Global-to-local: Perspectives on global change drivers and implications for the southern forest sector

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Collaborating Institutions:

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Global Forces, Local Resource Management Decisions

• Global change drivers include *gradual* factors:
  – Environmental change
  – Socioeconomic developments
  – Emerging market growth
  – Paradigm-shifting technology developments
Global Forces, Local Resource Management Decisions

• How do local resources managers adapt to gradual global change drivers?
  – Adaptive management to new market/policy realities *(recursive dynamic)*
  – Expectations ➞ management today is a function of where we *think* we’ll be in the future *(intertemporal)*
    • Markets, productivity change, etc.
Global Forces, Local Resource Management Decisions

- Could also include *instantaneous* exogenous or unanticipated factors:
  - Pandemics
  - Armed conflict
  - Trade disputes
Global Forces, Local Resource Management Decisions

• How do local resources managers adapt to *gradual* global change drivers?
  – Expectations => management today is a function of where we *think* we’ll be in the future
    • Markets, productivity change, etc.
    • Subject to local resource constraints, institutions
Global Forces, Local Resource Management Decisions

• How do local resources managers adapt to \textbf{instantaneous} global change?
  – Adaptive management \(\Rightarrow\) adjustments to unanticipated exogenous change
    • Management change subject to lag effects
    • Decisions post-event can have recourse
Local modeling perspective

- Local scale analyses (and some regional frameworks) are based on exogenous factors
  - Prices, input costs, land rents
    - Based on global market conditions
- We can use Monte Carlo to quantify ROI for a stand
  - But when we scale up... the cumulative effect of management changes affect markets, creating market feedback
  - Need to understand changing relative comparative advantages under global change
Global modeling perspective

• Modeling global systems can miss nuance of local factors
  – Resource conditions
  – Institutions
  – Infrastructure
  – Etc.
Global Modeling Perspective

- Recent advances by the global FSM community in modeling future “pathways”

Figure 3: Relationship of key elements in Forest Sector Pathway (FSP) narratives.

Source: Daigneault et al. 2019
Global Modeling Perspective

Source: Daigneault et al. 2019
For-MIP Results

- We’re seeing common themes in directionality of global results.
  - What about regional outputs?
Wider variation in regional outputs
Why the divergence at regional scale

• Global models have different criteria for optimizing spatiotemporal distribution of land use/harvests
• Global models may not capture nuance of local/regional systems
  – What is the solution?
Multi-Scale Modeling

Modeling at different spatiotemporal scales offers flexibility in analysis of policy and investment options.

Global
National
Regional
Local
Integration across scales can improve modeling of systemic change.
Multi-Scale Modeling

What does integration across scales mean?

Global -> National

Regional -> Local
Multi-Scale Modeling

- Global
- National
- Regional
- Local

What does integration across scales mean?

⇒ Capturing feedback loops
Multi-Scale Modeling

What does integration across scales mean?

Integration of key data sources and constraint sets
Integration across Scales

• What is SOFAC’s role?
  – Continue improving representation of southern forestry
  – Participation in multi-model assessments
  – Model integration efforts
    • Iterative processes across scales to achieve “convergence” in market outputs
Integrating Spatially Explicit Process and Economic Modeling
(with Tom Gower, Madisen Fuller, Bob Abt, Maniswini Ganjam)
Closing Remarks

- Markets and environmental change forces matter when modeling policy and market change
- Economic models reflect market opportunity costs of mitigation and facilitate tradeoff analysis
- Integration across scales and disciplines can improve modeled assessments
Thank You!

• Questions?
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