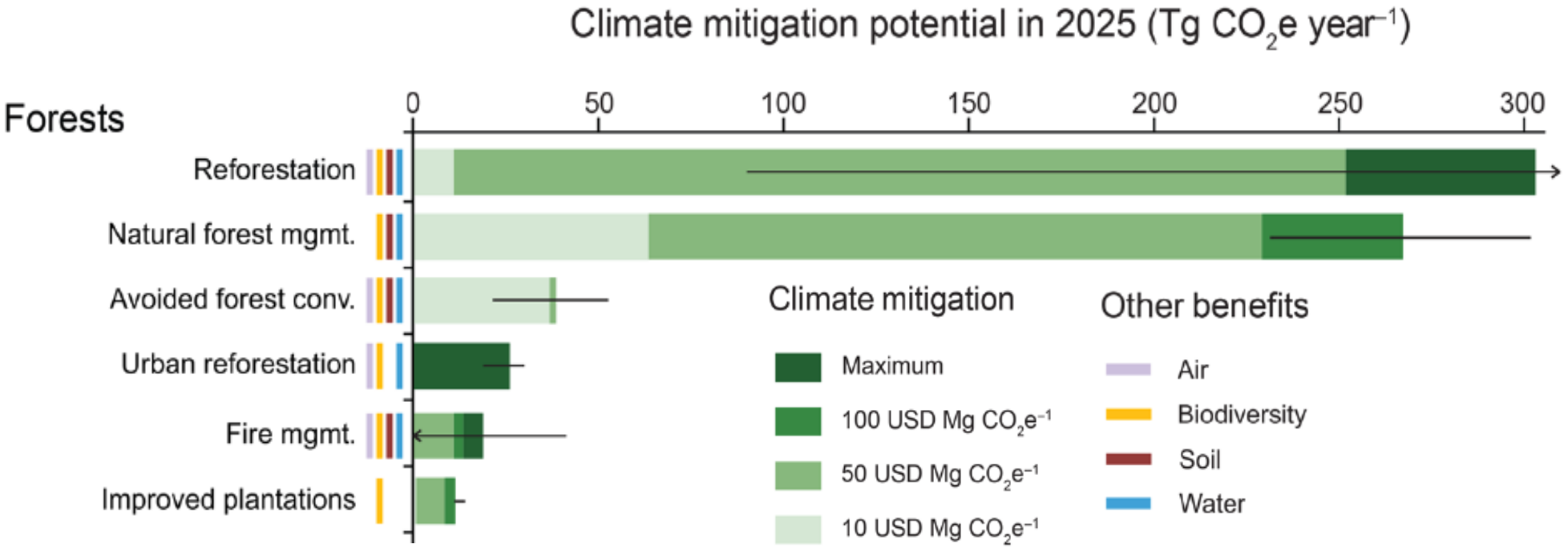
FOREST SECTOR MODELLING FRAMEWORK



Project 3: Mitigation Potential (and other ES)

Q: What is market value/potential for forest carbon sequestration (and other forest ecosystem services?) in Maine?

E.g., Fargione et al estimate Natural Climate Solutions for US, and also publish figures at the state level



Fargione et al (2018)

Potential Research Outcomes

1. Better informed and more resilient and adaptive landowners and managers
2. More robust forest products industry
3. Investment in mitigation and adaptation focused forest management

Current Knowledge Gap

- Not a lot Forest Econ + CC research in Maine/NE…
- What FCCI thinks people need/want to know:
  - What CC-related policies are likely to be most influential on forest-dependent economies?
  - Which CC impacts are expected to have the largest impact on forest sector profitability? (e.g., changing winter effect on harvest operations)
  - How will markets shift as a result of CC and related policy?
  - What can forest managers do to adapt to CC?

Question/Comments

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