

Bioenergy, Sustainability, and Land-Use Change Report Oak Ridge National Laboratory (ORNL) April 2016

Publications

- Dale VH, Kline KL, Richard TL, Karlen DL. Selecting indicators of changes in ecosystem services due to cellulosic-based biofuel in the midwestern United States. Submitted to *Biomass and Bioenergy*

CBES Presentations

Apr 4-8: The US Chapter of the International Association of Landscape Ecology (IALE) annual meeting in Asheville, NC, on April 4-6 (<http://www.usiale.org/asheville2016/>) had three symposia that were organized by ORNL sustainability scientists and posters by affiliated students. (see attached).



Apr 11: Yetta Jager spoke in a combined session on Renewable Bioenergy and Biodiversity and Riparian Buffers at the National Working Forum: Managing Poplar and Willow for Environmental Benefits and the Renewable Fuels Industry.

April 15: Virginia Dale gave the keynote lecture at the 2nd Annual Women in STEM Research Symposium at the University of Tennessee: <http://cfwstem.weebly.com/symposium.html>. The title of her talk was “From Disturbance to Sustainability: Following Interesting Questions and Fun Opportunities.”

April 19: Keith Kline presented “Words Matter” for BETO, US Forest Service and DOE Laboratory staff involved in the Billion Ton 2016 Resource Assessment Report Volume 2 on Sustainability (BT16 Vol 2).



April 21: Virginia Dale gave a lecture at the Baker Center for Public Policy’s Environment and Energy Forum at the University of Tennessee. Her talk was on “Opportunities and costs of wood-based bioenergy.”



Bioenergy Study Tour in the Southeastern US

Apr 10-14: ORNL and DOE hosted the Bioenergy Study Tour in the southeastern United States. Participants included researchers associated with DOE and its national laboratories, the International Energy Agency (IEA), university staff and students, and industry. The Study Tour highlighted innovations for the bioeconomy developed by DOE laboratories and helped participants develop a better understanding of bioenergy systems in the southeastern United States. Please see the CBES website for the agenda, presentations, handout material, and lots of photos (<http://web.ornl.gov/sci/ees/cbes/workshop.shtml>) and search the following hashtag on Twitter for pictures and more information  **#BioenergyTour**



Other ORNL Activities

Apr 1: Keith Kline presented a poster on improving the scientific basis for characterizing and assessing land-use change to the Science Advisory Board of CCSI and discussed potential future modeling collaborations with Brian O’Neill, National Center for Atmospheric Research (NCAR).

Apr 7: After attending the talk by Joe Fargione of The Nature Conservancy at the University of Tennessee Baker Center, Virginia Dale, Keith Kline and Yetta Jager joined Joe and Paul Armsworth for dinner and conversation about conservation.

Apr 14-15: Keith Kline participated in IEA Bioenergy Tasks (43 & 38) meetings in Savannah, Georgia, related to assessing sustainable bioenergy supply chains, land-use change, international standards, and selecting an appropriate reference system when conducting life-cycle assessments.

April 19: Keith Kline drafted and distributed “Notes on terminology related to agricultural land and crops,” a 7-page white paper defining terms and providing guidance on words to use or avoid in BT16 Vol 2.

Upcoming ORNL Visits/Events

May 8-12: Virginia Dale is invited to give a plenary lecture at the International Society of Ecological Modelling Global Conference in Baltimore, Maryland – see <http://www.isemconference.com/>. The title of her talk is "Tradeoffs in sustainability assessment."

Jasmine Kreig will present “Spatial allocation of conservation practices to maximize bioenergy production and water quality at a regional scale” at the Baltimore Ecological Modeling Conference



May 11: Rebecca Efrogmson is assisting BETO to organize the peer review workshop for the Billion Ton Sustainability Report (Vol. 2) and many ORNL researchers are contributing. Presentations will be given by Rebecca Efrogmson, Keith Kline and Yetta Jager who are leading chapters in BT16 Vol 2.

May 15-21: Keith Kline is invited by Michigan Technological University (NSF grant) to contribute to the Annual Project Meeting, Program for International Research and Education-PIRE, Sustainable Bioenergy in the Americas, in Tabasco, Mexico.

May 17: The next, new CBES forum will be held at the FIA Demonstration Plot at the UT Forest Resources AgResearch and Education Center starting at 3:30pm on May 17th. Jeff Turner of the US Forest Service, Southern Research Station, will be conducting the tour and giving a presentation.

May 25: Pint of Science will hold its first gathering in Knoxville in May at Last Days of Autumn Brewing, 808 E Magnolia Avenue, 37917. Virginia Dale will speak on “Mount St Helens: Devastation in 1980; Resiliency Now.” Check it out at <http://pintofscience.us/event/ch-ch-ch-changes>

Jun 6-10: Keith Kline and Virginia Dale plan to contribute to the Workshop on Land Use Change at the European Biomass Conference and Exhibit (EUBCE) (pending confirmation of invited travel) <http://www.eubce.com/conference/parallel-events-workshops-and-project-meetings/workshops-project-meetings/the-world-needs-more-land-use-change.html>

Jun 29: Keith Kline will attend the American Society for Testing and Materials (ASTM) International meeting (Bellevue, WA) to help E-48 committee review ballot results and respond to comments on the new Standard Practice for Sustainability Assessment.

Jul 17-20: Yetta Jager is invited to the symposium, “Conservation of aquatic ecosystem connectivity: from planning to practice,” at the Society of Conservation Biology in Madison, Wisconsin. She will present parallel spatial optimization of new energy generation and eel production with coauthors James Nance (ORNL) and Matt Fuller (Duke).

July: The Billion Ton 2016, Volume 1, which quantifies potential biomass availability at particular prices, is to be released at Biomass 2016.

Aug: Natalie Griffiths and co-authors will present at the Ecological Society of America meeting in Florida on “Evaluating the water quality effects of short-rotation pine production for bioenergy using a watershed-scale experiment.”

Sep 24: Virginia Dale will contribute to symposium on “The value of a tree” at Appalachian State University in Boone, NC, organized by Eric Marland.

Sep 28-29: Virginia Dale has been invited to give a talk at the Symposium on Watershed Scale Sustainability of Forest-Based Bioenergy Production in the Southeastern United States to be held in Raleigh, NC. The goal of this symposium is to synthesize results from the Operational Scale Pine/Switchgrass Intercropping Project, initiated by Catchlight Energy, LLC and Weyerhaeuser Company, with additional funding from DOE; and to put the results into a scientific, operations and policy context.

Fall: Presentation by Tim Volk at the International Poplar Commission meeting in Germany on “Incorporating shrub willow into multifunctional system using a landscape design approach” by T.A. Volk, J. Heavey, C. Negri, H. Ssegane, V. Dale, D. Daley, and M. Eisenbies.

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Attachment: International Association of Landscape Ecology (IALE) annual meeting in Asheville, NC -- April 4-6 <http://www.usiale.org/asheville2016/>

Three symposia were organized by ORNL sustainability scientists:

Reshaping Landscapes: Bioenergy and Biodiversity II – organized by Yetta Jager

- Kristen Johnson - Introduction
- Yetta Jager – Can future US bioenergy production coexist with avian biodiversity?
- Luciano Verdade – Vegetation biomass as a surrogate for birds’ diversity
- Colin Phifer - Bird community responses to afforested eucalyptus plantations in Argentina
- Elke Brandes - Subfield profitability analysis reveals an economic case to increase biodiversity
- Christopher Lituma -Multi-scale assessment of wildlife sustainability in switchgrass biofuel feedstock production
- Maria Cristina Negri -A resource recovering landscape for sustainable bioenergy
- Gwen White - Mississippi Basin / Gulf Hypoxia Initiative: Seven LCCs meet large-scale agricultural conservation challenges from grassland birds to Gulf coast shrimp
- Kevin Craig - Linking watershed processes to coastal fisheries: effects of nutrient enrichment and hypoxia on the Gulf of Mexico fishery ecosystem
- Samuel Evans - The role of economics in understanding biodiversity in bioenergy landscapes
- A Pouyan Nejadhashemi - Optimization of bioenergy crop selection and placement based on a stream health indicator

Opportunities and Barriers for Sustainable Bioenergy – organized by Keith Kline

- Keith Kline gave an “attendee-choice” presentation on behalf of the IEA Bioenergy Inter-Task project, “Mobilizing Sustainable Bioenergy Supply Chains.” This was an abridged version of Tat Smith’s talk based on report: <http://www.ieabioenergy.com/publications/mobilizing-sustainable-bioenergy-supply-chains/>
- Hans Langeveld, M Breure, P Quist-Wessel, and KL Kline (presenter) - Bioenergy opportunities to increase resource management efficiency: effects of direct land use within a landscape perspective
- Jason Hansen - Exploring Integrated Landscapes for Bioenergy Feedstock Production
- Annette Cowie - How emission accounting and reporting influence perceptions of bioenergy
- A Coleman, M Wigmosta, R Efroymson (presenter) et al. - Opportunities and barriers for waste resource utilization in bioenergy production
- Andy Scott - Balancing bioenergy benefits on the landscape with sustainable productivity challenges on sites
- Maggie Davis (presenter), M Langholtz, L Eaton, K Kline - Landscape implications of US “Billion-Ton” supply assessments; historical review
- Rebecca Efroymson - Investigating sustainability issues in bioenergy resource assessments: The example of the US 2016 Billion-Ton Report
- Inge Stupak, T Smith, M Mansoor - Creating trust and credibility in sustainability governance of bioenergy supply chains
- Jeremy Woods and L DiLucia- The role of land and a bio-based economy as mediators of climate mitigation and adaptation
- Kristen Johnson - Strategies to overcome barriers to a more sustainable bio-economy; followed by a synthesis of priorities to realize opportunities (presented and discussion moderated by Kline).

Landscapes Designs that Incorporate Sustainable Wood-based Bioenergy: a Focus on the Southeastern United States – organized by Virginia Dale

- Jen Costanza and David Wear - Land use futures in the Southeast: The interaction of urban and rural market forces
- Cathryn Greenberg - Natural disturbances shaping the structure and composition of southeastern forests
- Danny Lee - Remote tracking of forest dynamics using satellite imagery: Implications for sustainable forest management in the Southeast
- Art Wiselogel - DOE’s Moves Toward Forest Landscape Design
- Floor van der Hilst - Variation in carbon balances of wood pellet production in Southeast US
- Alisa Coffin - Landscape considerations of perennial biofuel feedstock production in conservation buffers of the Georgia Coastal Plain, USA
- Oludunsin Tunrayo Arodudu - Spatio-temporal assessment of agro-bioenergy systems-a Human appropriation of net primary production (HANPP) approach
- Jami Nettles - Sustainable bioenergy intercropping in pine plantations - results from research to operational-scale trials
- Esther Parish - Analysis of US Forest Inventory and Analysis (FIA) Program Data across two Southeastern US fuelsheds.
- Christopher Moorman - An experimental approach to assess the effects of woody biomass harvests on wildlife habitat
- Nathan Tarr - Modeling the effects of biomass production on landscapes and wildlife habitat

- Virginia Dale - Opportunities and constraints for progress toward sustainable bioenergy in the southeastern United States



The following posters by students associated with ORNL were also presented at the IALE meeting:

- **Jasmine Kreig:** Designing bioenergy landscapes to improve water quality through spatial allocation of conservation practices. (photo)
- **David Gorelick** (a UNC Chapel Hill student who worked at ORNL): Spatial optimization of bioenergy feedstock introductions in the Arkansas White-Red River Basin: Trade-offs between nutrient loadings and agricultural economic benefits
- **Sarah Eichler Inwood** (a PhD student in The Bredesen Center for Interdisciplinary Research and Graduate Education at the University of Tennessee): Cover crops reduce agricultural nutrient export in a simplified model of land-use change in the Upper Beaver Creek Catchment, Ohio.

