Reference Scenarios involving bio-based product systems and implications for land sector carbon accounting

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Science: testing hypotheses with observations

Look out the window - change is persistent.

To assess the climate effects of land management options, the interactions in and among complex biological systems and people must be considered.

Humans are a part of natural systems and have been impacting earth systems for centuries.

Monitoring and consistent measurements are essential to improve future modeling and analysis.

A plea to create and use ‘best available data’
Biological systems productivity, land cover and management are essential to perform full-chain analysis (LCAs, TEAs, compliance with standards).

To quantify effects of a proposed option, we need to agree on facts:

- Where we are?
- Where have we been?
- Where will we go if we continue on current path?
- Setting future goals for “change”
- Desired Future Conditions (or undesired future conditions)

Dale et al. (in review BioScience) An Operational Definition of Sustainability
Where are we? Biomass to BURN!

• **400-550 million hectares burn every year**
  (Randerson et. al., 2012; Giglio et al. 2010; Doerr and Santin 2016)

• **Millions more impacted by other disturbances (disease, pests, droughts, floods, hurricanes...)**

• **Management matters!** (Andela et al. Sci. 2017)
How to properly account for carbon when assessing our effects on land?

Definitions matter

“Management...”
“Negative emissions...”
“Waste”
“Sustainable _____”
“LUC accounting...”

➢ Compared to what?

Choices matter:
- Temporal & spatial scales
- Data resolution
- Class ontologies

Koponen et al. (2017) Renew &Sust Energy Rev. Dale et al. (in review, BioScience)
Emissions and removals

Emissions and removals

Developing a standard protocol for Reference Scenarios

Volunteers welcome!

ASTM E3066 2017

Reference scenarios for evaluating wood pellet production in the Southeastern United States

Esther S. Parish, Virginia H. Dale, Keith L. Kline and Robert C. Abt
Questions

• Who defines “forest”

• Do we have consistent incentives for ALL areas? (regardless of class, wetland, marine systems...)?

• What are “best available data”?
  • Transparent
  • Defensible
  • Representative
  • Realistic
  • Credible
  • Publicly available
  • Support replicable analyses
Questions

• How can analyses be more useful for decisions?
  • What subsidies/market distortions cause observed “problems” or increase “waste”
  • How can consistent performance-based policies be established with flexibility to find best solutions?
  • How to pay for desired services, penalize undesired effects?
• What are the best management opportunities in a given context?
• Can better data guide land management to increase C-storage capacities & improve resilience to disturbance?
Thank you!
References and related reading

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References and related reading

- Sumner DA (2009) Recent commodity price movements in historical perspective. American Journal of Agricultural Economics, 91(5) 1250-1256
- Woodall et al. 2015. Monitoring Network Confirms Land-Use Change is a Substantial Component of the Forest Carbon Sink in eastern United States
- USDOE State of Technology updates: [http://www1.eere.energy.gov/bioenergy/key_publications.html](http://www1.eere.energy.gov/bioenergy/key_publications.html)
- IPCC 2012 Special Report on Renewables and Climate Change Mitigation.
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