

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

Publications

- Du, E., C.R. Jackson, J. Klaus, J.J. McDonnell, N.A. Griffiths, M.F. Williamson, J.L. Greco, and M. Bitew. 2016. Interflow dynamics on a low relief forested hillslope: lots of fill, little spill. *Journal of Hydrology* 10.1016/j.jhydrol.2016.01.039.
- Efrogmson RA, Kline KL, Angelsen A, Verburg PH, Dale VH, Langeveld JW, McBride A. submitted, A causal analysis framework for land-use change and the potential role of bioenergy. *Global Environmental Change*
- Efrogmson RA, VH Dale, MH Langholtz. Submitted. Socioeconomic indicators for sustainable design and commercial development of algal biofuels. *GCB Bioenergy*
- Griffiths, N.A., C.R. Jackson, J.J. McDonnell, J. Klaus, E. Du, and M.M. Bitew. 2016. Dual nitrate isotopes clarify the role of biological processing and hydrologic flowpaths on nitrogen cycling in subtropical low-gradient watersheds. *JGR-Biogeosciences* 10.1002/2015JG003189.
- Jackson, C.R., E. Du., J. Klaus, N.A. Griffiths, M. Bitew, and J.J. McDonnell. An ensemble of interacting hydraulic conductivities and thresholds revealed by a multi-tracer hillslope irrigation experiment. Accepted to *Water Resources Research*.
- Kline KL, Msangi S, Dale VH, Woods J, Souza G, Osseweijer P, Clancy J, Hilbert J, Mugeru H, McDonnell P, Johnson F (submitted) Reconciling biofuels and food security: priorities for action. *Global Change Biology Bioenergy*.

CBES Presentations



Lorentz BioPanel (above) including Keith Kline second from left. Patricia Osseweijer and Keith Kline (center right side) and Emil van Zyl and Keith Kline (far right)

Jan 18-23: Keith Kline was asked to present “Context Dependence: Food Security and Land Use Challenges Associated with a More Sustainable Bioeconomy” in the Lorentz Center www.lorentzcenter.nl workshop on “Bridging technological and social innovation for a biobased economy” in Leiden, NL. The event developed a vision statement and created the Lorentz Bio Panel which is finalizing an international cooperative research agenda aiming to help overcome social acceptance barriers.



Jan 19-21: Virginia Dale, Donna Perla (EPA), and Doug Karlen (USDA) organized two sessions on the bioeconomy for the Conference in Washington, DC, of the National Council on Science and the Environment (NCSE) on the Food-Energy-Water Nexus: <http://foodenergywater nexus.org/>. The symposium was titled “Considerations and Challenges Associated with a Vibrant Bioeconomy” and the World Café was on “Innovation in Bioenergy and the Bioeconomy.” The USDA, DOE, and EPA were sponsors for this conference. Virginia Dale gave a presentation on “Food-Energy-Water Nexus: Considerations & Challenges Associated with a Vibrant Bioeconomy” at the NCSE meeting.



The Food-Energy-Water Nexus

16th National Conference and Global Forum
on Science, Policy and the Environment

January 19-21, 2016

Hyatt Regency Crystal City at the
Washington, DC National Airport



Jan 28: Keith Kline gave a presentation titled: “Land Use Change (LUC) and Indirect LUC (ILUC): Definitions and science-based measurement” to a group from the American Lung Association who expressed specific interest to learn about LUC and potential influence of LUC/ILUC estimates on other analyses (e.g., Life-Cycle Assessment emissions calculations, food security, deforestation, health, etc.) and regulators (CARB).



Jan 28-29: Keith Kline and Virginia Dale participated via webinar in the kick-off meeting for the 2016-2018 triennium for IEA Bioenergy Task 43 that was held in Wageningen. Virginia gave a presentation on the “Bioenergy Study Tour in Southeast United States.”

Other CBES Activities

Jan 25: Esther Parish was interviewed by USDA Today Ag Edition reporter regarding environmental impacts and reactions to the Renewable Fuel Standard.

Jan 27: Keith Kline and Virginia Dale participated via webinar in a joint meeting of IEA Bioenergy Tasks 38, 40 and 43 held in Wageningen regarding their work plan on a strategic intertask project on “Measuring, governing, and gaining support for sustainable bioenergy supply chains.”

Upcoming ORNL Visits/Events:

Feb 9: Yetta Jager (ORNL) and May Wu (ANL) will jointly present Mississippi River Basin modeling research in a Federal agency modeling communication webinar along with representatives from USDA, USGS, USEPA, and USACE as part of an effort to improve interagency coordination.

Feb-Apr: Scientists from Oak Ridge National Laboratory will contribute to the Ecology Core class for graduate students in the Department of Ecology and Evolutionary Biology at the University of Tennessee in Knoxville. Natalie Griffiths and Colleen Iversen will lead the part of the class on ecosystem ecology, and Virginia Dale will lead the section on landscape ecology and sustainability. Their lectures will occur during the months of February and April.

Mar 1-3: Yetta Jager is invited to attend the Mississippi River Basin / Gulf Hypoxia Initiative meeting in Indianapolis. This initiative, led by the USFWS, seeks to provide guidance and also involves developing a decision support modeling framework for farmers.

Mar 8-11: Virginia Dale is invited to participate in a workshop on EcoHealth Metrics for the Gulf of Mexico convened at the Harte Research Institute at Texas A&M University-Corpus Christi.

Mar 14-18: Chalmers University invited Keith Kline and Virginia Dale to contribute to meetings with the Swedish University of Agriculture Sciences in Stockholm and to a workshop on “Landscape management and design for food, bioenergy and the bioeconomy: methodology and governance aspects” at Chalmers University in Göthenburg, Sweden. In addition, Virginia will serve as the invited opponent at Oskar Englund's public defense of his PhD thesis: “On the sustainability of biomass for energy and the governance thereof” at Chalmers University of Technology.

Mar 29-April 2: Latha Baskaran will attend the 2016 American Association of Geographers (AAG) Annual

Meeting in San Francisco, CA, and present on “Identifying opportunities for sustainable bioenergy production in two southern tributary basins of the Mississippi River Basin: focus on water quality, quantity and biodiversity.” Her co-authors for this presentation are Yetta Jager, Jasmine Kreig, Gangsheng Wang and Craig Brandt.

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/>) will have three symposia that were organized by ORNL staff as follows: (*Speakers supported by BETO CBES and the title of their talks are listed for each symposia*)



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

- Yetta Jager – Can future US bioenergy production coexist with avian biodiversity?

Opportunities and Barriers for Sustainable Bioenergy – organized by Keith Kline

- Harry Baumes - Policies, regulations and USDA programs to support opportunities for sustainable bioenergy
- Matt Langholtz/Laurence Eaton - Landscape implications of US “Billion-Ton” supply assessments; historical review
- Rebecca Efrogmson - Investigating sustainability issues in bioenergy resource assessments: The example of the US 2016 Billion-Ton Report
- Kristen Johnson (BETO) - Research and Strategic Plans to Integrate Sustainable Bioenergy in Landscape Designs
- Keith Kline - Synthesis of priorities to realize opportunities for more sustainable landscape designs incorporating bioenergy

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

- Art Wiselogel - DOE’s Moves Toward Forest Landscape Design
- 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.
- Virginia Dale - Opportunities and constraints for progress toward sustainable bioenergy in the southeastern United States

The following posters by students associated with ORNL also have been accepted at this meeting:

- Jasmine Kreig will present a poster titled: Designing bioenergy landscapes to improve water quality through spatial allocation of conservation practices.
- David Gorelick, a UNC Chapel Hill student who worked at ORNL for two summers will present a poster. The title is “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, will present a poster on “Cover crops reduce agricultural nutrient export in a simplified model of land-use change in the Upper Beaver Creek Catchment, Ohio.”

Apr 10-14: ORNL and DOE are hosting a bioenergy study tour in the southeastern United States. Participants will include researchers associated with DOE and its national laboratories, the International Energy Agency (IEA), university staff and students, and industry. The goal of the tour is to have participants develop a better understanding of bioenergy systems in the southeastern United States.

Apr 11: Yetta Jager is invited to speak 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.

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 Krieg was also accepted to give a presentation at the Baltimore Ecological Modeling Conference. The title is "Spatial allocation of conservation practices to maximize bioenergy production and water quality at a regional scale".



Jul 17-20: Yetta Jager was invited to the Symposium, "Conservation of aquatic ecosystem connectivity: from planning to practice," at the Society of Conservation Biology in Madison, Wisconsin.

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.