

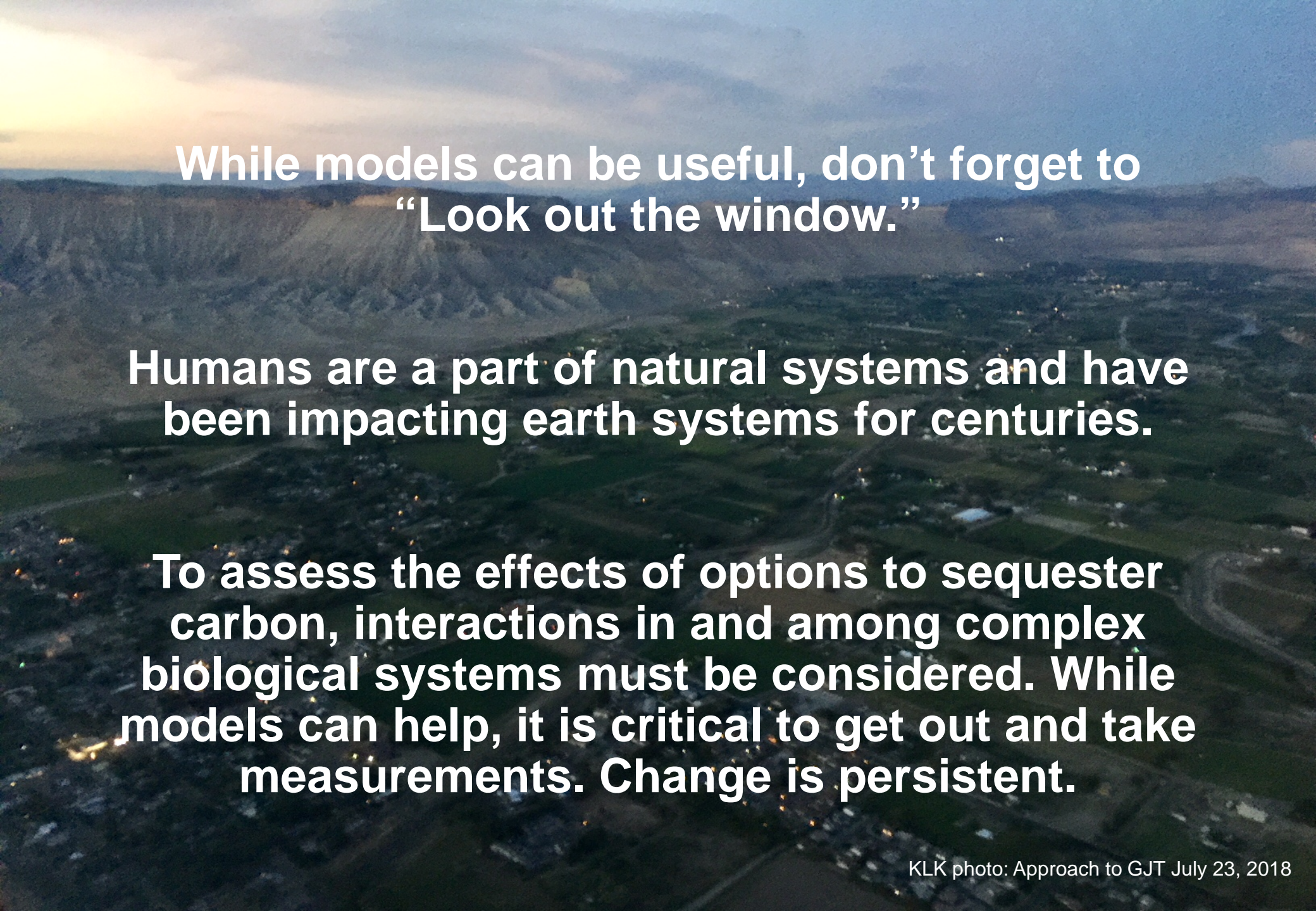
Humans & Nature or Human Nature?

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Lightning Talk for the
USDA-DOE Summit on *Realizing the
Circular Carbon Economy*

July 25, 2018
Golden, CO, USA



An aerial photograph of a valley at dusk. The foreground shows a town with lights, surrounded by green fields and a winding river. In the background, there are rugged mountains under a sky with soft, colorful clouds from the setting or rising sun.

**While models can be useful, don't forget to
“Look out the window.”**

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

**To assess the effects of options to sequester
carbon, interactions in and among complex
biological systems must be considered. While
models can help, it is critical to get out and take
measurements. Change is persistent.**

How to measure progress toward circular carbon economy goals?

“Using better... using well...” →

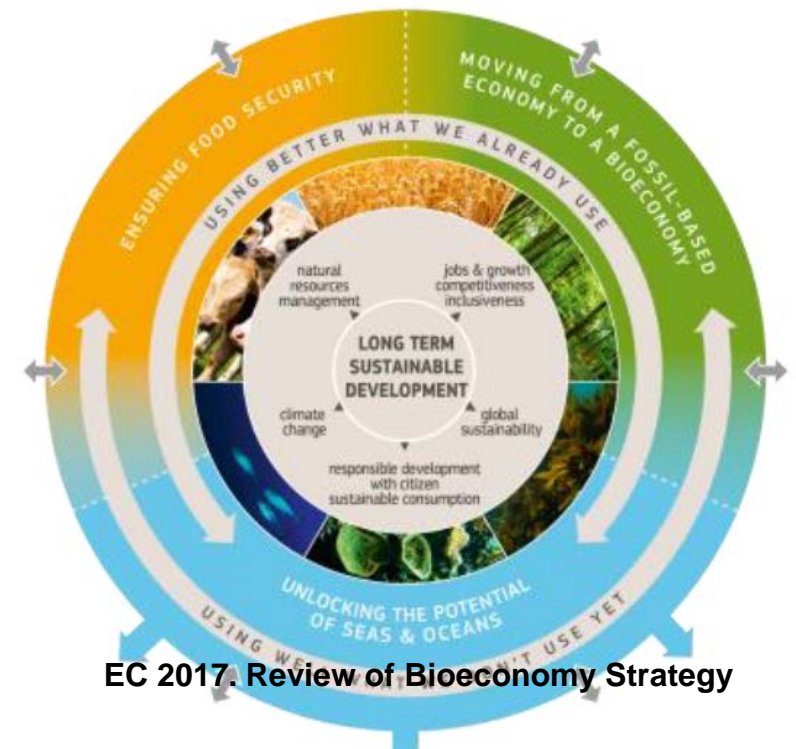
“LUC accounting”

“Optimize biomass use”

“Negative emissions”

“Highest & best use”

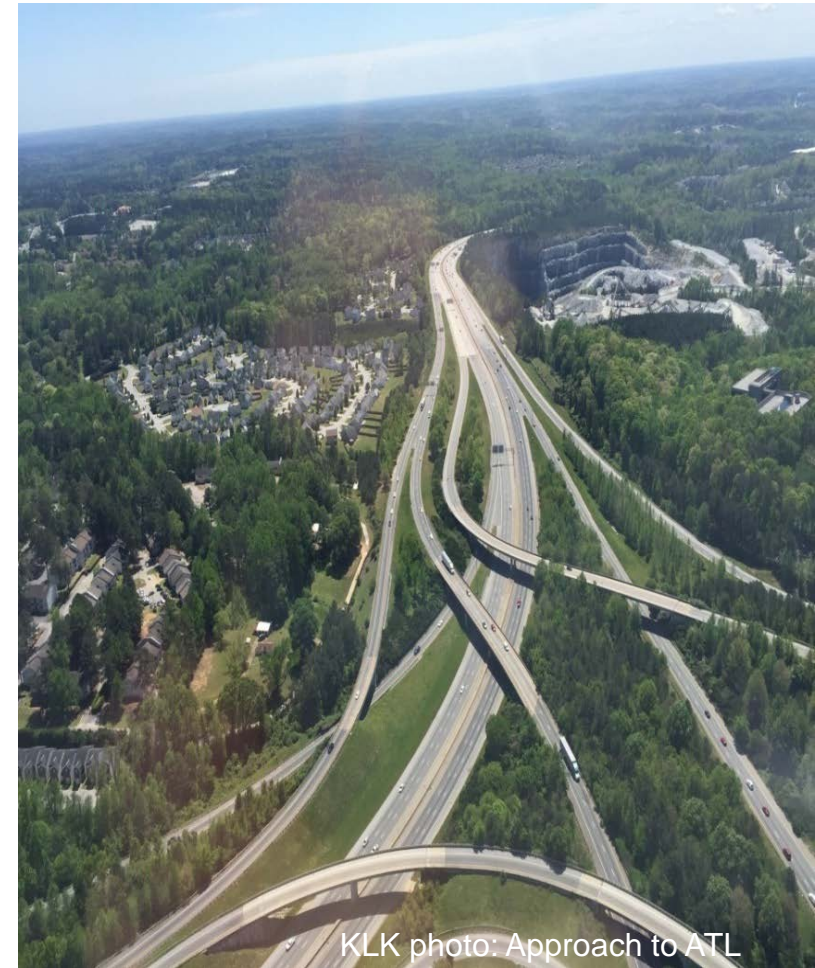
- Definitions matter
- Compared to what?
- “Natural” system? Assume no humans (proposed ref for land-use LCAs)
 - What is “natural?”
 - >500 ways to estimate but none are real



Inclusion of biological systems and land management (LUC) is essential to perform full-chain analysis of carbon cycle (LCAs, TEAs, Standards that account for carbon stocks)

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)



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)

■ Fires 12/7/2017

Select fires to display using the following choices.

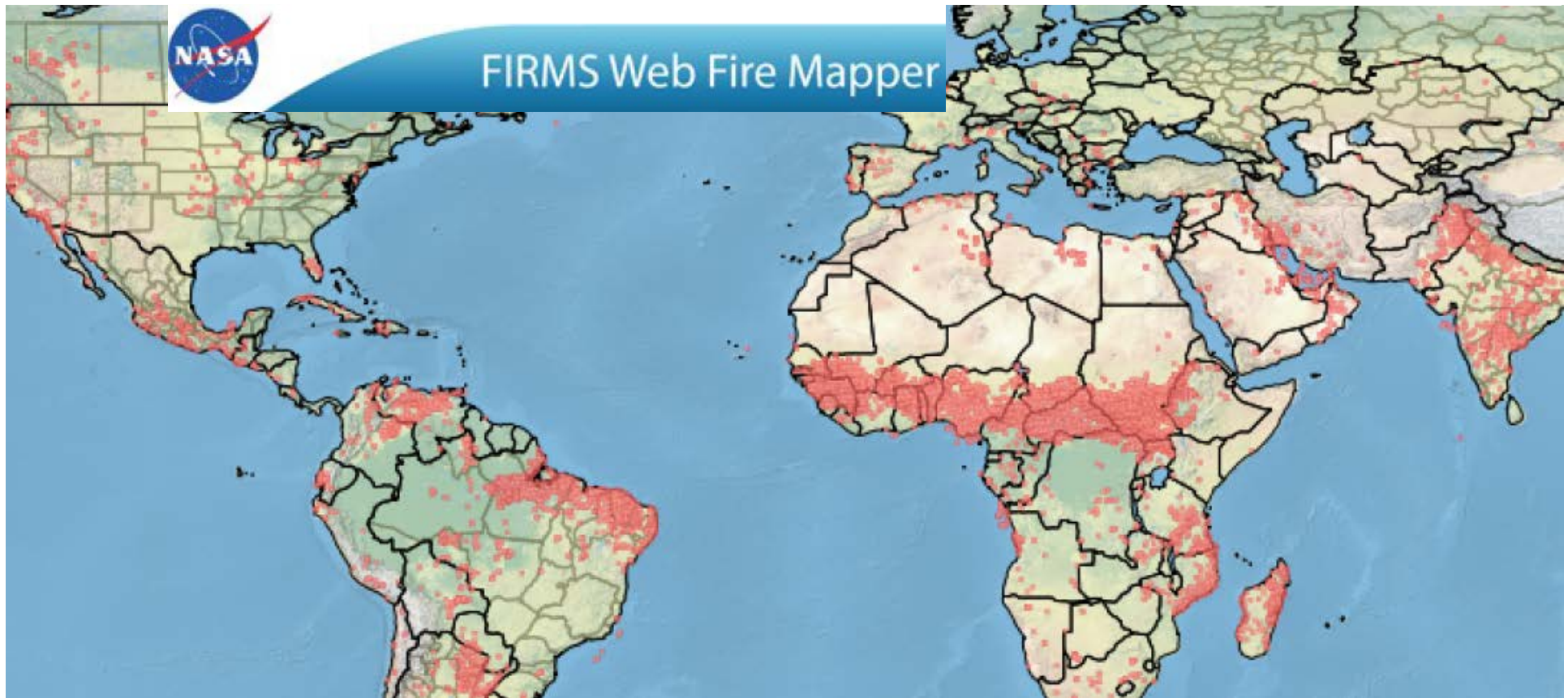
Data source :

VIIRS 375 m

Time period:

☒ Past 24 hours

☐ Past 48 hours



Food for thought: about a third of the world's agricultural area is used annually to produce food that is lost or wasted

<http://www.fao.org/news/story/en/item/196402/icode/>



**No shortage of land.
Shortage of good land
management.**

Kline et al. 2017. GCB-Bioenergy. Food Security & Bioenergy: Priorities...

KLK photo 2017 – on
approach to AMS

Developing a standard protocol for Reference Scenarios

Volunteers welcome!

ASTM E3066 2017

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Review

A framework for selecting indicators of bioenergy sustainability

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View online May 11, 2015 at Wiley Online Library ([wileyonlinelibrary.com](http://www.wileyonlinelibrary.com));
DOI: 10.1002/bsb.1562 Biofuels, Bioprod. Bioref. 9:435–446 (2015)

Abstract: A framework for selecting indicators of bioenergy sustainability is presented. Evaluating indicators of bioenergy sustainability are useful for assessment, management, and development. Efforts to develop sustainability indicators for bioenergy are ongoing. The framework for selecting indicators of bioenergy sustainability is presented. The framework for selecting indicators of bioenergy sustainability is presented. The framework for selecting indicators of bioenergy sustainability is presented.

Keywords: bioenergy, sustainability, indicators, framework, selection, assessment, management, development, bioenergy, sustainability, indicators, framework, selection, assessment, management, development.

Focus Article

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

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ASTM INTERNATIONAL

Designation: E3066 – 16a

Standard Practice for Evaluating Relative Sustainability Involving Energy or Chemicals from Biomass¹

This standard is issued under the fixed designation E3066; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last approval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This standard practice provides a science-based methodology for evaluating the relative sustainability of options involving energy or chemicals derived from biomass. Options may involve products, processes, or projects.

ISO 14044 Life Cycle Assessment—Requirements and Guidelines
ISO 13065 Sustainability Criteria for Bioenergy

3. Terminology

Energy – Choice of reference system

Annette Cowie^{d,f}, Miguel Brandão^{e,f}



R&D Actions — “look out of the window”

- ***Identify subsidies/market distortions causing “waste”***
- ***Need consistent performance-based policies to pay for desired services, penalize undesired effects***
- ***Ensure results are useful: simulations & reference scenarios must incorporate socio-econ drivers to offer guidance for decisions***
- ***Collect data to guide land management to increase C-storage capacities & improve resilience to disturbance***
- ***Accept that we are a part of nature & have management opportunities & responsibilities***

Thank you!

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