Developing U.S. Sustainability Certification Standards to Ensure Landscape-Level Sustainability

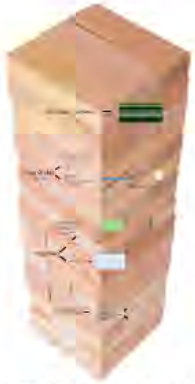
Incorporating Bioenergy In Sustainable Landscape Designs Workshop Two: Agricultural Landscapes
June 26, 2014

Energy Biosciences Institute


Rayane Aguiar, J.D., M.A. 2014


Matt Walker, J.D./M.S. 2016


Problem


Building the BMAS Architecture

Thank you for your time and attention!
jendres2@illinois.edu

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Biofuels Unsustainable?

Problem


Meaningful Standards
Standards Should Prioritize Measurement, Not Only Activity Documentation
Otherwise Miss Paradigm-Shifting Opportunities


Systems Approaches In Standards
Approaches to sustainability policy are often siloed; challenge is to incorporate the full set of pros and cons of bioenergy's enviro-socio-economic effects at various scales
Outside of standards, must deal with systemic causes of problems improperly assigned to biofuels (e.g., governance, diet)

Biofuels Unsustainable?

Sustainability Questions Plague Bioenergy

Manomet Center for Conservation Sciences JUNE 2010 NCI-2010-03

NATURAL CAPITAL INITIATIVE AT MANOMET REPORT

MANOMET Center for Conservation Sciences

BIOMASS SUSTAINABILITY AND CARBON POLICY STUDY

NATIONAL GEOGRAPHIC MAGAZINE

FOOD

Where will we find enough food for 9 billion?

theguardian

News | US | World | Sports | Comment | Culture | Business | Money

Environment › Biofuels

Corn biofuels worse than gasoline on global warming in short term – study

- $500,000 study paid for by federal government
- Conclusion: 7% more greenhouse gases in early years

Associated Press in Washington
theguardian.com, Sunday 20 April 2014 15.48 EDT
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Biofuels made from corn residue have attracted more than $1bn in federal support. Photograph: Marvin Dembinsky Photo Associate/Alamy

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DOI: 10.1126/science.1151861

REPORT

Use of U.S. Croplands for Biofuels Increases Greenhouse Gases Through Emissions from Land-Use Change

Timothy Searchinger[1,*], Ralph Heimlich[2], R. A. Houghton[3], Fengxia Dong[4], Amani Elobeid[4], Jacinto Fabiosa[4], Simla Tokgoz[4], Dermot Hayes[4], Tun-Hsiang Yu[4]

+ Author Affiliations

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Policy and Business React:

"Drivers" of Sustainability Quantification

Laws and Regulations

5.6.2009 EN Official Journal of the European Union L 140/63

DIRECTIVE 2009/29/EC OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL

of 23 April 2009

amending Directive 2003/87/EC so as to improve and extend the greenhouse gas emission allowance trading scheme of the Community

(Text with EEA relevance)

EPA United States Environmental Protection Agency

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International Sustainability & Carbon Certification

FSC

RSB ROUNDTABLE ON SUSTAINABLE BIOMATERIALS

SBP
Sustainable Biomass Partnership

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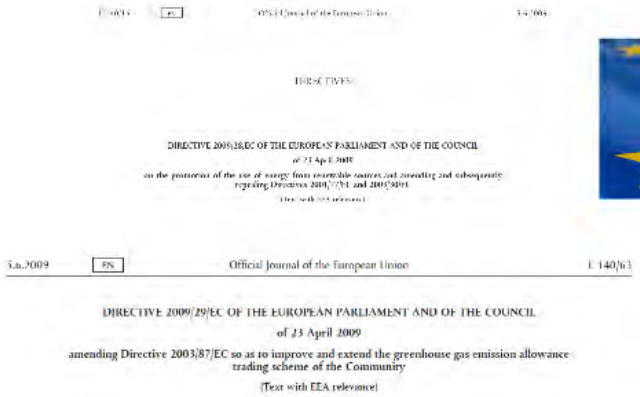

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Laws

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Low Carbon Fuel Standard Program


EPA
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THE SUSTAINABILITY CONSORTIUM

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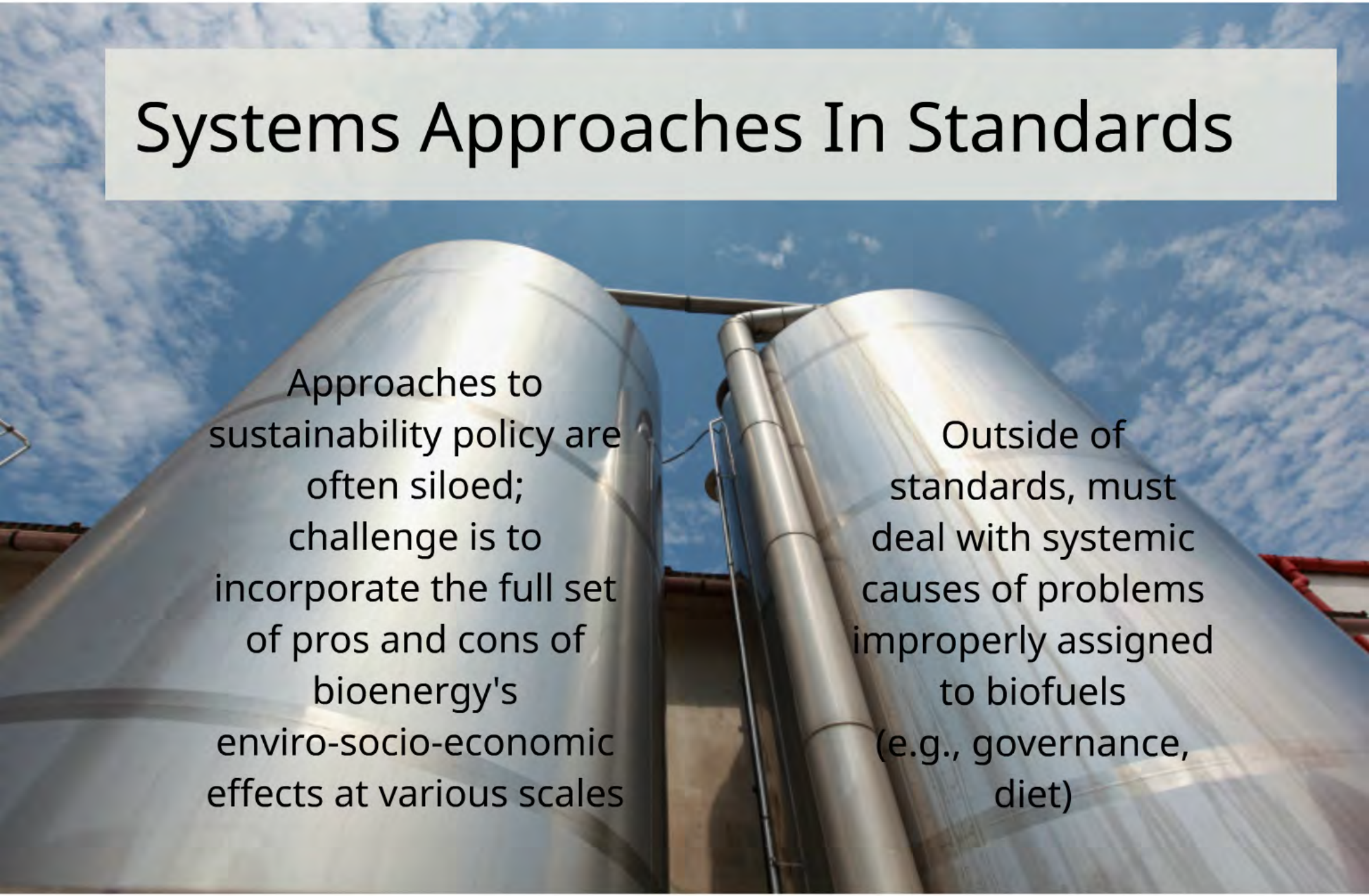

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- Institutional architectures that
  - Facilitate data gathering and
  - Translate scientific analysis of data into holistic policy decisions that are
    - credible and verifiable

Standards Design Imperatives

- Seize on opportunities to show positive benefits, including reduced supply chain costs
- Provide credible and verifiable measurement of sub-field, field, and landscape sustainability
- Incorporate tremendous scientific capacity, including that built by USDA, DOE, and institutes like EBI
- Integrate agriculture and forestry for multifunctionality
- Provide communications support structure
  - Stakeholders in certification
  - Issues outside of certification
- Assist in harmonization of approaches
- Are usable for fuels, food, feed, packaging, chemicals

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Biomass Toolbox

Biomass Market Access Standards (BMAS) Group

Architecture enables policymakers to make informed decisions about the sustainability of biomass-based energy based on transparent data, analytics, and philosophies.

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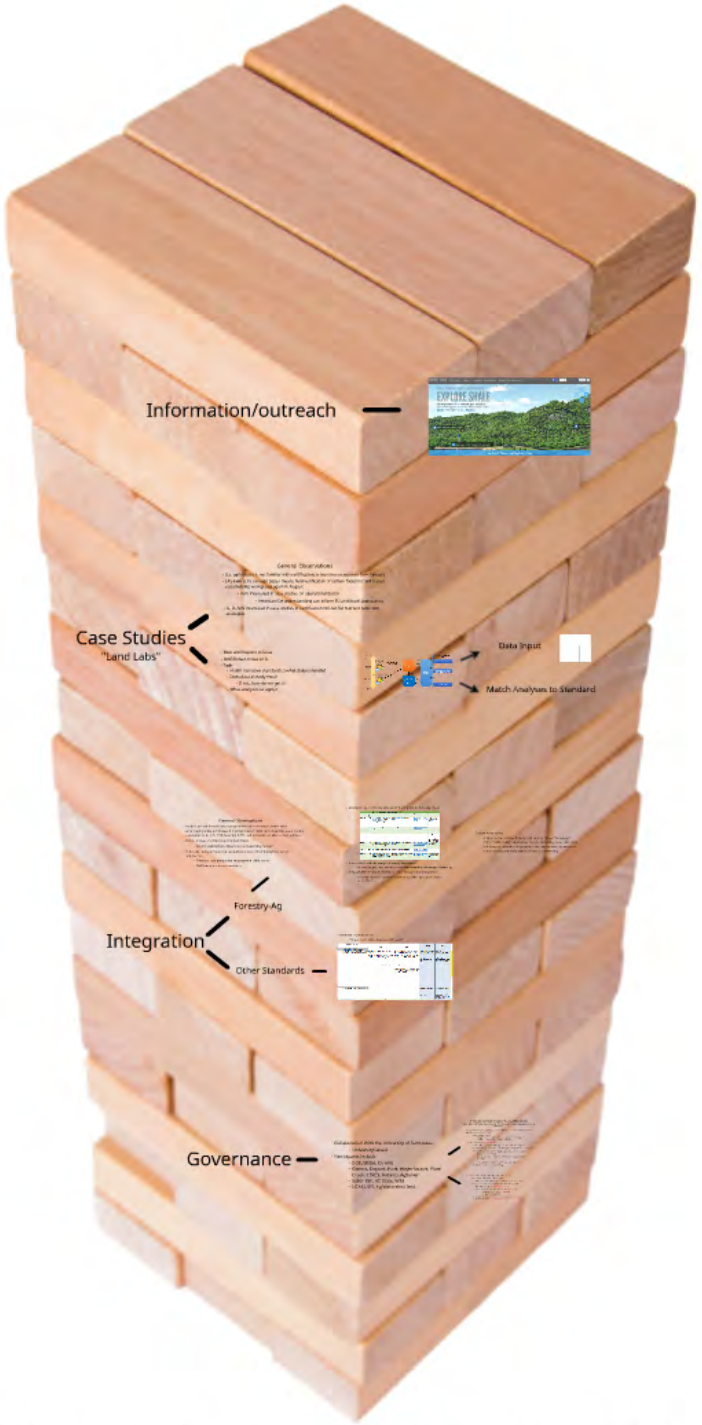

Building the BMAS Architecture

Governance

- Collaboration With the University of Tennessee
  - University based
- Participants include
  - DOE, USDA, CA ARB
  - Genera, Dupont, Poet, Weyerhauser, Plum Creek, CERES, Antares, AgSolver
  - SUNY-ESF, NC State, WIU
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Stakeholder Alignment in Complex Sociotechnical Systems:
Reconsidering "Good Governance" Principles In Private Standards Setting
In prep (2014)

1. Assessment of existing good governance guidance: Used as a "gatekeeper" of whether standards are credible
   - ISO, ANAB/ASI, ISEAL
     - Are governments and businesses capable of dissecting what these guidelines really mean, and how they function?
2. Stakeholder mapping (structural)
   - Stakeholder capacity in identifying problems and critiquing science
   - Leaders with systems view and multidisciplinary experience (behavioral)
   - Who is most capable of mediating/interpreting science? Academe?
     - Culture of "peer review"
     - Fashion academic facilitation like Federal Advisory Committee Act's SABs
     - Separation of standards development from auditing
   - Inclusiveness, consensus, and timing

3. Process: uncertainty, philosophy, and transparency:
   - Precaution: "no action until we know"
     - But, how do we move forward without case studies to know?
   - Process, therefore, must build architecture for learning
     - Building core trust (cultural, behavioral)
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- Agriculture and forest biomass proponents voices stronger as one voice
- Anticipating policy trend toward multifunctional landscapes: driven by water quality regulation in the U.S., CAP Greening in EU, and economics of diverse fuel supplies
- Polarizing nature of forestry standard choice
  - Market and membership versus sustainability output?
- Culturally, integrating agriculture with forestry is challenging because of approaches
  - Temporal and geographic management differences
  - BMPs versus outcome analytics

Integration

Forestry-Ag

Other Standards

- Benchmarking of each state BMP (which forestry standards heavily rely on)

- How do these make their way into management plans?
  - Versus in agriculture, which does not have a tradition of this type of planning
- Although different standards exist, compare standards in actual practice
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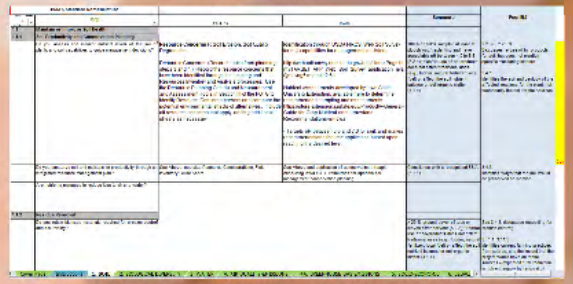

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State Best Management Practices (BMPs) for Forestry					
State	Soil or Water Focus	Description	Document Name	Citation/Reference	Other Notes
Alabama	BOTH	Document provides several strategies and approaches to implementing harvest methods, road access for logging, reforesting, wetland management and stabilization	Alabama's Best Management Practices for Forestry	http://www.forestry.state.al.us/publications/BMPs/2007_BMP_Manual.pdf	The 2007 is the most current update of this document
Alaska	BOTH	Alaska has a regulatory provision with suggested methods on implementation of the best management requirements found in the regulations	Implementing Best Management Practices for Timber Harvest Operations from the Alaska Forest Resources and Practices Regulations	http://forestry.alaska.gov/forestpractices.htm#acts	Other relevant documents are included on the site, particularly the regulations and BMP suggestions.
Arizona	???				The program in AZ has been discontinued and finding the documents on the state forestry website are not easily done, though legacy web pages are still present
Arkansas	BOTH	Focuses on reducing the amount of erosion and water pollution for the state, identifying specific practices for harvesting timber, including road creation, wetland protection, reforestation, etc.	Best Management Practices for Water Quality Protection	http://forestry.arkansas.gov/Services/ManageYourForests/Documents/bmpbookrevise.pdf	The 2002 BMP guide is the most recent document for BMP implementation
California	BOTH	California Code of Regulations that controls professional foresters law and water and soil matters	CALIFORNIA FOREST PRACTICE RULES 2014	http://calfire.ca.gov/resource_mgt/downloads/2014_FP_Rulebook_w_TRA_No.1.pdf	
Colorado	BOTH	Emphasizes water protection and quality, but is a condensed version of a bigger document. The BMPs focus on planning to minimizing the impact for the watershed	Forestry Best Management Practices to Protect Water Quality in Colorado	http://csfs.colostate.edu/pdfs/ForestryBMP-CO-2010.pdf	Other, more complete documents are available at http://csfs.colostate.edu/pages/forests-

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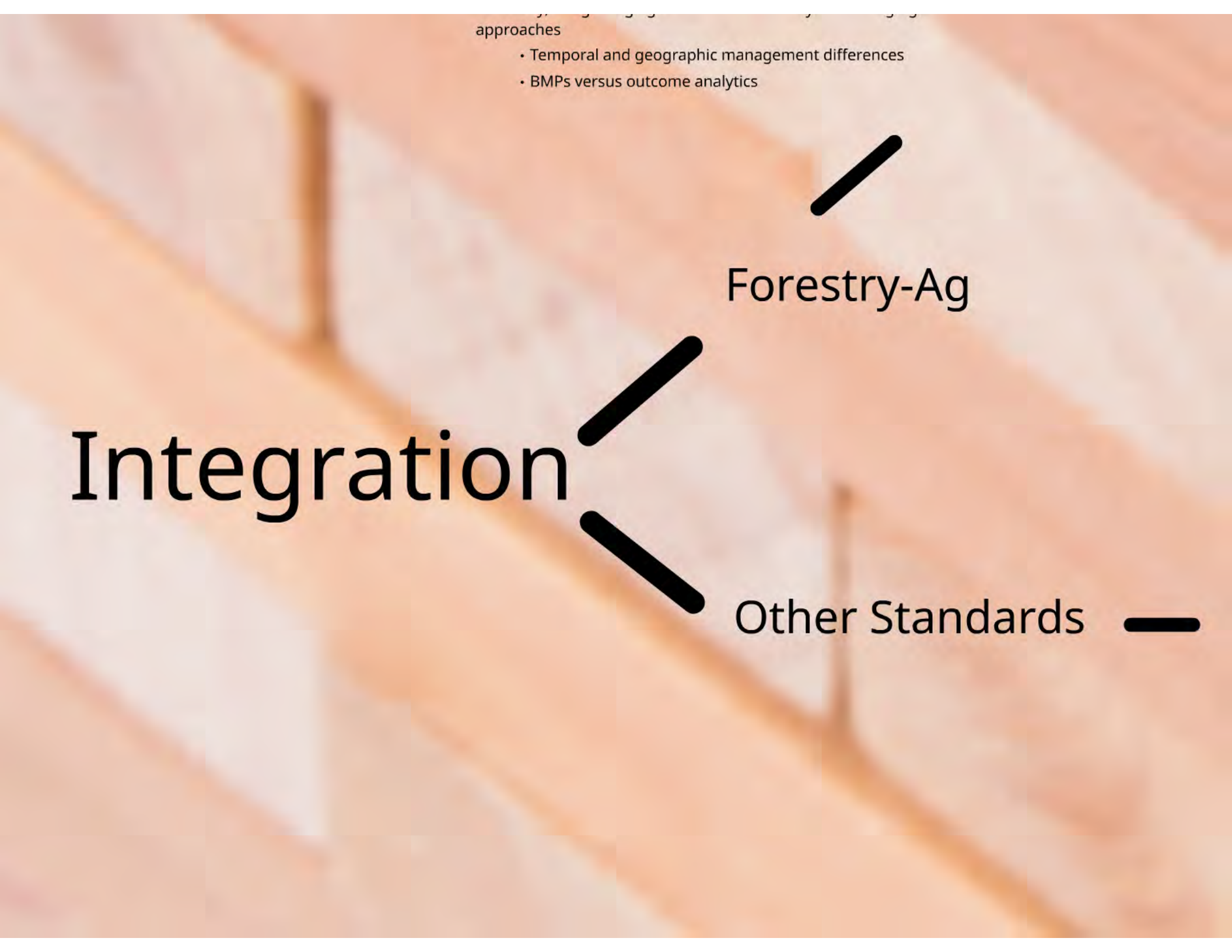
Carbon Accounting

- Neither FSC nor SFI have their own carbon accounting methodologies
- "Other" sustainability indicators could be used in existing carbon calculators
- Article in prep on methodologies in UK, USEPA approaches, CA, private tools
- Information/educational portal for increased understanding

approaches

- Temporal and geographic management differences
- BMPs versus outcome analytics



Forestry-Ag

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BMAS Standard Nomenclature					
Criterion / Indicator	SOIL	CPA 52	Iowa	Bonsucro	Poet EIS
1.1	Maintain or Improve Soil Health				
1.1.1	Soil Productivity and Conservation Planning				
	Do you assess and monitor nutrient levels of the soil or plants and soil capabilities to guide management decisions?	**Resource Concerns** F. Soil Erosion, Soil Quality Degradation Resource Concerns (Record results from planning steps 3 and 4.) Record the resource concerns that have been identified through the scoping and Resources Inventory and Analysis processes. Use the Resource Planning Criteria and Measurement and Assessment Tools in Section III of the FOTG to identify Resource Concerns present and compare the potential environmental effects of alternatives. Include all resource concerns that apply, adding additional sheets as necessary.	Identification through USDA NRCS Web Soil Survey for soil capabilities for management decisions http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm?TARGET_APP=Web_Soil_Survey_application_nxa0jmuvag5kmhupkp2l5lr Nutrient Assessments developed by Iowa State University Extension, available here to determine recommended sampling and assessments. https://store.extension.iastate.edu/Product/A-General-Guide-for-Crop-Nutrient-and-Limestone-Recommendations-in-Iowa - Targets pH between 6.0 and 7.0 for soil, and makes recommendations for lime application based upon reaching the desired level	100% of fields sampled at least at plough-out / replanting and have acceptable pH between 4.0 to 8.5 (5.2.4); Yes/No use of co-products does not affect traditional uses (e.g., fodder, natural fertilizer, local fuel) or affect the soil nutrient balance or soil organic matter (4.1.4)	2.2.3.8, 2.2.3.9 Discusses re-use of by-products for soil, but does not mention specific monitoring matters 3.4.1 Identifies the soil and geology of the affected locations for the plant, not necessarily the soil for the sources
	Do you conserve soil and maintain its productivity through an integrated resource management plan?	See Above, see also Resource Considerations, Field Inventory Guide Sheet	See Above and application of conservation through consulting Iowa FOTG resources for specific soil management conservation planning	Compliance with a recognized ESIA (5.7.1)	3.4.3 Identifies ways that the soil would be preserved on location
	Are nutrients managed to reduce loss to air and water?				
1.1.2	Residue Removal				
	Do you retain biomass materials required for erosion control and soil fertility?			> 20 % ground cover of tops or leaves after harvest (5.2.2); Yes/No use of co-products does not affect traditional uses (e.g., fodder, natural fertilizer, local fuel) or affect the soil nutrient balance or soil organic matter (4.1.4)	See 3.4.3, discusses reseeding for erosion control 3.11.1; 3.11.3 Identifies current farming practices from source, and the impact that the project would have on those sources - expected 10% reduction in nutrient supply by removal of

Cover Page | Instructions | 1. SOIL | 2. ECOLOGICAL DIVERSITY | 3. WATER | 4. AIR QUALITY-EMISSIONS | 4A. GREENHOUSE GAS EMISSIONS | 5. SOCIO-ECONOMIC | 6. LEGAL

- Benchmarking to Bonsucro
  - "Only outcome-based standard in the world"

BMAS Standard Nomenclature					
Criterion / Indicator	SOIL	CPA 52	Iowa	Bonsucro	Poet EIS
1.1	Maintain or Improve Soil Health				
1.1.1	Soil Productivity and Conservation Planning				
	Do you assess and monitor nutrient levels of the soil or plants and soil capabilities to guide management decisions?	**Resource Concerns** F: Soil Erosion, Soil Quality Degradation Resource Concerns (Record results from planning steps 3 and 4.) Record the resource concerns that have been identified through the scoping and Resources Inventory and Analysis processes. Use the Resource Planning Criteria and Measurement and Assessment Tools in Section III of the FOTG to identify Resource Concerns present and compare the potential environmental effects of alternatives. Include all resource concerns that apply, adding additional sheets as necessary.	Identification through USDA NRCS, Web Soil Survey for soil capabilities for management decisions http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm?TARGET_APP=Web_Soil_Survey_application_nva0jmuvag5kmhipkp2t5lii Nutrient Assessments developed by Iowa State University Extenstion, available here to determine recommended sampling and assessments: https://store.extension.iastate.edu/Product/A-General-Guide-for-Crop-Nutrient-and-Limestone-Recommendations-in-Iowa - Targets pH between 6.0 and 7.0 for soil, and makes recommendations for lime application based upon reaching the desired level	100% of fields sampled at least at plough-out / replanting and have acceptable pH between 4.0 to 8.5 (5.2.4); Yes/No use of co-products does not affect traditional uses (e.g., fodder, natural fertilizer, local fuel) or affect the soil nutrient balance or soil organic matter (4.1.4)	2.2.3.8, 2.2.3.9 Discusses re-use of by-products for soil, but does not mention specific monitoring matters 3.4.1 Identifies the soil and geology of the affected locations for the plant, not necessarily the soil for the sources
	Do you conserve soil and maintain its productivity through an integrated resource management plan?	See Above, see also Resource Considerations, Field Inventory Guide Sheet	See Above and application of conservation through consulting Iowa FOTG resources for specific soil management conservation planning	Compliance with a recognized ESIA (5.7.1)	3.4.3 Identifies ways that the soil would be preserved on location
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General Observations

- Agriculture and forest biomass proponents voices stronger as one voice
- Anticipating policy trend toward multifunctional landscapes: driven by water quality regulation in the U.S., CAP Greening in EU, and economics of diverse fuel supplies
- Polarizing nature of forestry standard choice
  - Market and membership versus sustainability output?
- Culturally, integrating agriculture with forestry is challenging because of approaches
  - Temporal and geographic management differences
  - BMPs versus outcome analytics

Integration

Forestry-Ag

Other Standards

- Benchmarking of each state BMP (which forestry standards heavily rely on)

- How do these make their way into management plans?
  - Versus in agriculture, which does not have a tradition of this type of planning
- Although different standards exist, compare standards in actual practice
  - Important because opens the certification market up to more land to be certified

Carbon Accounting

- Neither FSC nor SFI have their ow
- "Other" sustainability indicators c
- Article in prep on methodologies
- Information/educational portal fo

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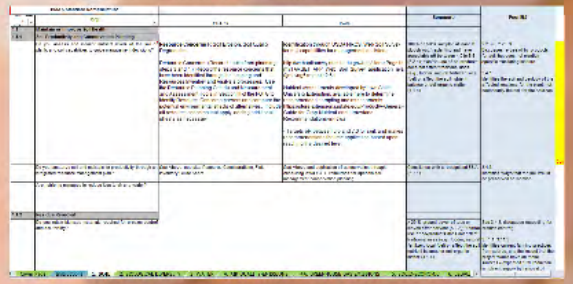
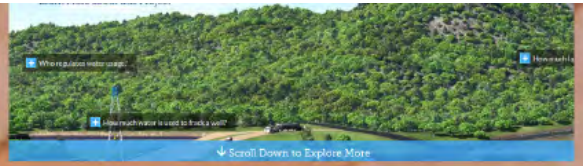


Stakeholder Alignment in Complex Sociotechnical Systen
Reconsidering "Good Governance" Principles In Private Standar
In press (2014)

Information/outreach



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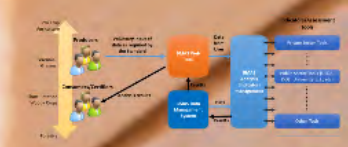
- CA's new LCFS concept paper means field verification of carbon footprint; will restart sustainability workgroup again in August.
  - Very interested in case studies on operationalization
    - American/CA understanding can inform EU and Brazil approaches
- IL, IA, MN interested in case studies in certification roll out for nutrient reduction strategies

Case Studies

"Land Labs"

- Poet and Dupont in Iowa
- DOE/Indian Creek in IL
- Task:
  - Match narrative standard to what data is needed
  - Does data already exist?
    - If not, how do we get it?
  - What analytics to apply?



Data Input

Match Analyses to Standard

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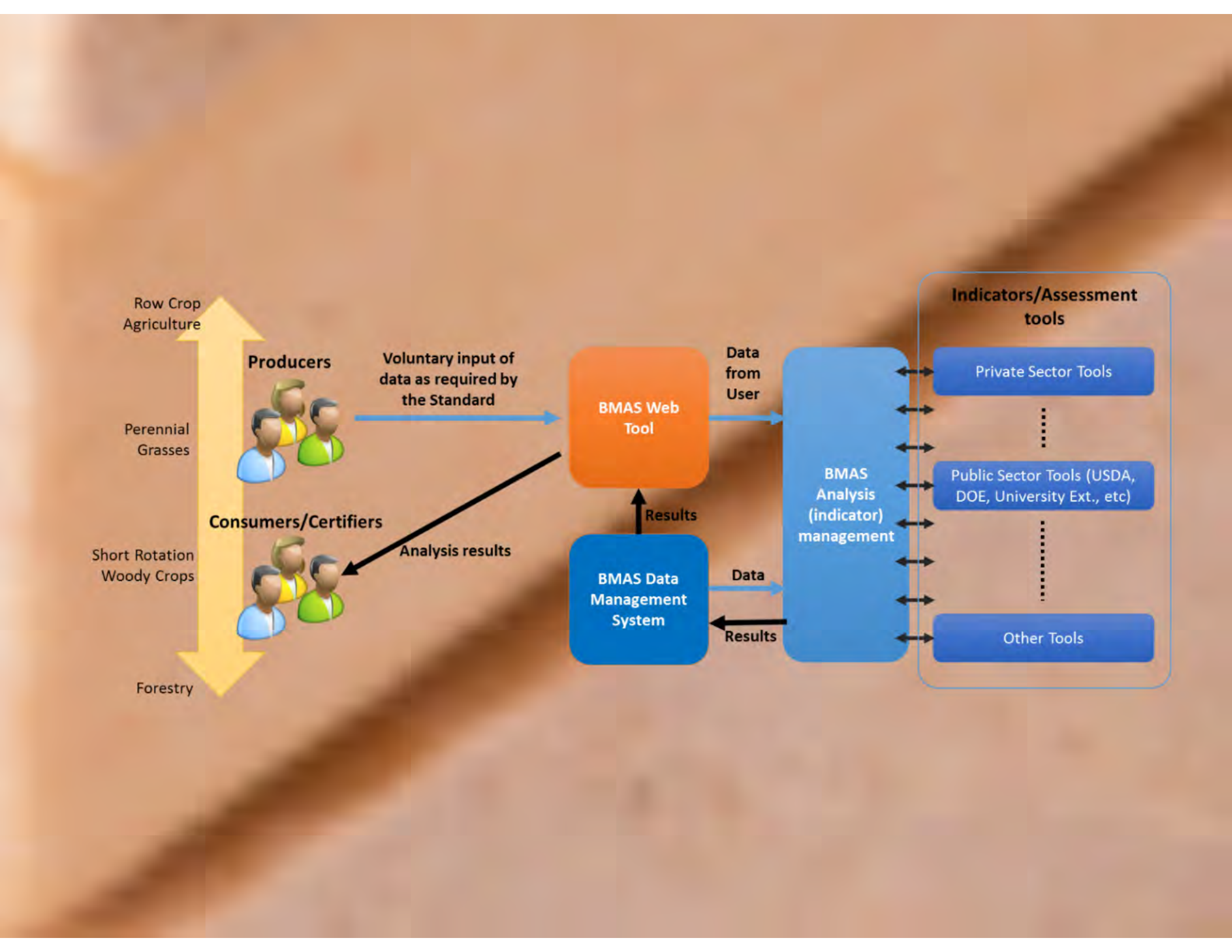

Row Crop Agriculture
Perennial Grasses
Short Rotation Woody Crops
Forestry
Producers
Consumers/Certifiers
Voluntary input of data as required by the Standard
Analysis results
BMAS Web Tool
Data from User
Results
BMAS Data Management System
Data
Results
BMAS Analysis (indicator) management
Indicators/Assessment tools
Private Sector Tools
Public Sector Tools (USDA, DOE, University Ext., etc)
Other Tools

Data Input

Match Analyses to Standard

Biomass Toolbox

Biomass Market Access Standards (BMAS) Group

5.1.5. Nitrogen

Participants preserve nitrogen on site for plant uptake through plant tissue indicators or judicious soil sampling. Potential nitrogen run off is dealt with in conjunction with Indicator 2.1.1 Soil Productivity and Conservation Planning and 4.1.1 Water Quality Management Planning, to avoid ground and surface water contamination.

5.1.5. lbs. 0 per acre

Insert your average nitrogen application in pounds per acre. [need kg/ha measurement?]

5.1.5.

In the space above, please document how your operation avoids ground or surface water contamination from nitrogen applications. Attach a file below if needed.

5.1.5. Browse... No file selected. Upload

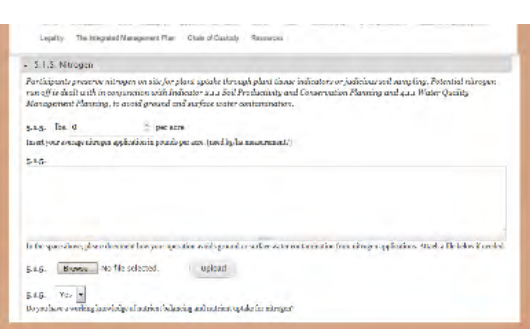
5.1.5. Yes

Do you have a working knowledge of nutrient balancing and nutrient uptake for nitrogen?

Data Input

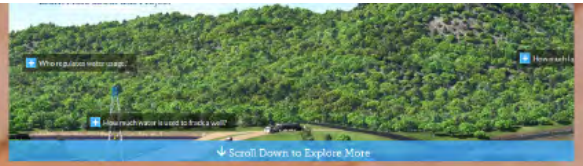
Match Analyses to Standard

Data Input



Match Analyses to Standard

Information/outreach



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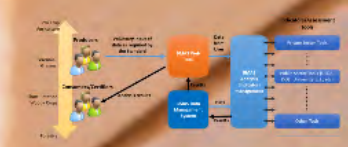

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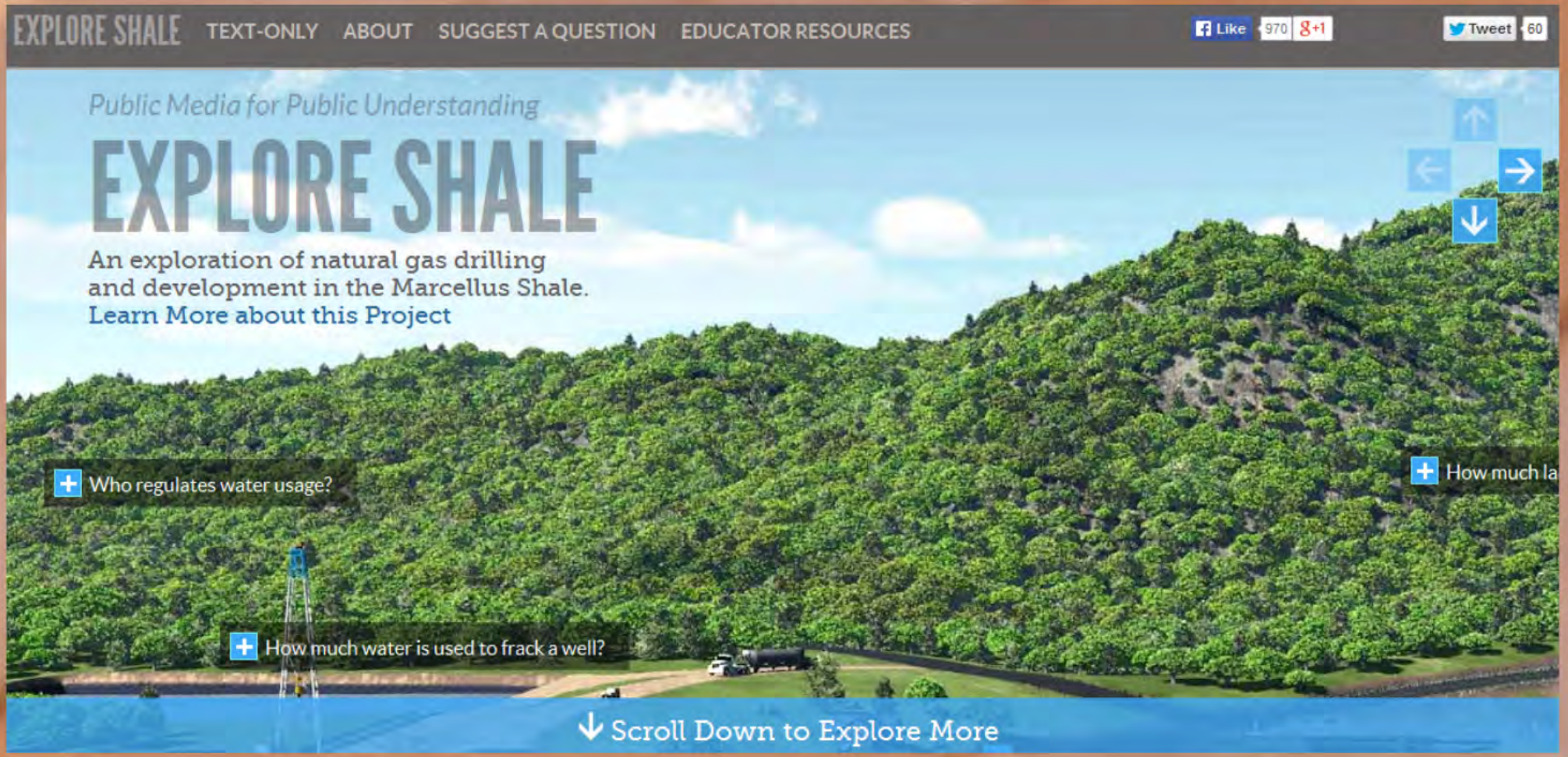
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Developing U.S. Sustainability Certification Standards to Ensure Landscape-Level Sustainability

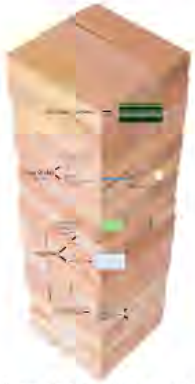
Incorporating Bioenergy In Sustainable Landscape Designs Workshop Two: Agricultural Landscapes
June 26, 2014

Energy Biosciences Institute


Rayane Aguiar, J.D., M.A. 2014


Matt Walker, J.D./M.S. 2016


Problem


Building the BMAS Architecture

Thank you for your time and attention!
jendres2@illinois.edu