

**A Watershed Perspective on Bioenergy Sustainability:
A Workshop to be held at Oak Ridge National Laboratory
Oak Ridge, Tennessee
3-4 February 2010**

An informal workshop focused on a watershed-scale perspective of cellulosic bioenergy feedstock sustainability will be held at Oak Ridge National Laboratory (ORNL) in Oak Ridge, Tennessee, 3-4 February 2010. The workshop will include researchers from ORNL, Savannah River Site, NCASI, Weyerhaeuser, academic institutions, and other private industry groups. The workshop is being supported by the National Council for Air and Stream Improvement, Inc. (NCASI) and by the U.S. Department of Energy Office of Energy Efficiency and Renewable Energy's Biomass Program.

The topics covered will include water-related sustainability issues associated with intensive cellulosic bioenergy feedstock production (particularly hydrology and water quality). Overall goals for the workshop include:

- Definition of the type and level of intensive management inputs required to achieve various production levels for trees and switchgrass and the likely watershed hydrology and water quality consequences
- Definition of watershed standards in terms of hydrology and water quality regulatory compliance or targets in states in which intensive cellulosic production is possible
- Attendees to exchange information about their activities in this area and to build collaborations and connections
- Identification of sustainability indicators relevant at a watershed scale
- Development of key attributes of watershed studies/experiments that address bioenergy sustainability
- Development of a network of experimental intensive cellulosic bioenergy watersheds where research is ongoing, planned, or potentially can occur in a collaborative fashion to characterize the variability in key sustainability attributes

Workshop participants will share their current research and perspectives in a format that promotes communication among all participants. This workshop should increase the awareness of what research is occurring as well as research needed in this rapidly developing field.

Steering Committee

ORNL: Virginia Dale, Pat Mulholland

US Forrest Service/Savannah River Site (USFS/SRS): John Blake

NCASI: Al Lucier

Weyerhaeuser: Bob Bilby

February 3rd, Day 1:

8:30 Welcome and Introduction

Oak Ridge National Laboratory (ORNL) – Martin Keller
DOE Biomass Program – Alison Goss Eng
National Council for Air and Stream Improvement (NCASI) – Al Lucier
Center for BioEnergy Sustainability (CBES) – Virginia Dale

Invited Presentations

- 9:00 Tom Fox, Virginia Polytechnic Institute (VPI), and Mike Kane, University of Georgia (UGA):
Inputs needed to achieve high biomass production for SE trees
- 9:25 George Ice (NCASI): Groundwater and stream water quality compliance standards and expectations
- 9:50 Break
- 10:05 Jami Nettles (Weyerhaeuser): Weyerhaeuser Catchlight study
- 10:30 Wayne Skaggs, North Carolina State University (NCSU), and Devendra Amatya (USDA/FS):
Eastern North Carolina study
- 11:00 Matthew McBroom, Stephen F. Austin State University: Texas study of water quality impacts of intensive forestry
- 11:25 Melanie Mayes, ORNL: Soil water quality under fertilized switchgrass plots in Alfisol soils, Milan, TN.
- 11:50 Rhett Jackson, UGA: Sites for watershed studies
- 12:15 Lunch
- 1:15 Yetta Jager and Latha Baskaran, ORNL: Modeling direct and indirect landscape influences on water quality and fish biodiversity over large spatial extents
- 1:45 Stephen Schoenholtz/Sheila Christopher, VPI: Scaling up results from small watershed studies to larger spatial scales
- 2:15 “3 in 5” Presentations
Jim Pease, VPI: Biomass feedstocks with the Chesapeake Bay Watershed
Donna Perla, U.S. Environmental Protection Agency (EPA): Biomass production in the Chesapeake Bay Watershed: Framing critical environmental questions
- 2:30 Break
- 2:45 “3 in 5” Presentations (continued)
Stephen Hamilton and Ajay Bhardwaj, Michigan State University (MSU): Terrestrial water balance and water footprints of grain-based and cellulosic biofuel crops: Research at the DOE Great Lakes Bioenergy Research Center
Gayathri Gopalakrishnan, Argonne National Laboratory (ANL): Resource recovery designs for sustainable lignocellulosic biomass
Mark Walbridge, U.S. Department of Agriculture, Agricultural Research Service (USDA/ARS): Watershed-scale analysis of bioenergy production – A key component of agricultural sustainability
Rebecca Efroymsen, ORNL: Analytical frameworks for watershed analysis
May Wu, ANL: Addressing water resource and water quality issues for biofuel production - quantifying regional impact

Jennifer Knoepp and James Vose, U.S. Department of Agriculture, Forest Service, Savannah River Site (USDA/FS/SRS): Long-term research at Coweeta Hydrologic Laboratory: Forest management impacts on ecosystem sustainability

Pat Mulholland, ORNL: Hydrology and water-quality impacts of short-rotation wood biomass for bioenergy: A watershed-scale experiment at DOE's Savannah River Site

Peter Schweizer, ORNL: Aquatic biodiversity in the Arkansas-White-Red River Basin: Sustainability in landscapes with dedicated bioenergy crops

Keith Kline, ORNL: Watershed land-use planning - Ingredients for success from international-development experiences

Jeff Warren, ORNL: Sweetgum plantation water use under elevated CO₂

Marilyn Buford, USDA/FS: Integrating bioenergy and sustainable productivity

George Chescheir, NCSU: Hydrologic impacts of biomass production in Uruguay

4:30 Adjourn

Dinner at Museum of Appalachia

February 4th, Day 2:

8:30 *"3 in 5" Presentations*

Al Lucier, NCASI: NCASI priorities regarding sustainable production and use of forest biomass

Jennifer Franklin, The University of Tennessee (UT): Root distribution and the soil moisture profile

Mary Beth Adams, USDA/FS: Biomass, biofuels, and sustainability in the Central Appalachians

Virginia Dale, ORNL: A landscape design for bioenergy feedstock

Mike Hilliard, ORNL: A spatial optimization approach to modeling water quality implications of perennial crops planting for bioenergy feedstocks

Esther Parish, ORNL: Selecting sites for bioenergy crop plantings within a watershed experimental design

Mark Downing, ORNL: Economic modeling and environmental modeling approaches to figuring out why farmers are doing what they are doing

9:20 Breakout Groups Assignments and Topics [moderator]

- Discussion topic 1 –Critical questions/hypotheses with regard to hydrology and water-quality issues from intensive cellulosic bioenergy feedstock production at the watershed scale [Al Lucier]
- Discussion topic 2 - Sustainability indicators (including most-appropriate hydrologic and water-quality measurements, other measurements), equipment, and instrumentation needed [Pat Mulholland]
- Discussion topic 3 - Field study design involving management treatments for planned experiments (site preparation, fertilizers, and herbicides), considerations for observational studies (monitor, spatial considerations, and nesting of catchment scales) [John Blake]
- Discussion topic 4 – Linking empirical studies (experiments and observations) and modeling [Bob Bilby]
- Discussion topic 5 – Other environmental indicators (e.g., greenhouse-gas emissions, long-term soil productivity, HG issues, and biodiversity) [Virginia Dale]

9:30 Break

9:50 Convene breakout groups

12:00 Lunch

1:00 Breakout reports and discussions

2:45 Break

3:00 Discussion of next steps and summary of workshop results [Moderator: Virginia Dale]

4:00 Workshop adjourned