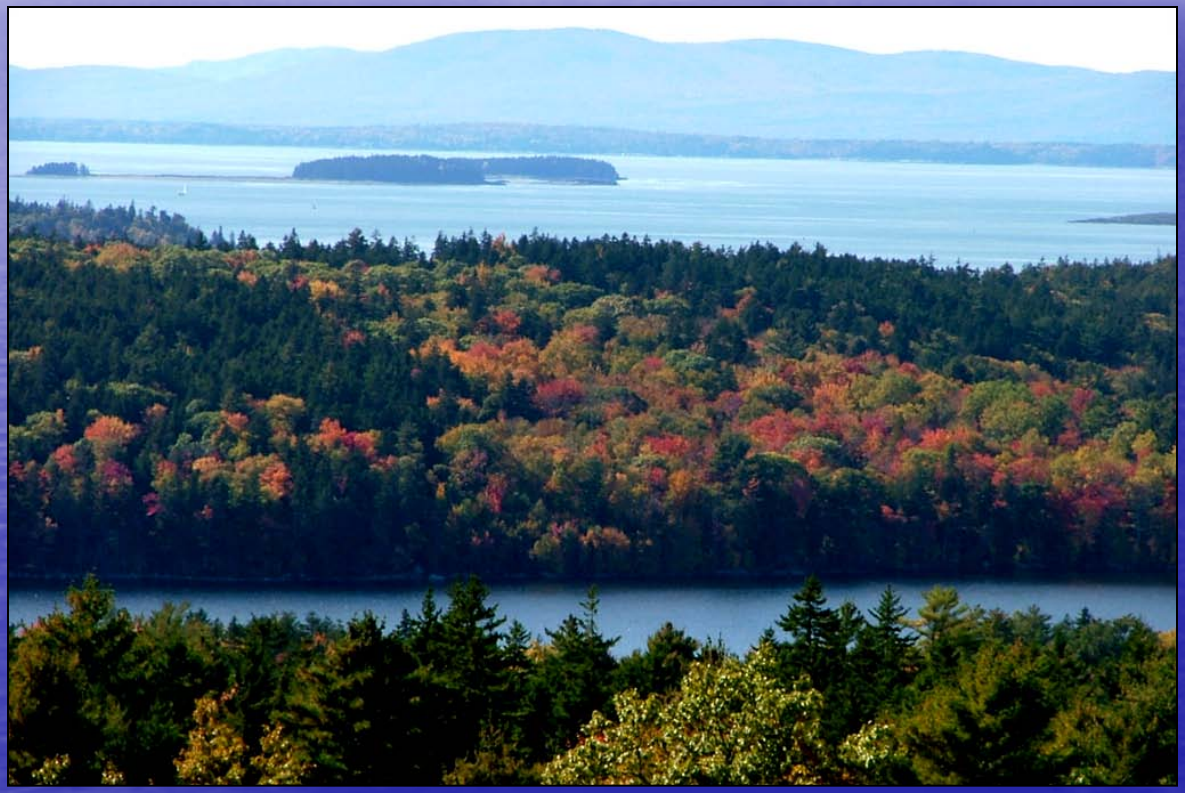
Alternative Futures Modeling:

Understanding the Past…
…Envisioning the Future



Lilieholm, Cronan, Owen, Johnson & Meyer
University of Maine, Orono

Convergence 2012
June 7, 2012

What is Alternative Futures Modeling?

Spatially explicit models that depict future landscapes under various land use policies & "drivers of change" –

- *Socio-demographic*
- *Economic*
- *Biophysical*

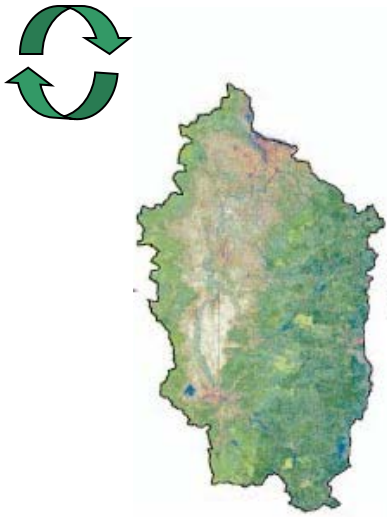
From this…

To this…

Anticipates future landscape conditions by modeling a wide range of alternative scenarios

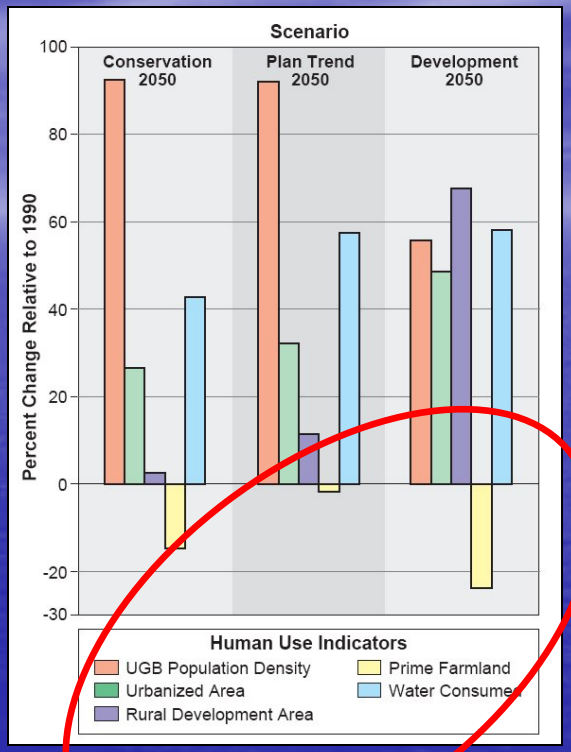
Modeling Landscape Change…

Basic & applied research on biophysical & socioeconomic systems dynamics



2012

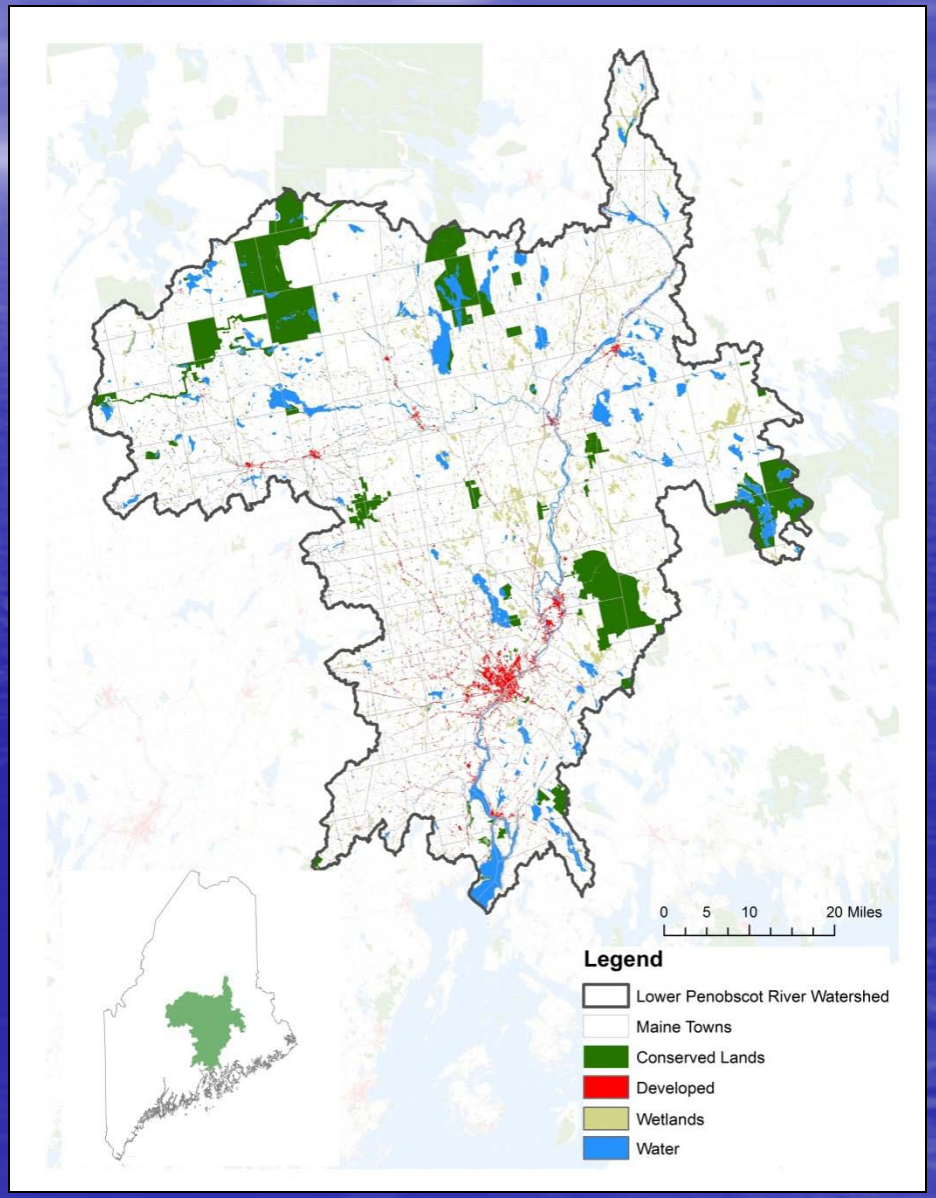
Willamette River Basin (Baker et al. 2004)



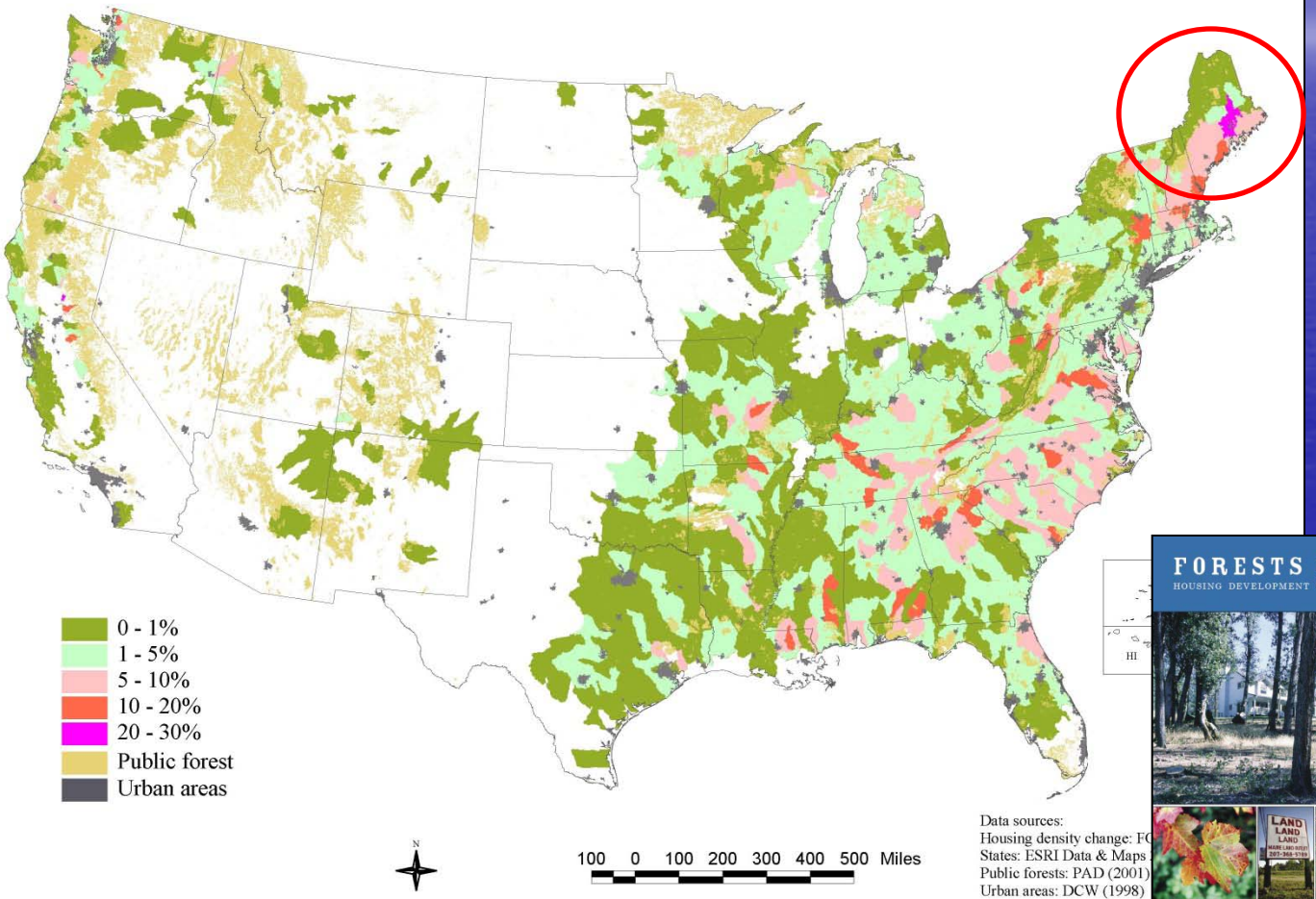
Understanding how today's decisions affect tomorrow's outcomes…

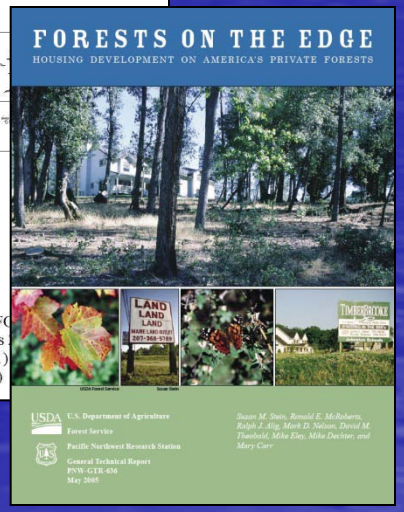
Lower Penobscot River Watershed

- 2.5 million acres
- Small towns, agriculture, forestry & conservation lands
- Penobscot Watershed includes:
  - *8,000 miles of rivers & streams*
  - *1,600 lakes & ponds covering 266,000 acres*
  - *90% forested, 95% private ownership*

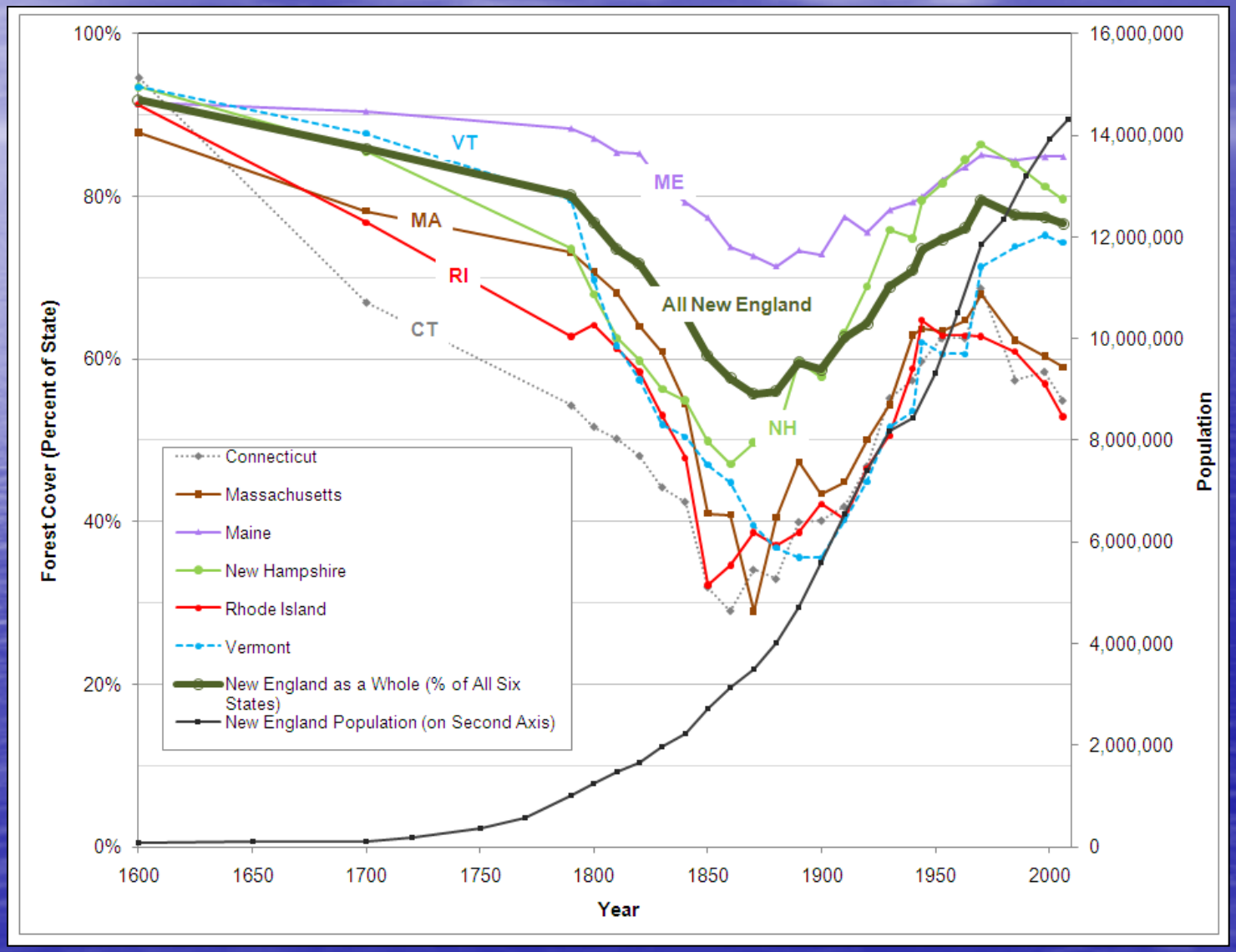


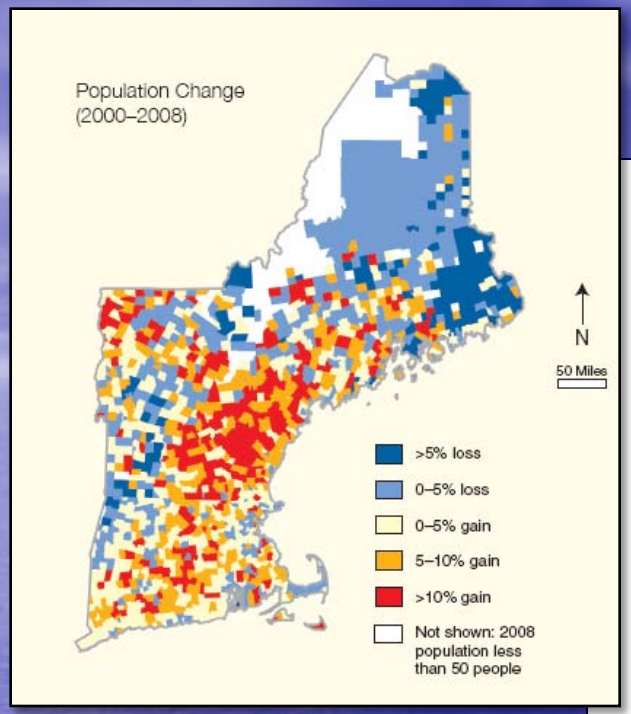
Map 3: Percentage of watershed with private forests projected to shift from rural or ex-urban to urban

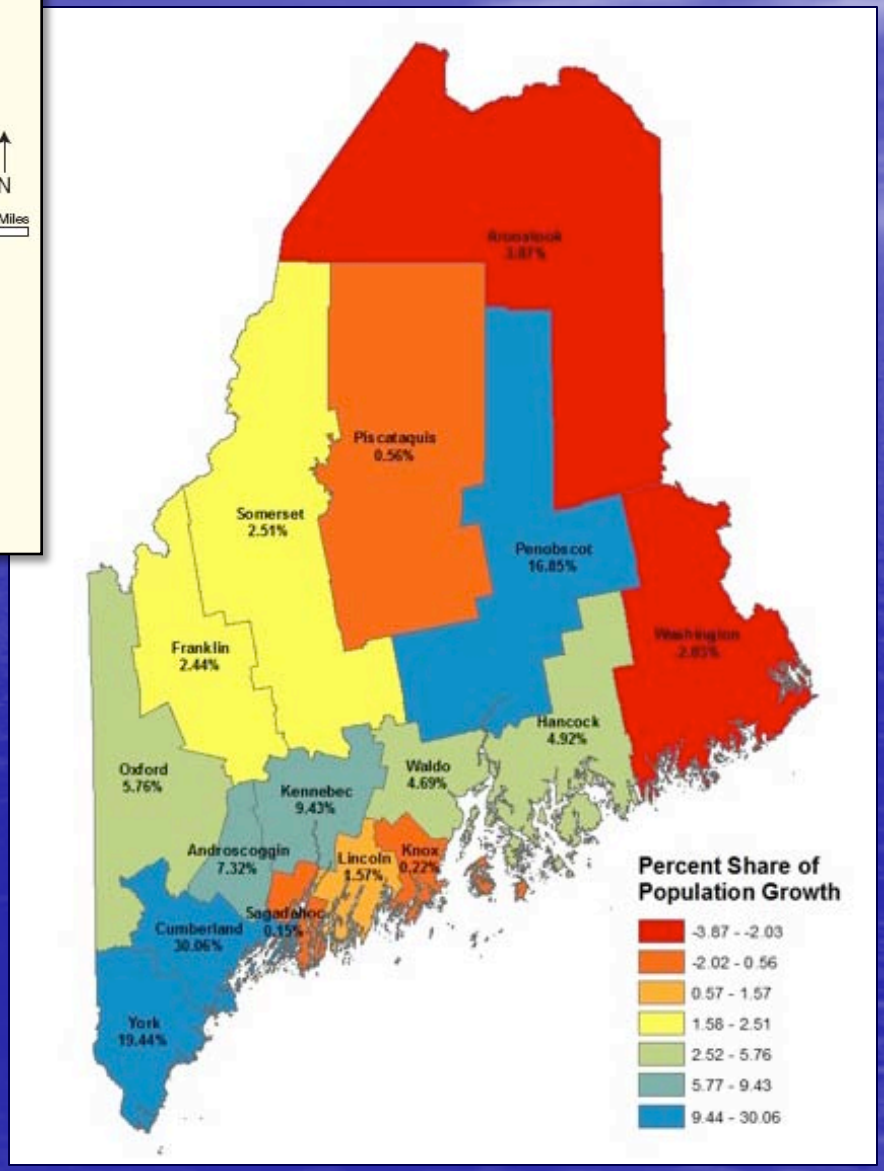




An Historical Perspective…





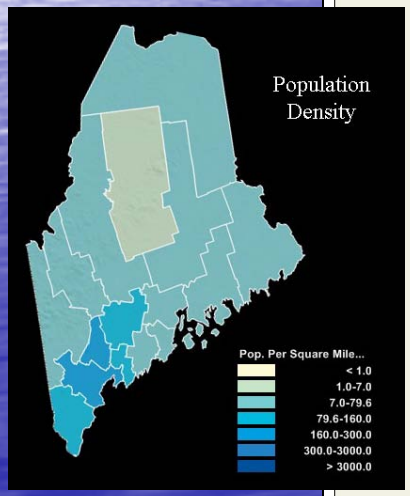


"Portland, ME had high population growth by Northeastern standards (17%), yet increased its urbanized land by 108% – more than five times the percentage increase in population."

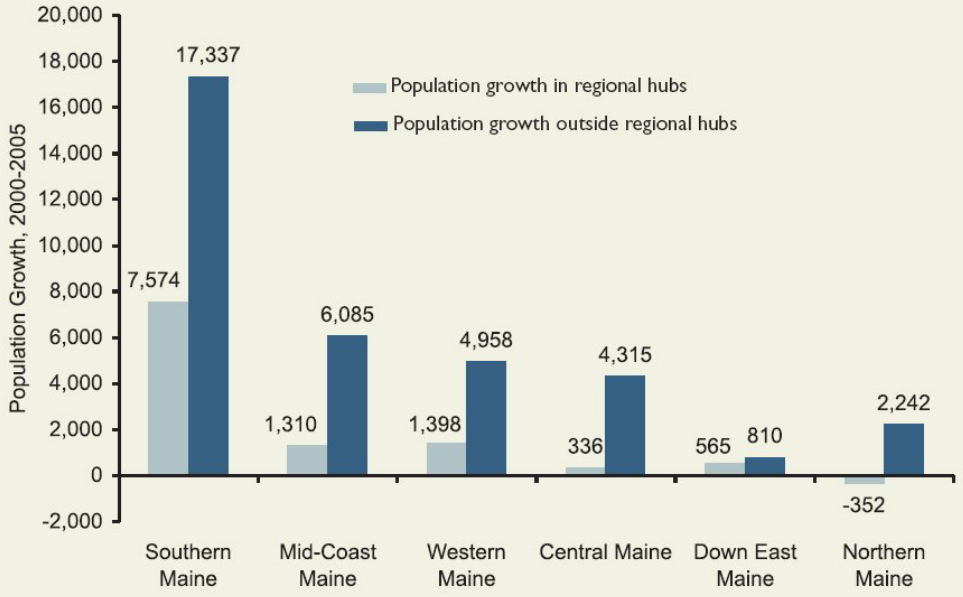
The Brookings Institution

Sprawling Development

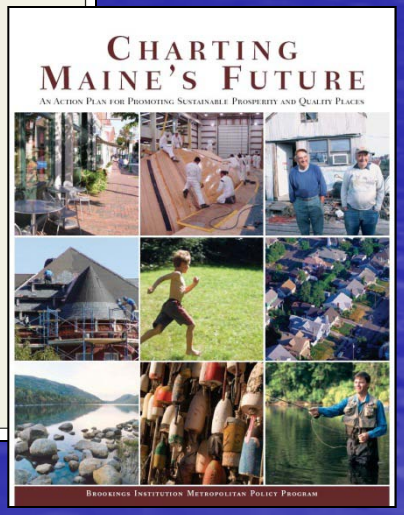
- But most development is occurring outside of established town centers…

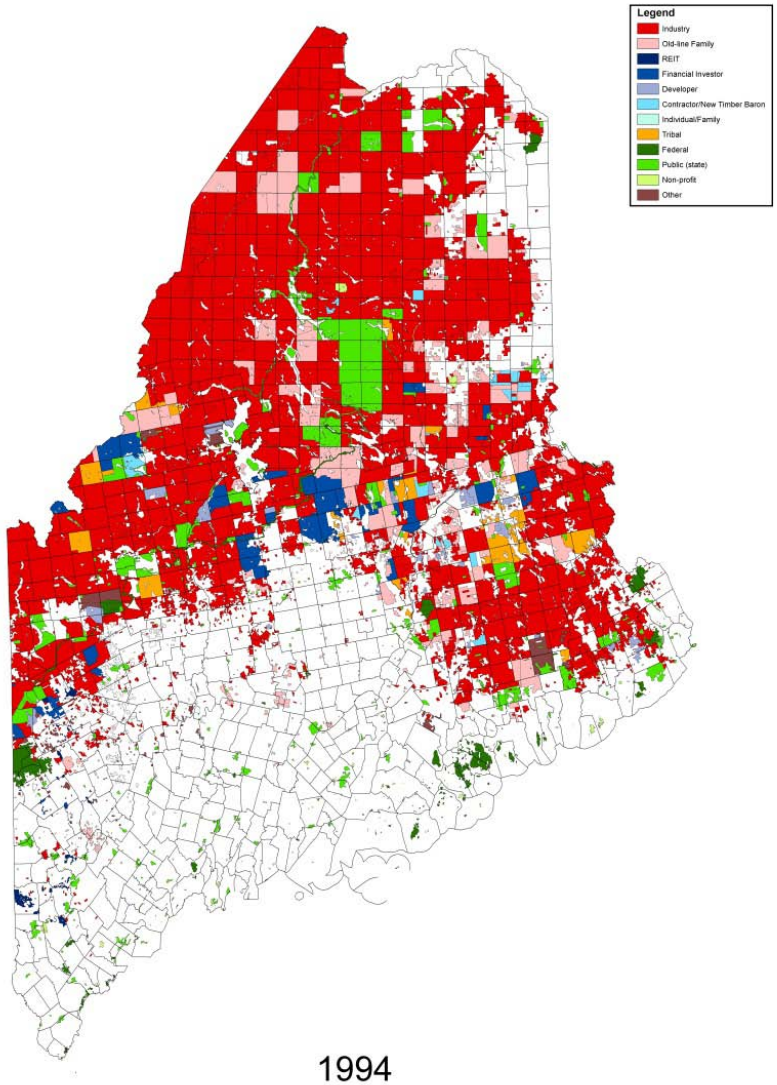


The bulk of Maine's recent population growth is occurring outside the state's traditional regional hubs

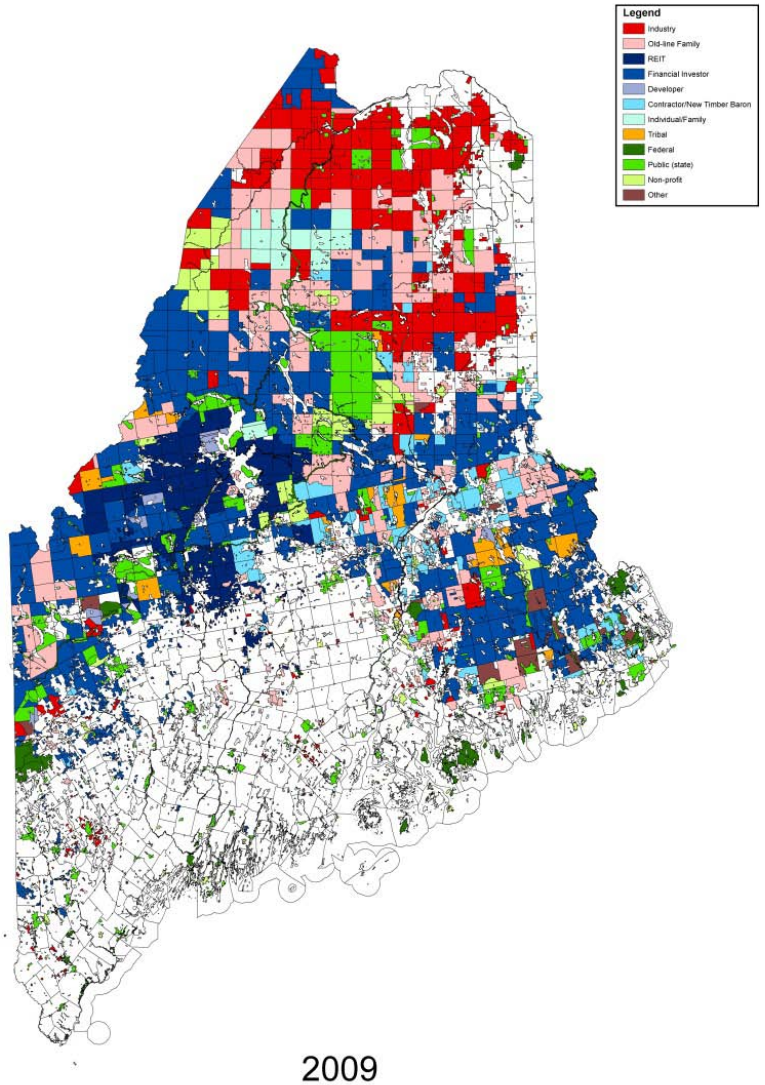


Source: Brookings analysis of U.S. Census Bureau data



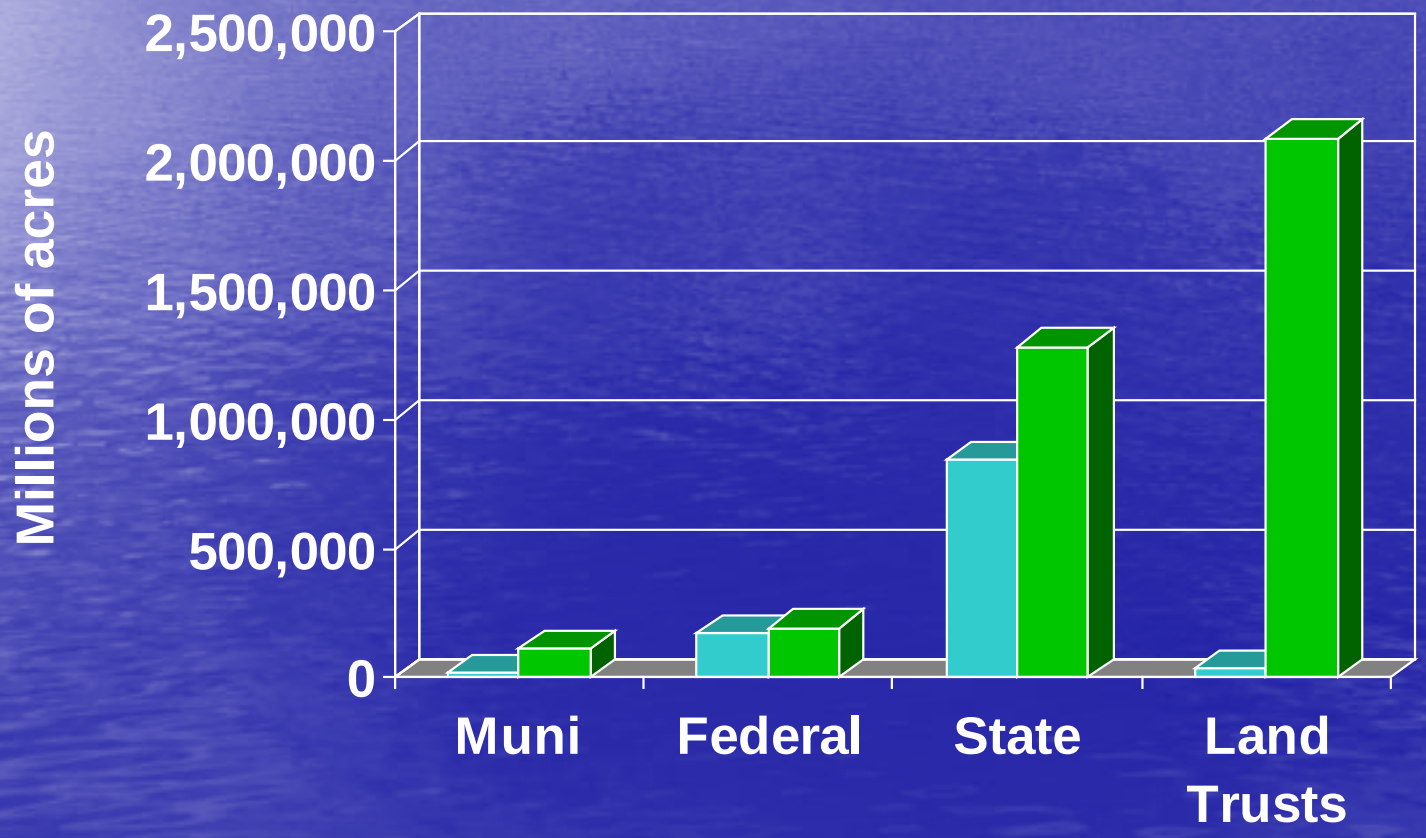


1994



2009

- Today, nearly 4 million acres – 18% of Maine – are under some form of "conserved lands" status, including fee and easements…



Environmental Management
DOI 10.1007/s00267-010-9481-7

An Assessment of Land Conservation Patterns in Maine Based on Spatial Analysis of Ecological and Socioeconomic Indicators

Christopher S. Cronan · Robert J. Lilieholm · Jill Tremblay · Timothy Glidden

Received: 8 July 2009 / Accepted: 18 March 2010

Abstract Given the nature of modern conservation acquisitions, which often result from gifts and opportunistic purchases of full or partial property rights, there is a risk that the resulting mosaic of conserved resources may not represent a coherent set of public values and benefits. With different public and private entities engaged in land conservation, one would further expect that each organization would apply separate goals and criteria to the selection and acquisition of its conservation portfolio. This set of circumstances raises an important question: what is the aggregate outcome of this land conservation process? Retrospective assessments provide a means of reviewing cumulative historical decisions and elucidating lessons for improving future conservation strategies. This study used GIS-based spatial analysis to examine the relationships of private and public conservation lands in Maine to a variety of landscape metrics in order to determine the degree to which these lands represent core ecological and socioeconomic values that are meaningful to a wide cross-section of citizens. Results revealed that the gains of past conservation efforts in Maine are counter-balanced to some extent by apparent gaps in the existing fabric of conservation holdings. Conservation lands capture a representative sample of diverse habitat, provide a large measure of protection for multiple conservation values and indicators, and offer an unusual mix of outdoor recreational opportunities for residents and visitors alike. Yet, the majority of parcels are relatively small and isolated, and thus do not provide contiguous habitat blocks that offset ongoing processes of landscape fragmentation. Furthermore, the majority of area associated with many of the ecological metrics examined in this report is located outside the boundaries of current conservation holdings. The under-represented metrics identified in this investigation can be viewed as potential targets for new strategic conservation initiatives.

Keywords Land conservation · Conservation assessment · Landscape metrics · Landscape planning · Conservation strategies · Conservation easement · Land trusts · Working forest protection

Abbreviations

MDIFW	Maine Department of Inland Fisheries and Wildlife
MNAP	Maine Natural Areas Program
ME DOT	Maine Department of Transportation
ME SPO	Maine State Planning Office
US FWS	U.S. Fish and Wildlife Service

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Introduction

In recent years, state and private land conservation initiatives have grown substantially in North America and have greatly expanded the land area protected through conservation easements and simple fee acquisition (Fairfax and others 2005; Ginn 2005). It is generally assumed by the public that

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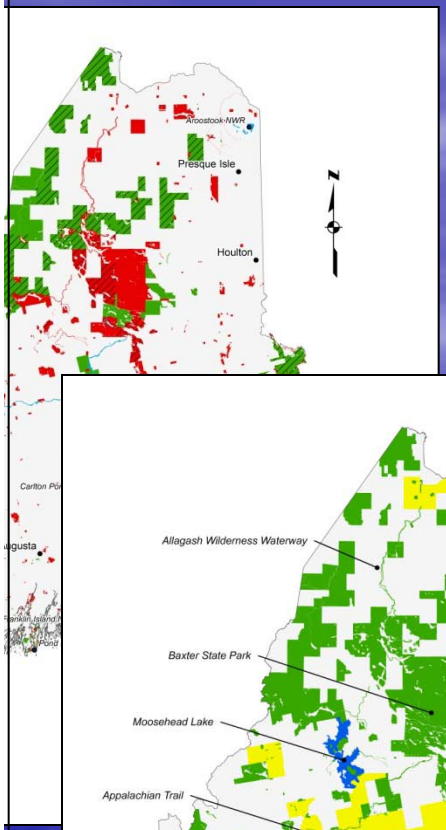

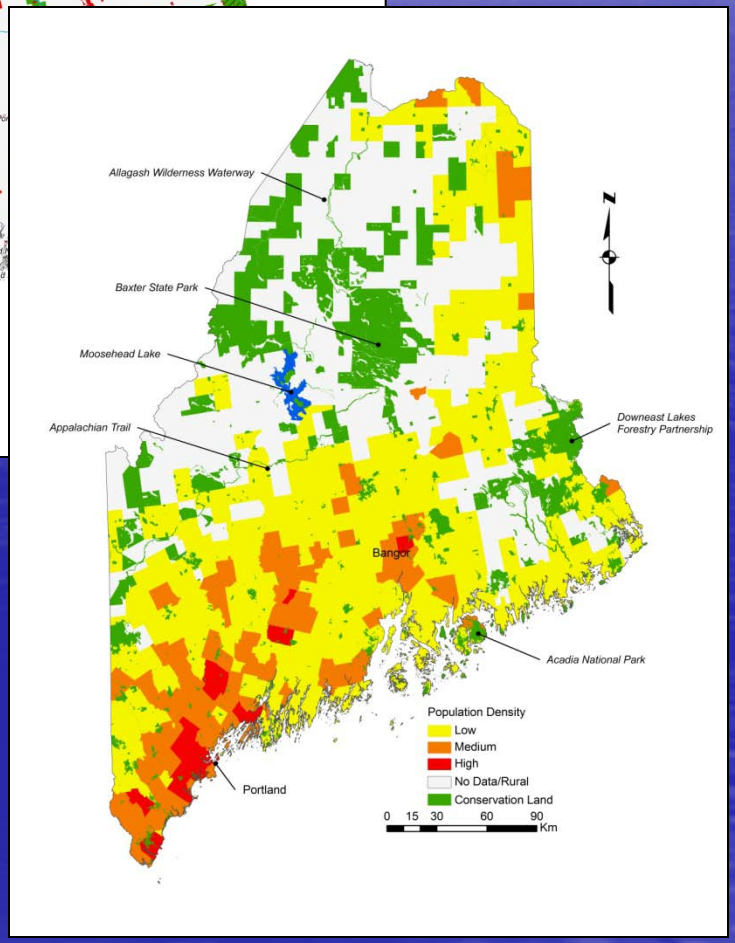

- Alternative Futures Modeling as a unifying framework to facilitate:
  - *Interdisciplinary Research*
  - *Stakeholder Engagement*
  - *Knowledge-to-Action*

Objectives

- Develop stakeholder-derived models to identify lands valued for development, forestry, agriculture, & conservation…

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- Develop stakeholder-derived models to identify lands valued for development, forestry, agriculture & conservation…
- Identify where these lands intersect, and explore the tradeoffs & opportunities between competing & complementary land uses

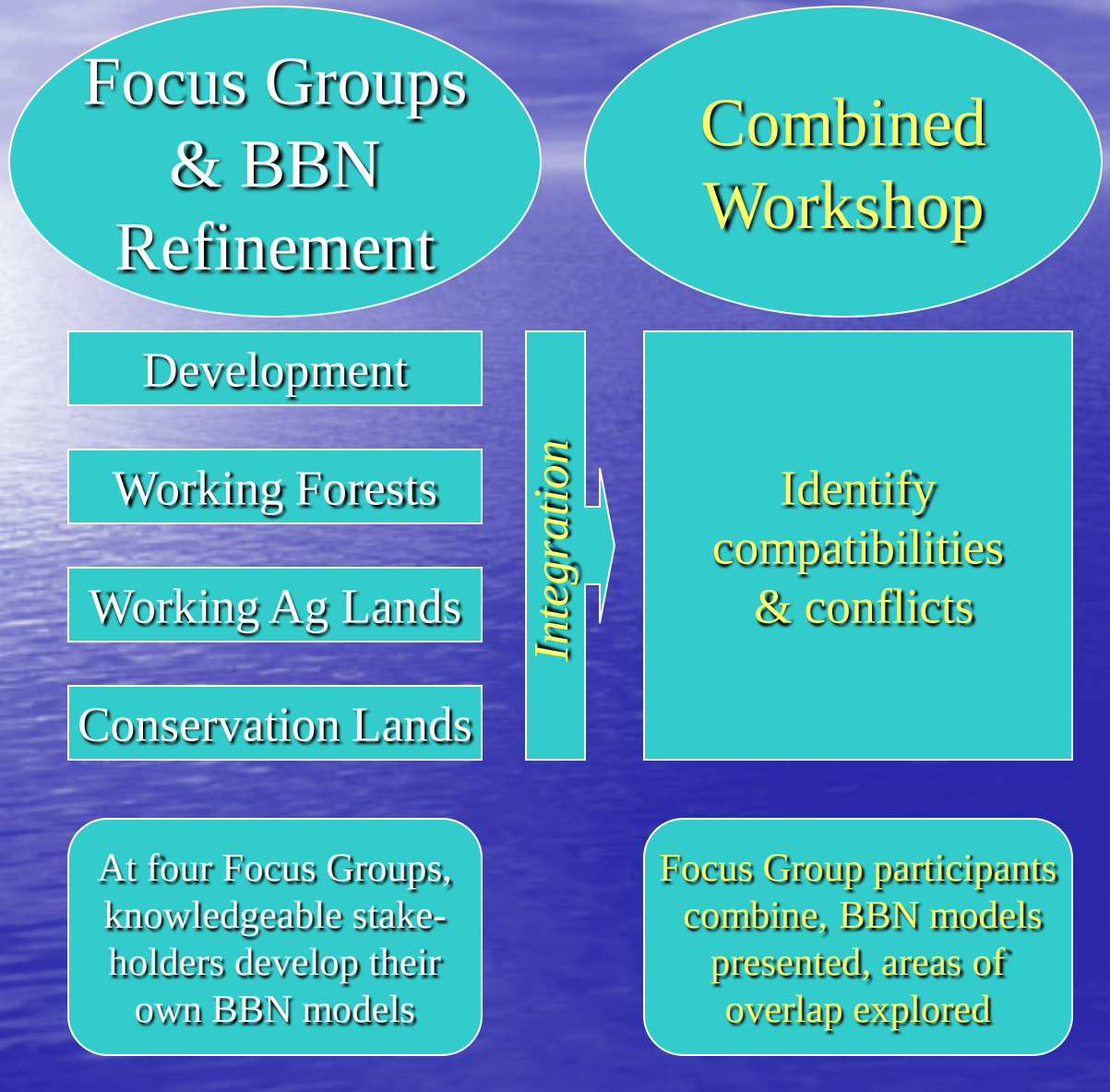
Stakeholder Engagement Process

Focus Groups & BBN Refinement

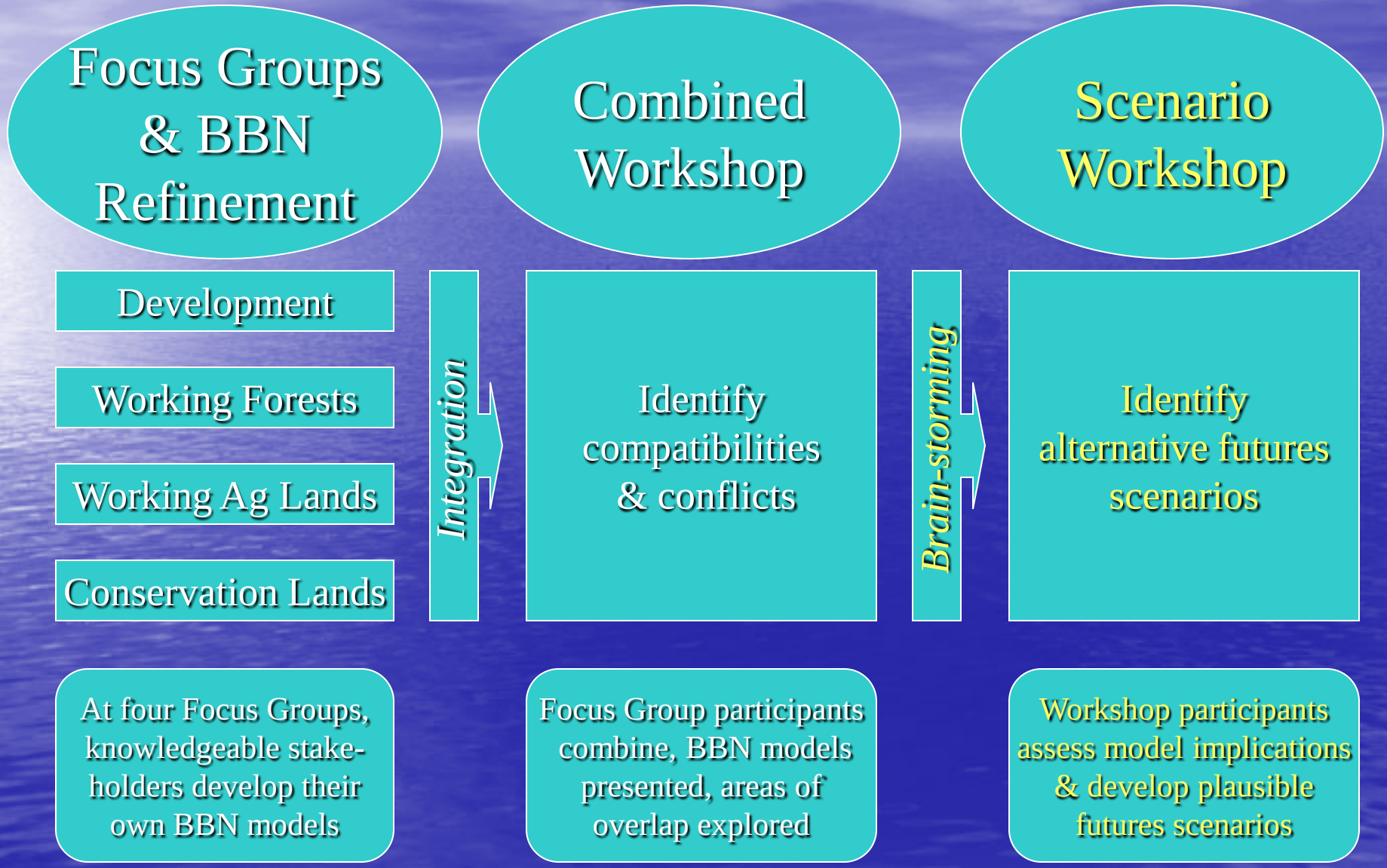
- Development
- Working Forests
- Working Ag Lands
- Conservation Lands

At four Focus Groups, knowledgeable stake-holders develop their own BBN models

Stakeholder Engagement Process

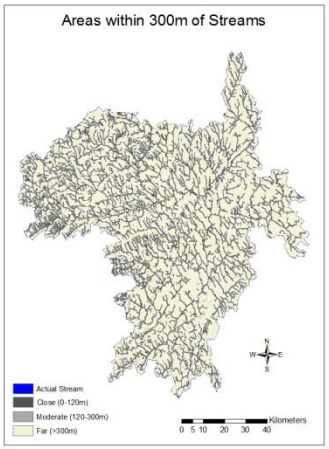


Stakeholder Engagement Process



Modeling Process

From spatial data…



Modeling Process

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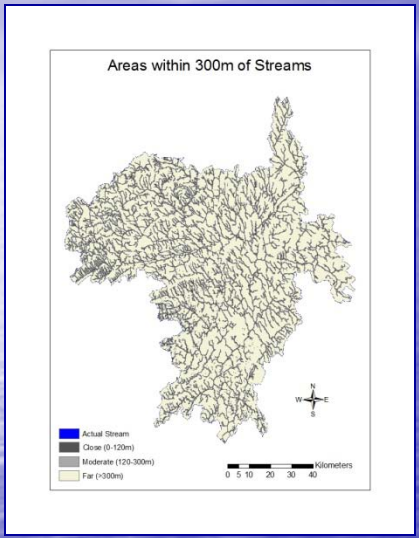
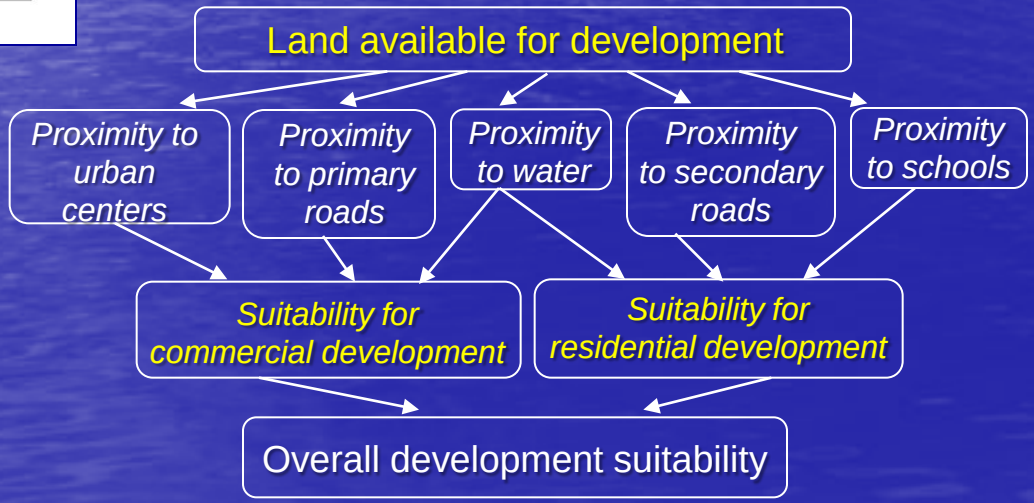


To a model using expert opinion to assess the importance of landscape features…



Modeling Process

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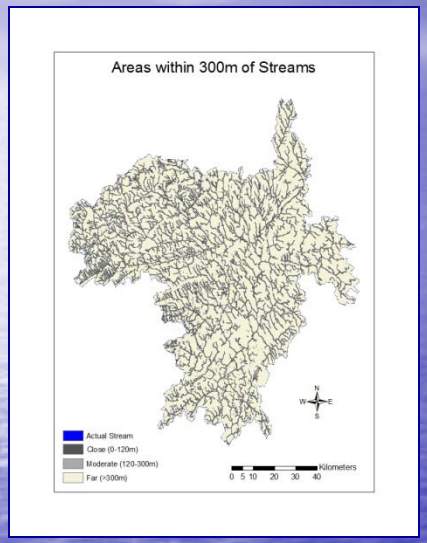

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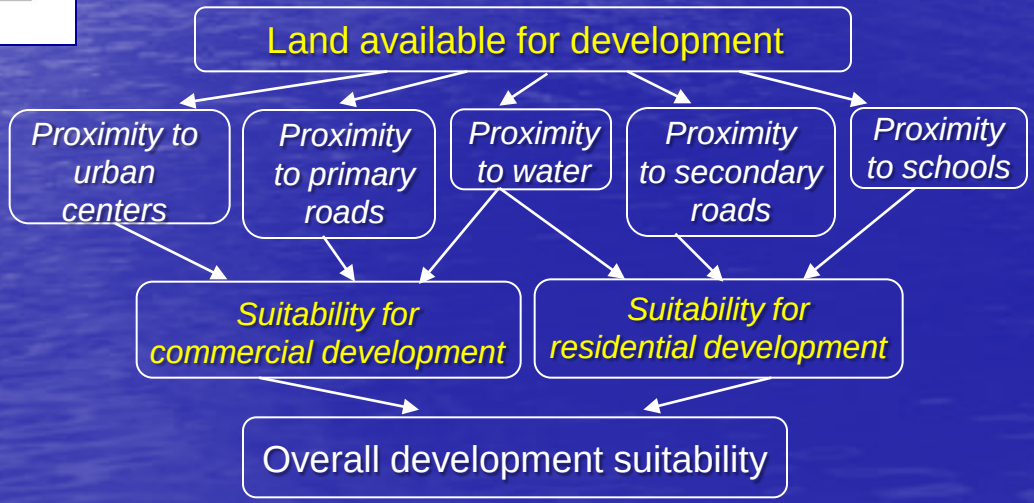
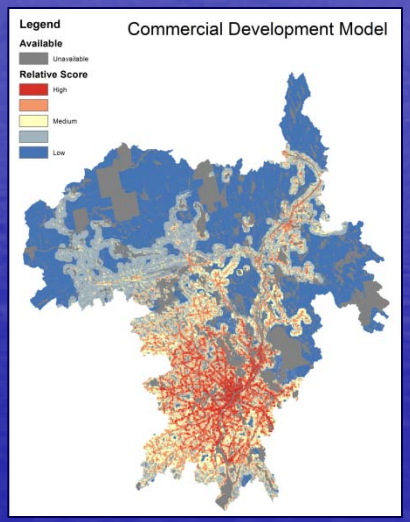
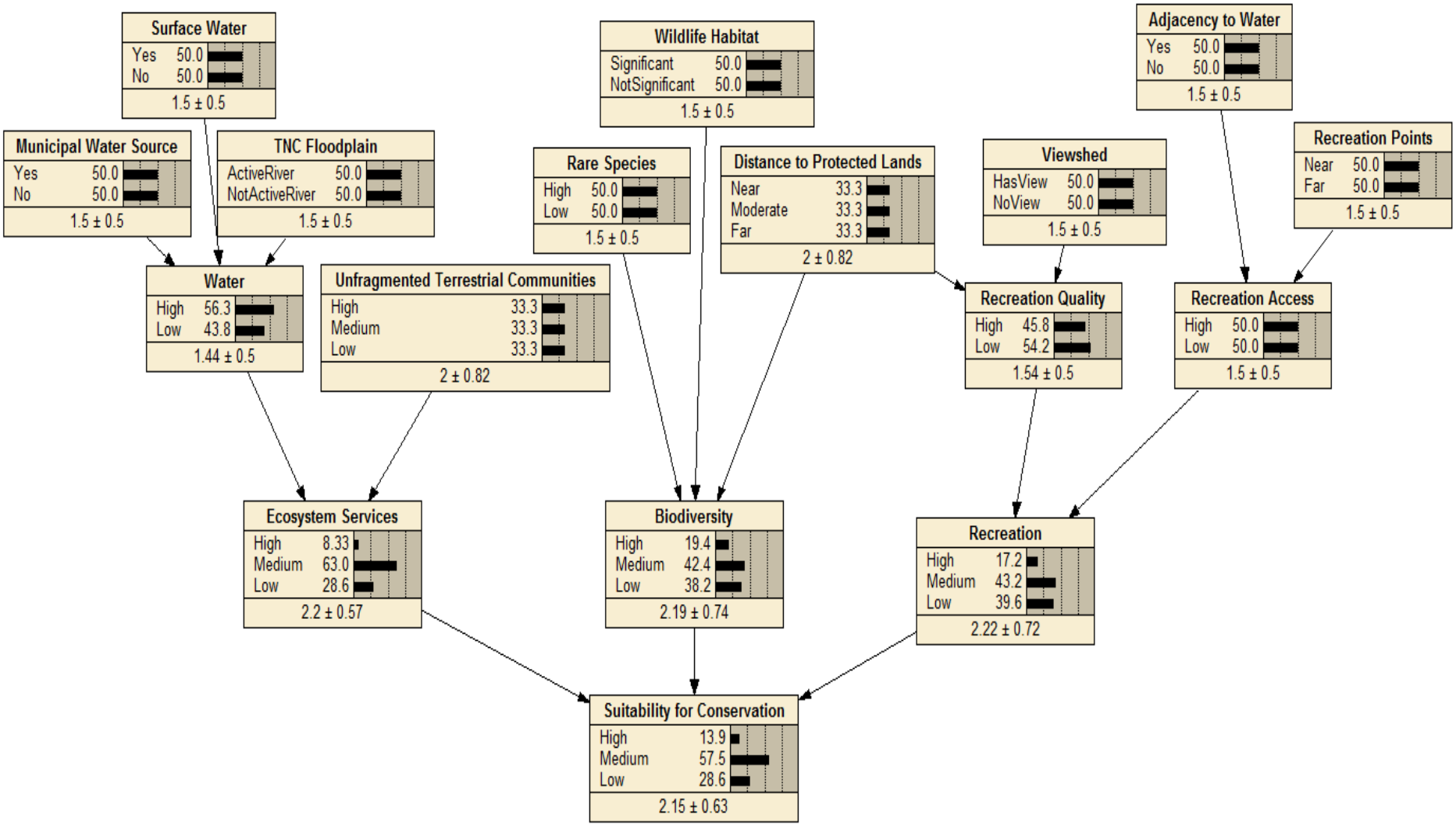


To a map showing areas that are suitable for various land uses

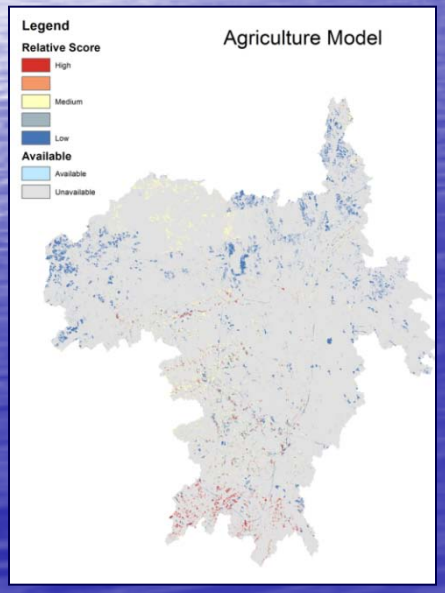


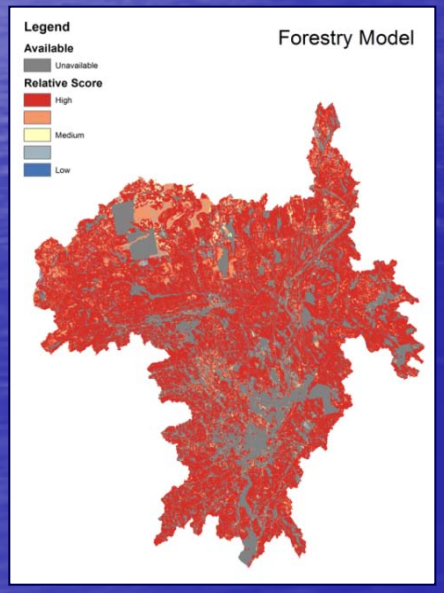
Conservation

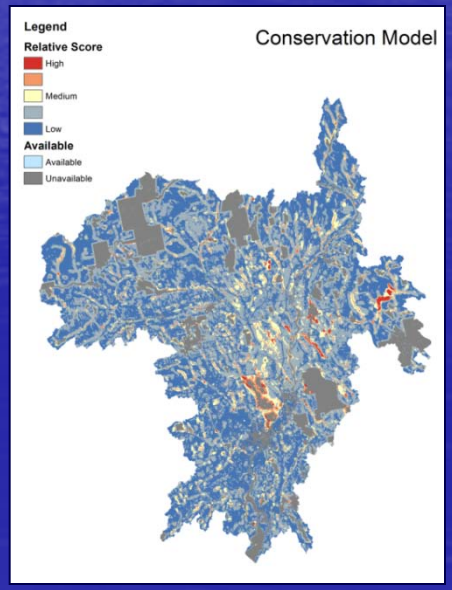


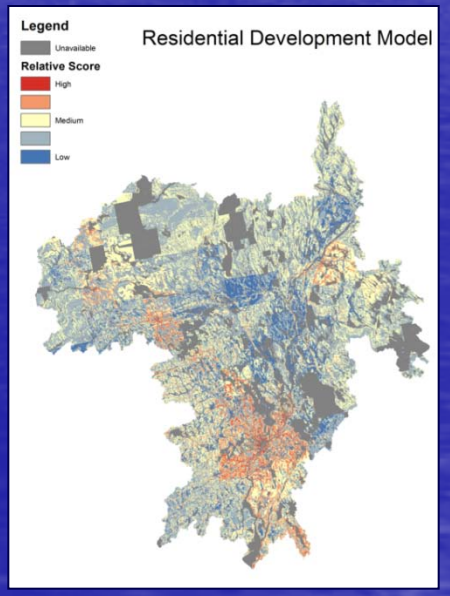
Agriculture | Forestry | Conservation | Development

Stakeholder-based Suitability Models





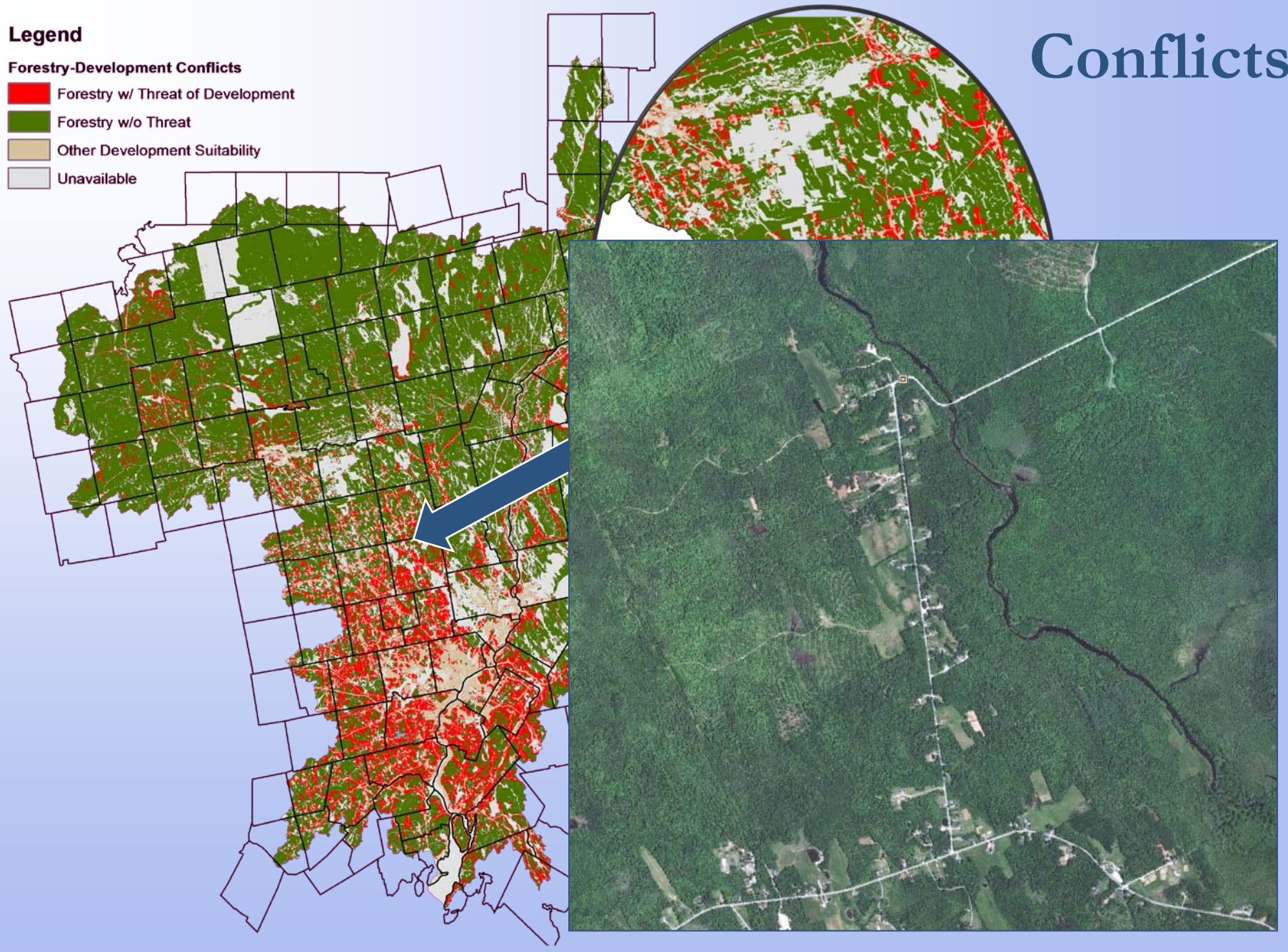




Conflicts

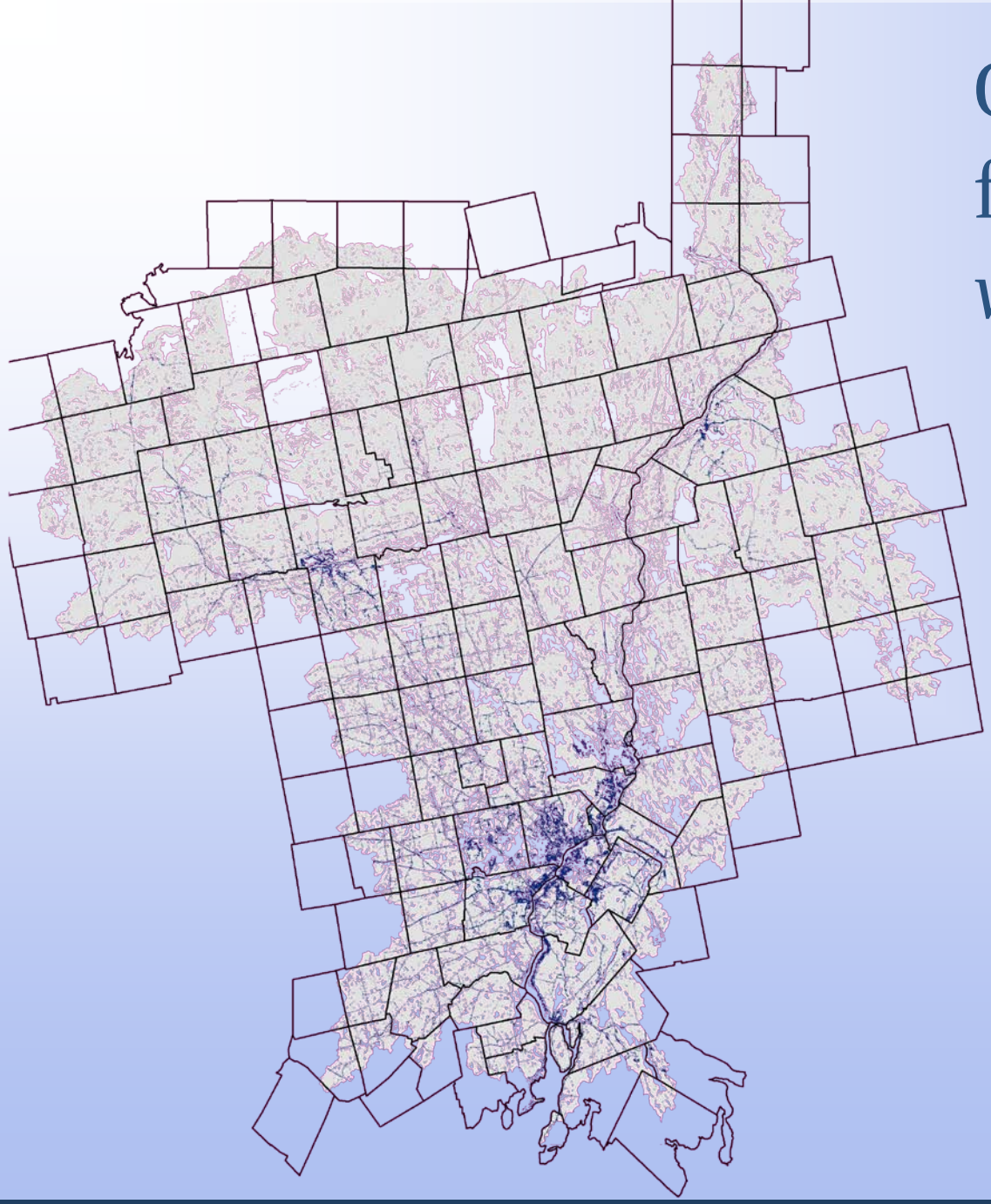

Legend
Conservation-Development Conflicts
Conservation w/ Threat of Development
Conservation w/o Threat
Other Development Suitability
Unavailable

Conflicts


Legend
Forestry-Development Conflicts
Forestry w/ Threat of Development
Forestry w/o Threat
Other Development Suitability
Unavailable

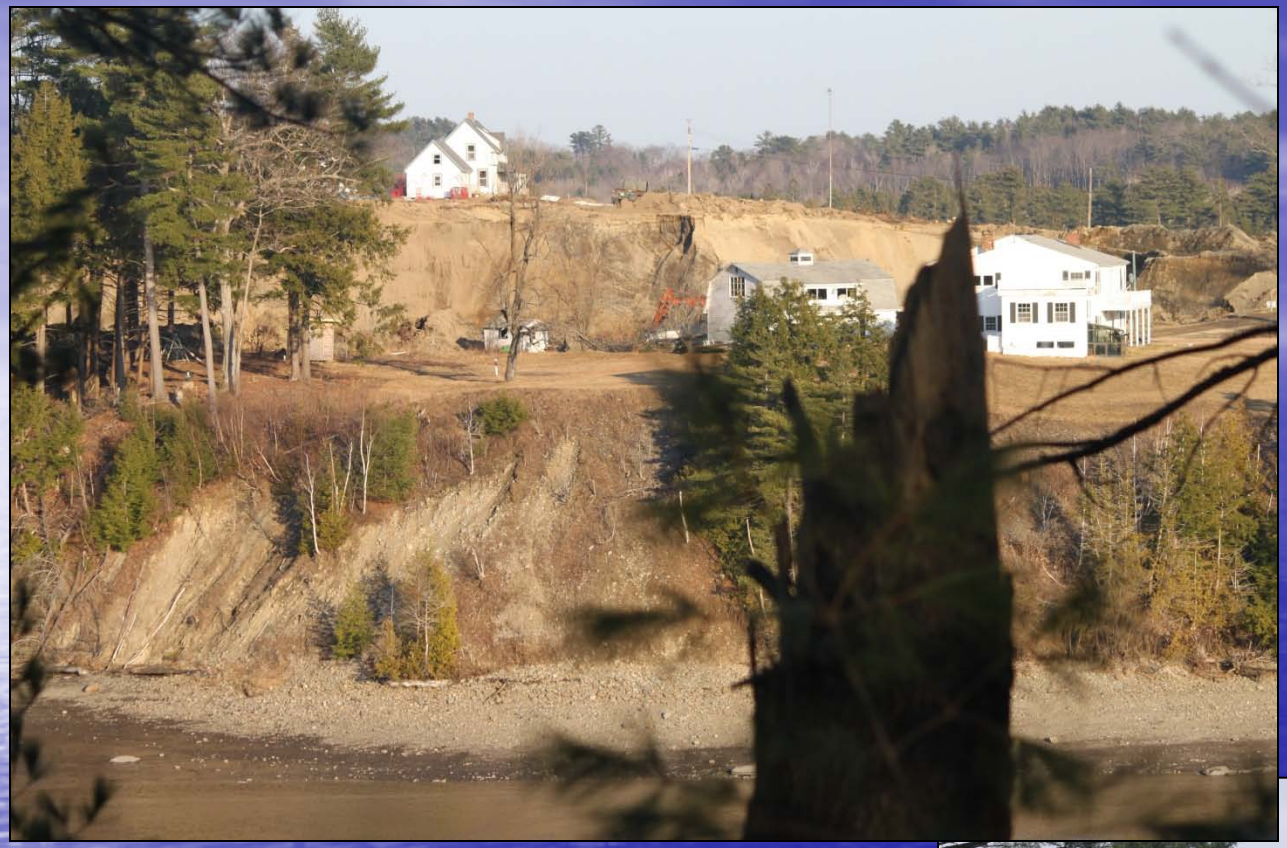
Opportunities

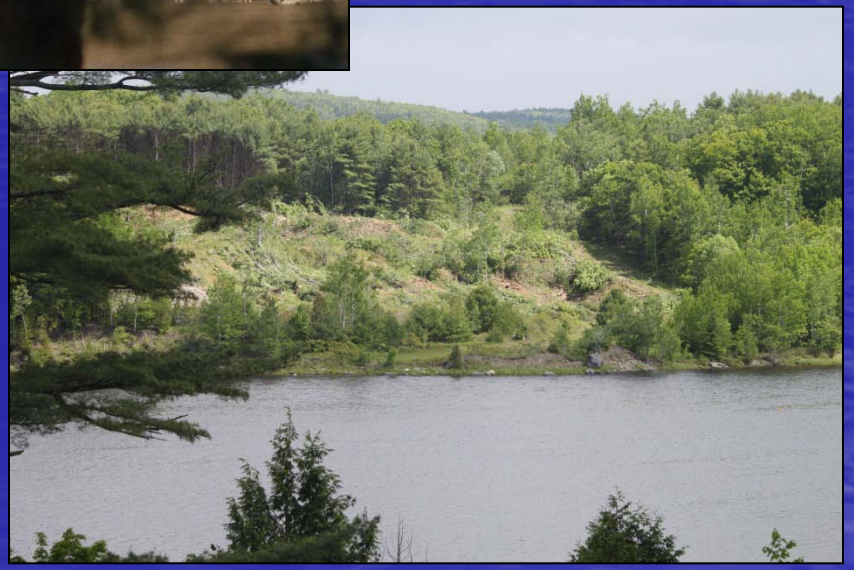
- 40,897 ha with Conservation/Forestry potential



Opportunities for Development *without* Conflict

Town	Hectares
Bangor	1,731
Hampden	1,383
Dover-Foxcroft	1,226
Hermon	1,095
Bucksport	978
Holden	905
Orrington	830
Brewer	774
Lincoln	716
Orono	686

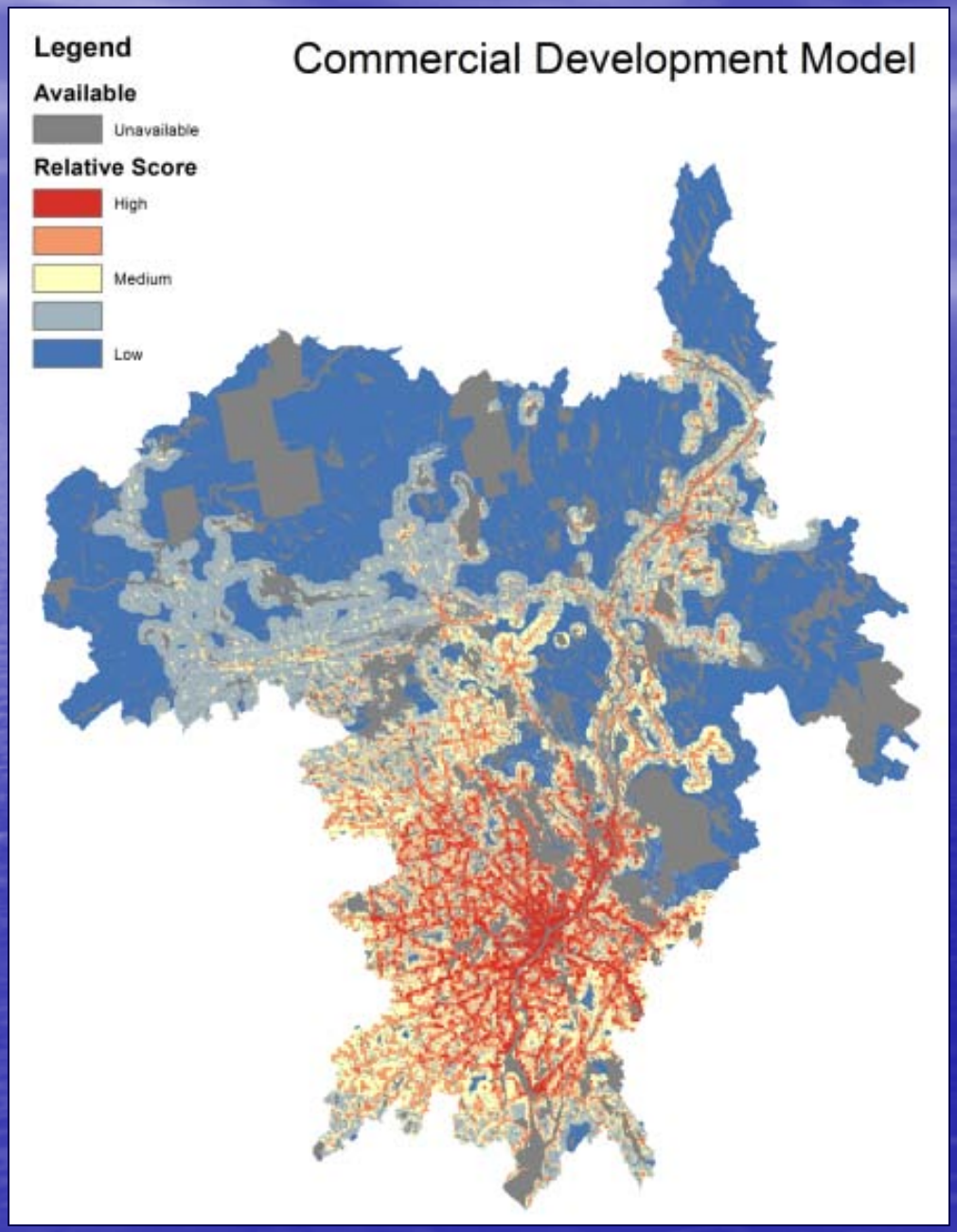


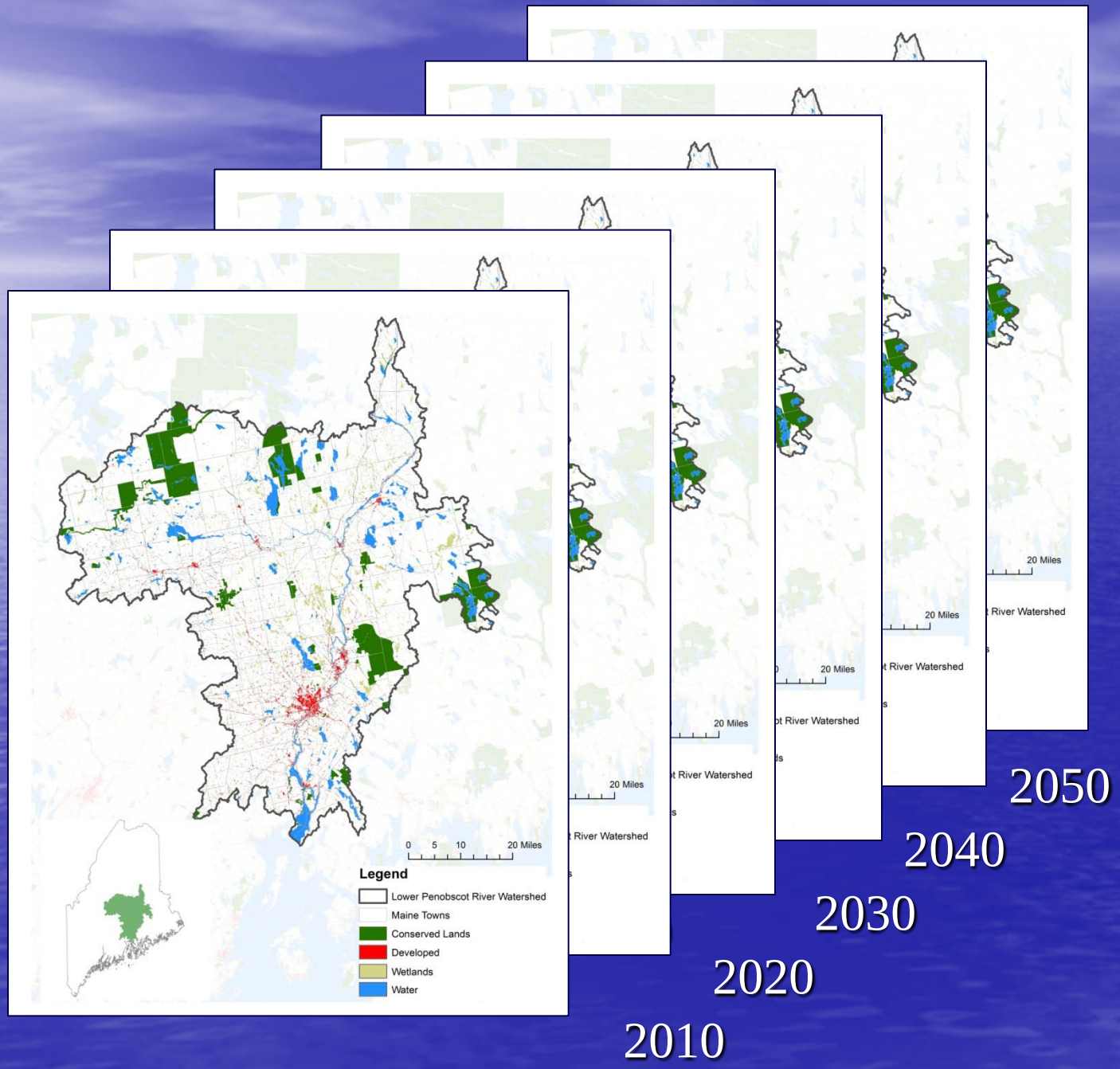


New large-scale commercial mining operation and clearcuts along the Penobscot River in Orrington

Next Steps…

- Scenario generation…


Legend
Available
Unavailable
Relative Score
High
Medium
Low
Commercial Development Model


0 5 10 20 Miles
Legend
Lower Penobscot River Watershed
Maine Towns
Conserved Lands
Developed
Wetlands
Water
20 Miles
River Watershed
2010
2020
2030
2040
2050

Next Steps…

- Scenario generation…
- Knowledge-to-action research

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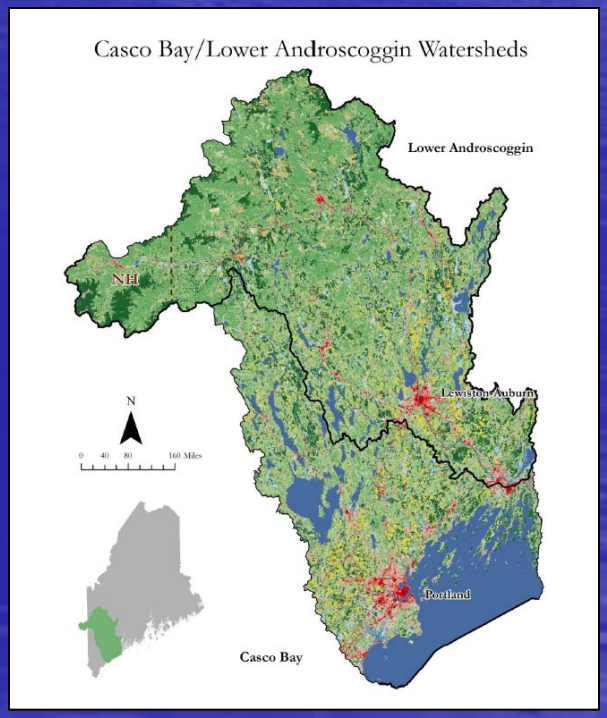
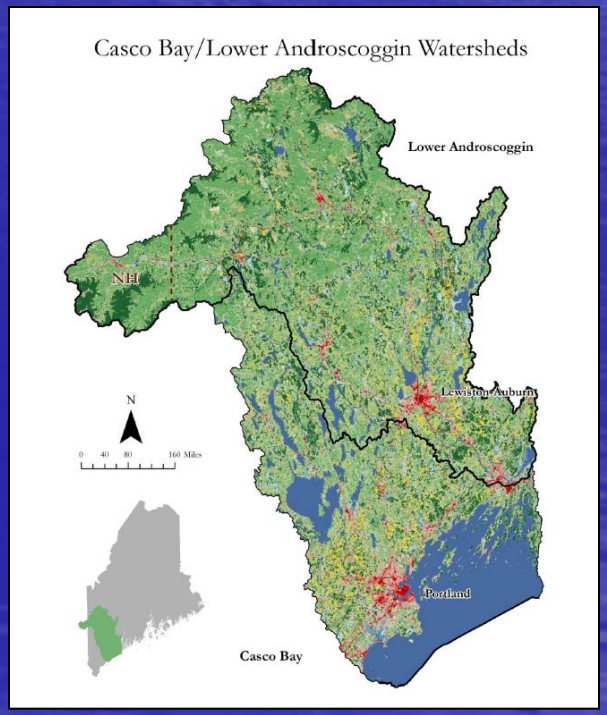
- Knowledge-to-action research
- Greater Portland & the Casco Bay Region



Next Steps…

- Scenario generation…
- Knowledge-to-action research
- Greater Portland & the Casco Bay Region
- Development & impaired urban streams…
  - *Ecological thresholds*
  - *Regulatory thresholds*



Benefits of Alternative Futures Modeling

- Provides a common visual reference for decision making

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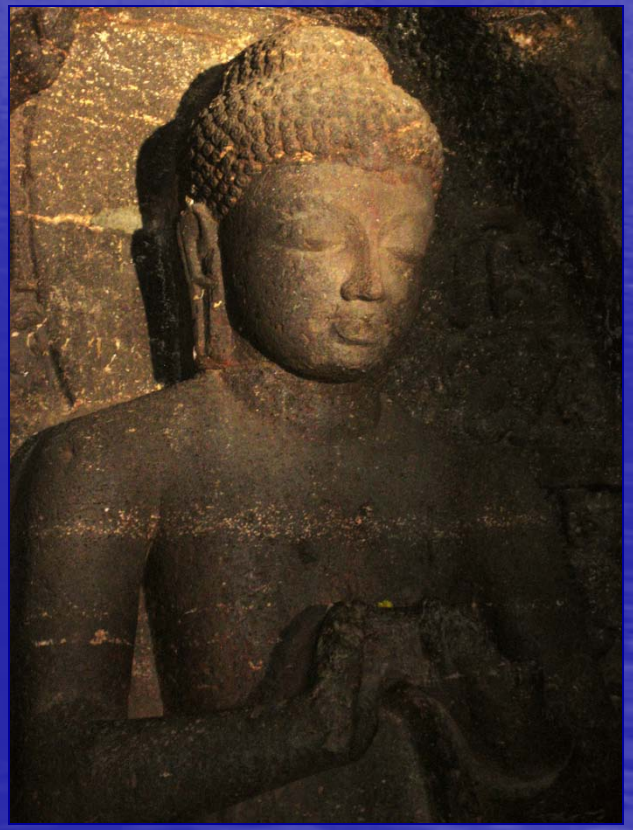
- Can explore issues at multiple scales…

Some Closing Thoughts…

"All models are wrong…
but some models are useful…"

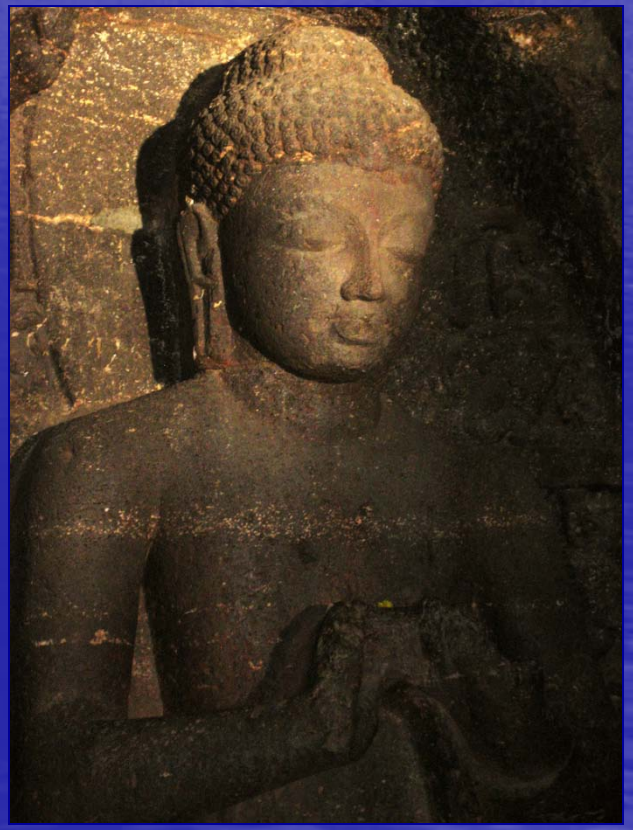


Some Closing Thoughts…

"All models are wrong…
but some models are useful…"

"The best way to predict the future is to create it"

(Peter Drucker)




Thank You!