

The Challenge

Maine's forest-based economy and rural communities face radical and rapid change driven by disruptive technologies and a complex array of dynamic, interactive socio-ecological factors

The Opportunity

Maine Innovation Economy Advisory Board (MIEAB) selected Maine-FOREST as a priority topic for potential NSF EPSCoR funding due to the alignment to the state's recent Science & Technology Plan

Our Vision

Lead a comprehensively integrated research, education, and outreach program that fosters diversified and robust forest-based economies and rural livelihoods.



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FOREST-BASED OPPORTUNITIES FOR RESILIENT ECONOMY, SUSTAINABILITY, AND TECHNOLOGY (MAINE-FOREST)

Future Opportunities for Decarbonization

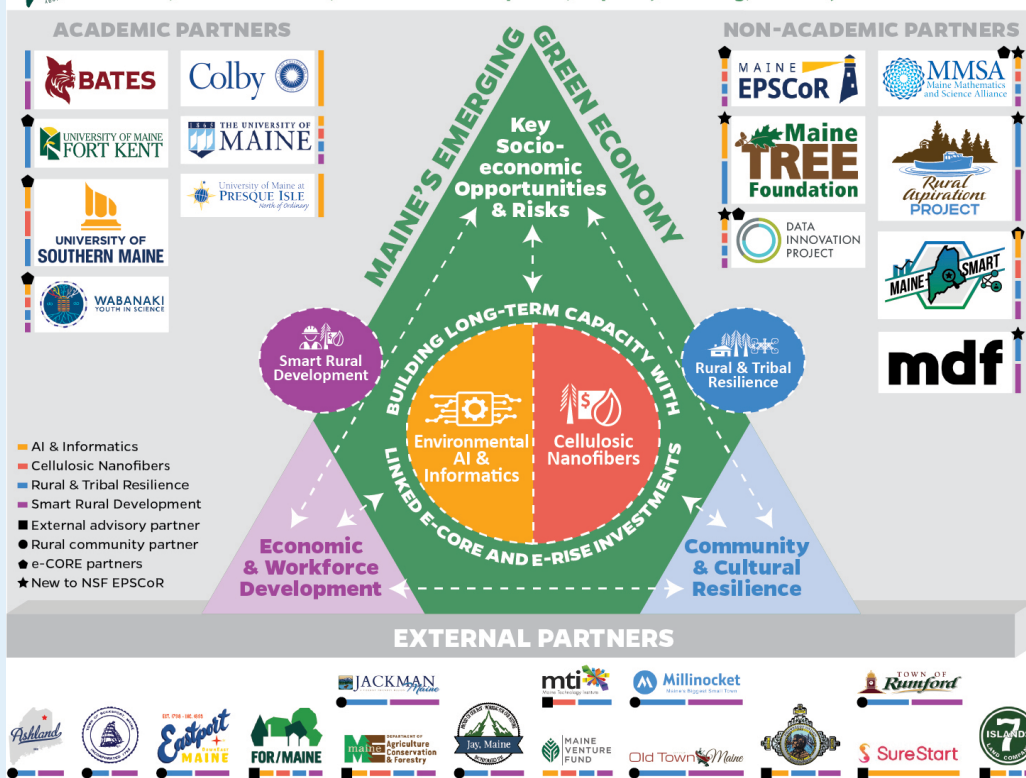
*NSF EPSCoR E-RISE Proposal for
Growing Maine's Forest-based Economy and Rural Economies
through Technology and Innovation*

Background, Goals, & Vision

- ✧ Maine's forest products sector annually contributes \$8-10B to the state's economy.
- ✧ Paper mill closures, the decline in available wood markets, reduced harvesting, a shift in the use of paper, and critical labor market disruptions have negatively impacted rural communities that rely on a robust forest economy.
- ✧ A majority of Maine's forests have reached a critical biological tipping point due to the lack of robust fiber markets and forestland threatened by disease and pests along with the ongoing challenges created by climate change.

MAINE-FOREST INNOVATION INCUBATOR ECOSYSTEM VISION

Research, STEM Education, Workforce Development, Capacity-building, Diversity & Inclusion Partners



- ✧ Maine's forestlands and the associated products it generates offset 60-75% of Maine's greenhouse gas emissions—and the potential to offset significantly more through improved forest management and innovative wood products.
- ✧ Maine's forests can provide climate-smart products that support growth in these rural communities
- ✧ A new strategy is essential to sustainably and effectively manage resilient forests in the face of these threats.
- ✧ A more diverse forest-based economy could enhance the utilization of renewable forest goods and services, and leverage the growing advanced bioproducts sector in Maine.

Our Approach

Expand on the University of Maine's comprehensive research capacity to build a program that considers the entire forest socio-ecosystem across all potential dimensions within the broader context of rural economic and livelihood diversification, through a 4-pronged approach:

Environmental
AI &
Informatics

Cellulosic
Forest-based
Nanomaterials &
Bioproducts

Rural & Tribal
Resilience

Smart Rural
Development

1. **Environmental Artificial Intelligence (AI) & Informatics:** Utilize advanced technologies and AI to better understand the driving ecological and economic factors influencing past/current/future value of forest ecosystem services.
2. **Cellulosic Forest-based Nanomaterials & Bioproducts:** Develop novel products that use sustainable nanomaterials and advanced manufacturing processes to strengthen the state's green economy.
3. **Rural & Tribal Resilience:** Advance participatory modeling to strengthen the capacity of resource-dependent rural and Indigenous communities to respond to socio-ecological shocks.
4. **Smart Rural Development:** Design, build, and implement successful pathway programs focused on targeted, applicable academic programs and job training.

Forestry & Forest Products

Identify products and practices that mitigate the impacts of climate change on Maine's forests and the globe, and help Maine reach its 2045 carbon-neutrality goal.

AI/Cyber

Use AI to help advance climate-smart practices and policies in agriculture, forestry, fisheries, and related fields, and research ways to reduce AI's large carbon footprint.

Bio-Based Alternatives

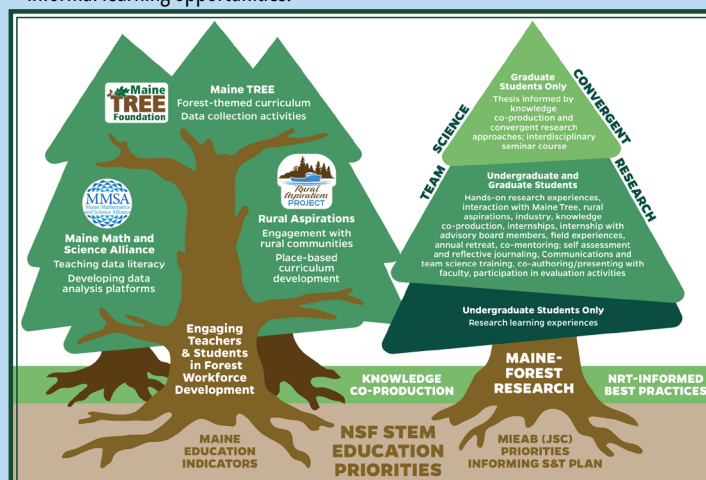
Advance the use of high-performance, low-energy, climate sequestering products in a variety of industries.

Healthy Aging

Prepare an age-capable workforce that can adequately identify and respond to the mental and physical health needs of older adults, especially in rural areas.

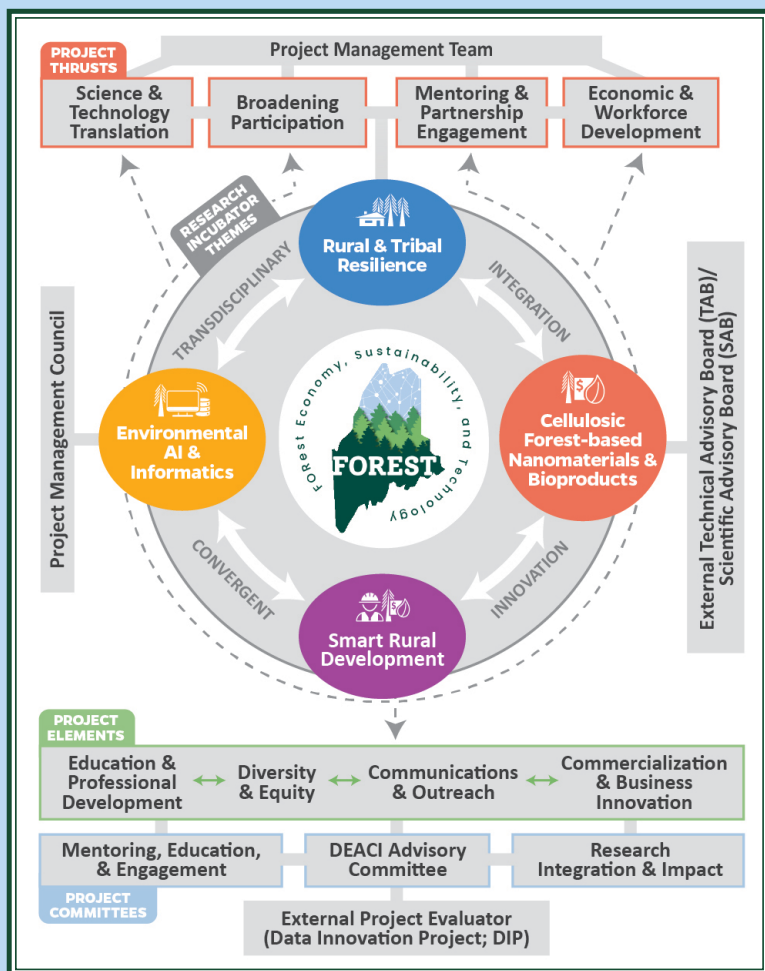
**Maine's
Forest-based
Opportunities
for Resilient
Economy,
Sustainability,
and Technology
(Maine-FOREST)**

Maine-FOREST is well aligned with key priority focal areas of the state's recently released Science & Technology plan (umaine.edu/mieab), which includes formal and informal learning opportunities.



Potential Long-term Impacts

- Utilization of data science and AI to understand forest conditions and forecast future changes using deep learning algorithms.
- Stronger R&D infrastructure that directly supports Maine industries.
- Expanded framework for new product development and the role of diverse stakeholder values and perspectives in shaping these decisions.
- Provide opportunities for STEM engagement and workforce development (e.g., AI and bioproducts).
- Collaborative knowledge network comprising members from research, green economy, Indigenous, landowner/manager, and conservation groups who will sustain growth and innovation for the project.
- Increased awareness, interest, and capacity for green collar opportunities.



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