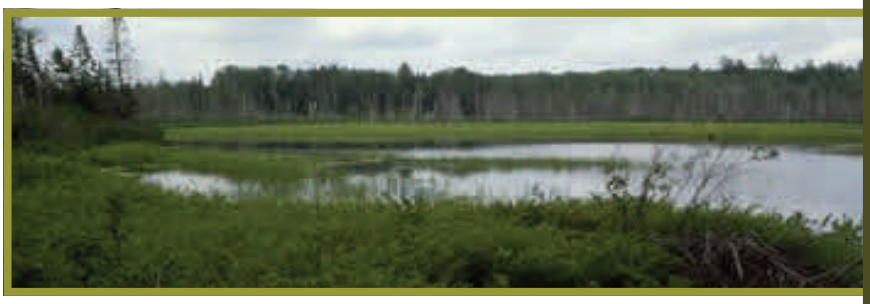
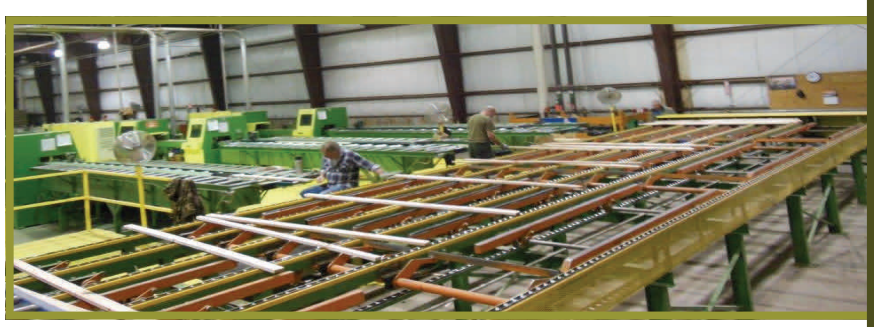
Michigan Biomaterials Conference

October 3rd & 4th, 2013 Traverse City, Michigan





Conference Guide

Michigan Biomaterials Initiative:

The Role of Education, Research, & Technology

Hosted by:

Michigan Society of American Foresters

October 3-4, 2013

Traverse City, Michigan

Photos from: Forestryimages.com

Terry Sharik, Peter Laks, & Tara Bal, SFRES, Michigan Technological University.

Program Schedule

Thursday, October 3, 2013

11:30 a.m.-1:00 p.m.: Lunch, welcome, and conference overview
Given by conference co-chairs: Bernie Hubbard and Terry Sharik

1:00-3:00 p.m.: Presentations by delegations from Maine and Oregon

3:00-3:30 p.m.: Break

3:30-5:30 p.m.: Presentations by delegations from North Carolina and Virginia

6:00-7:00 p.m.: Social

7:00-9:00 p.m.: Dinner
Keynote Presentation by David Shonnard
Richard and Bonnie Robbins Chair in Sustainable Materials, Department of Chemical Engineering
Director, Sustainable Futures Institute
Michigan Technological University

Friday, October 4, 2013

7:00-8:00 a.m.: Breakfast

8:00-10:00 a.m.: Breakout sessions around education, research, and technology

10:00-10:30 a.m.: Break

10:30-noon: Reporting on breakouts

Noon-1:00 p.m.: Lunch

1:00-3:00 p.m.: Strategies and assignments for moving forward

This is a call to action,

"I suspect that you've hit the hurdles when it comes to funding forestry programs in Michigan. Of the four states that I've worked in, Michigan is by far the least interested in forests…yet has a huge resource and huge potential for sustainable economic development and sustainable community economies.

For over a decade, I have been absolutely befuddled as to why Michigan could care less about forests."

(Anonymous 2013)

"Biomaterials" & Issues

"Biomaterials" is used to describe any organic materials that are extracted from ecosystems, including but not limited to, wood, mushrooms, edible berries, and plant sap in terrestrial ecosystems and algae in aquatic ecosystems.

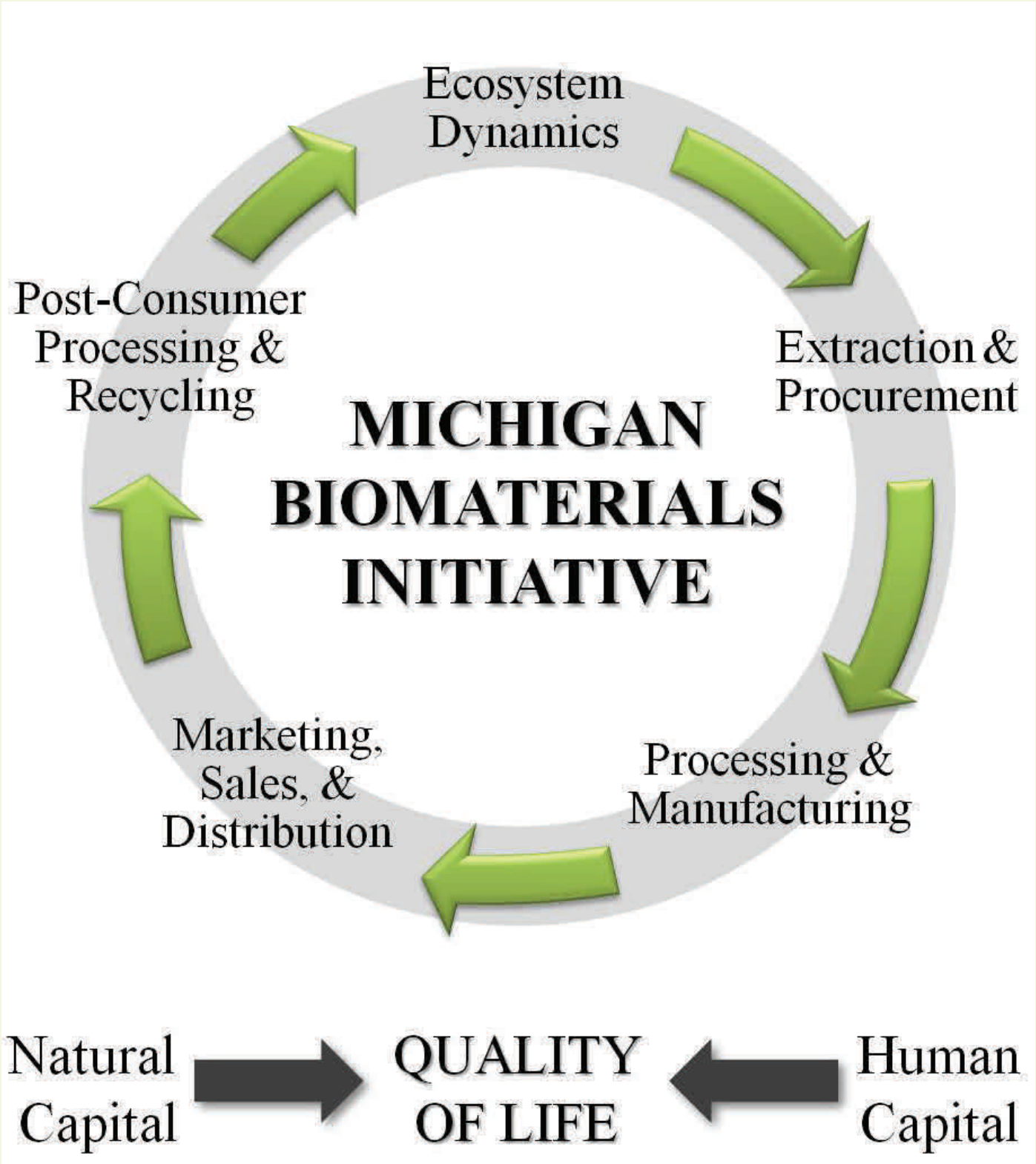
Issues: From a life cycle perspective, the issue is that of how to extract these materials from ecosystems without compromising their integrity; how to process these materials in a myriad of ways to fully utilize the resource; how to market them regionally, nationally, and globally; and how to recycle these "green materials" through the same or other materials, or back through ecosystems.

Overall Goal of the Conference: 'to position institutions of higher learning in the State of Michigan to work with other sectors to increase the economic well-being and overall quality of life for its citizens while maintaining the health of the ecosystems upon which they depend."

Expected Outcomes:

- Greater understanding of why the most highly regarded wood science and products academic programs in the country are rebranding themselves
- Greater understanding of how academic institutions in other states are reaching out to others in partnerships as part of this rebranding and realigning themselves with various industries given the new economic environment
- Identification of barriers to Michigan being a more significant player in the biomaterials industry
- Development of an educational program (2-year, 4-year, graduate, and continuing) in biomaterials that encompasses requisite knowledge, skills and abilities, and behaviors
- Identification of gaps in knowledge related to biomaterials

Biomaterials Life Cycle



Ecosystem Services

Ecosystem services are the benefits people obtain from ecosystems. These include provisioning, regulating, and cultural services that directly affect people and the supporting services needed to maintain other services (CF2). Many of the services listed here are highly interlinked. (Primary production, photosynthesis, nutrient cycling, and water cycling, for example, all involve different aspects of the same biological processes.)

Provisioning Services

These are the products obtained from ecosystems, including:

Food. This includes the vast range of food derived from plants, animals, and microbes.

Fiber. Materials included here are wood, jute, cotton, hemp, silk, and wool.

Fuel. Wood, dung, and other biological materials serve as sources of energy.

Genetic resources. This includes the genes and genetic information used for animal and plant breeding and biotechnology.

Biochemicals, natural medicines, and pharmaceuticals. Many medicines, biocides, food additives such as alginates, and biological materials are derived from ecosystems.

Ornamental resources. Animal and plant products, such as skins, shells, and flowers, are used as ornaments, and whole plants are used for landscaping and ornaments.

Fresh water. People obtain fresh water from ecosystems and thus the supply of fresh water can be considered a provisioning service. Fresh water in rivers is also a source of energy. Because water is required for other like to exist, however, it could also be considered a supporting service.

Regulating Services

These are the benefits obtained from the regulation of ecosystem processes, including:

Air quality regulation. Ecosystems both contribute chemicals to and extract chemicals from the atmosphere, influencing many aspects of air quality.

Climate regulation. Ecosystems influence climate both locally and globally. At a local scale, for example, changes in land cover can affect both temperature and precipitation. At the global scale, ecosystems play an important role in climate by either sequestering or emitting greenhouse gases.

Water regulation. The timing and magnitude of runoff, flooding, and aquifer recharge can be strongly influenced by changes in land cover, including, in particular, alterations that change the water storage potential of the system, such as the conversion of wetlands or the replacement of forests with croplands or croplands with urban areas.

Erosion regulation. Vegetative cover plays an important role in soil retention and the prevention of landslides.

Water purification and waste management. Ecosystems can be a source of impurities (for instance, in fresh water) but also can help filter out and decompose organic wastes introduced into inland waters and coastal and marine ecosystems and can assimilate and detoxify compounds through soil and subsoil processes.

Disease regulation. Changes in ecosystems can directly change the abundance of human pathogens, such as cholera, and can alter the abundance of disease vectors, such as mosquitoes.

Pest regulation. Ecosystem changes affect the prevalence of crop and livestock pests and diseases.

Pollination. Ecosystem changes affect the distribution, abundance, and effectiveness of pollinators.

Natural hazard regulation. The presence of coastal ecosystems such as mangroves and coral reefs can reduce the damage caused by hurricanes or large waves.

Cultural Services

These are the nonmaterial benefits people obtain from ecosystems through spiritual enrichment, cognitive development, reflection, recreation, and aesthetic experience, including:

Cultural diversity. The diversity of ecosystems is one factor influencing the diversity of cultures.

Spiritual and religious values. Many religions attach spiritual and religious values to ecosystems or their components.

Knowledge systems (traditional and formal). Ecosystems influence the types of knowledge systems developed by different cultures.

Educational values. Ecosystems and their components and processes provide the basis for both formal and informal education in many societies.

Inspiration. Ecosystems provide a rich source of inspiration for art, folklore, national symbols, architecture, and advertising.

Aesthetic values. Many people find beauty or aesthetic value in various aspects of ecosystems, as reflected in the support for parks, scenic drives, and the selection of housing locations.

Social relations. Ecosystems influence the types of social relations that are established in particular cultures. Fishing societies, for example, differ in many respects in their social relations from nomadic herding or agricultural societies.

Sense of place. Many people value the "sense of place" that is associated with recognized features of their environment, including aspects of the ecosystem.

Cultural heritage values. Many societies place high value on the maintenance of either historically important landscapes ("cultural landscapes") or culturally significant species.

Recreation and ecotourism. People often choose where to spend their leisure time based in part on the characteristics of the natural or cultivated landscapes in a particular area.

Supporting Services

Supporting services are those that are necessary for the production of all other ecosystem services. They differ from provisioning, regulation, and cultural services in that their impacts on people are often indirect or occur over a very long time, whereas changes in the other categories have relatively direct and short-term impacts on people. (Some services, like erosion regulation, can be categorized as both a supporting and regulating service, depending on the time scale and immediacy of their impact on people.) These services include:

Soil formation. Because many provisioning services depend on soil fertility, the rate of soil formation influences human well-being in many ways.

Photosynthesis. Photosynthesis produces oxygen necessary for most living organisms.

Primary production. The assimilation or accumulation of energy and nutrients by organisms.

Nutrient cycling. Approximately 20 nutrients essential for life, including nitrogen, and phosphorus, cycle through ecosystems and are maintained at different concentrations in different parts of ecosystems.

Water cycling. Water cycles through ecosystems and is essential for living organisms.

Reprinted from *Ecosystems and Human Well-Being*: *Synthesis*. Millennium Ecosystem Assessment, 2005. Island Press (ISBN 1-54726-040-1)

Further Background Information

Michigan Governor's Forest Products Summit, 2013

(www.michigan.gov/forestproducts)

Michigan's Rick Snyder convened the Governor's 2013 Forest Products Summit on April 23. The five-year working goals used to frame the Summit included:

(1) increasing the economic impact of the forest products industry on state and regional economies from $14 billion to $20 billion;

(2) increasing the export of value-added forest products by 50 percent;

(3) increasing forest products-related jobs by 10 percent;

(4) supporting existing industry; and

(5) encouraging regionally based industry development.

Key actions to take were:

(1) identifying opportunities and challenges for the forest products industry, including emerging markets;

(2) developing a framework for communication and collaboration among the forest products industry, financial community, economic development support network, government, and universities;

(3) aligning resources within state government and universities to address goals and actions identified in the Summit; and

(4) increasing the public awareness of Michigan's forest products industry.

White Papers being developed by the Michigan Timber Advisory Council focus on the following top priority areas identified in the Governor's Forest Products Summit:

-exports

-marketing/utilization and data analysis

-value added/processing

-private lands

-USFS management/supply

-biomass

State Delegation Abstracts

North Carolina

Steve Kelley, Richard Lemaster, Richard Mullen

Moving from 'Wood and Paper Science' to 'Forest Biomaterials' while supporting the Industry of Today and Tomorrow

Under different names, North Carolina State University has had degree programs in 'Wood Products' and 'Paper Science and Engineering' for more than 60 years. NC State is the only University in the nation where these programs are in the same college as the Forestry and Natural Resources, and Recreation programs - and this matters. Specifically, these applied engineering and technology programs need to have depth and rigor, but also to be structured to understand the landscape that supports the production of timber, and understand the multiple demands on that landscape. The undergraduate programs in the Department of Forest Biomaterials are growing due in part to the tremendous opportunities for employment, but also due to real changes in the students' perception of the industry. At the same time the industry is also changing with many pulp and paper companies focused on value-added products and demanding highly-skilled employees. This presentation will highlight changes in the undergraduate and graduate programs at NC State, and changes at Domtar, a strong industrial partner with mills in North Carolina and across North America.

Virginia

Bob Smith, Scott Renneckar, Charlie Becker and Dave Nutter

The Changing Roles of Biomaterial Science Education and its Impact on Virginia's Industry

As forest products and other biomaterial industries evolve to meet the changing needs of society for sustainable products, the role of higher education must change to provide an educated workforce and cutting-edge research necessary to assist these industries in increasing their competitiveness. In Virginia, one of the leading wood science and forest products programs in North America recently has evolved into the Department of Sustainable Biomaterials. This change was necessary to meet a changing need by our industry, to reflect the new science evolving in this field, and to attract new students who are interested in careers in this new landscape of sustainable products for a sustainable future. This presentation will highlight the drivers of the changes that have occurred in the Department of Sustainable Biomaterials at Virginia Tech, it will provide insight to the type of biomaterial research occurring in the Department from cellulose nanocomposites to gasification of wood chips for bioenergy, and will provide an overview of the industrial changes occurring within Virginia and surrounding region that describe the new industry. It will highlight the industry partnerships and affiliates programs within the department, and will show how economic development efforts from the university can support industry growth.

State Delegation Abstracts

Maine

Stephen Shaler, Michael Bilodeau, Doug Denico, John McNulty, Jim St. Pierre

Forest Bioproducts & Bioenergy in Maine

Maine is blessed not only with over 17 million acres of beautiful forested landscape, but also with a diverse forest products industry. Over the past ten years, there have been significant research and market activities in forest bioproducts and bioenergy. Working relationship's have developed between industry, landowners, state government, and the University of Maine as we anticipate and react to changes in policy, markets, and stakeholder preferences. Speakers will discuss University/Industry research partnerships for forest bioproducts (Michael Bilodeau, University of Maine), biofuel production (Jim St. Pierre, Old Town Fuel & Fiber), the impact of new markets on forest land management (John McNulty, Seven Island Land Company), the big picture of these changes on the forest resource in Maine – and how it compares to Michigan (Doug Denico, Maine Forest Service), and finally, the evolving educational programs at the University of Maine (Stephen Shaler, University of Maine) to prepare students to be successful as changes occur in the mix of products demanded from the forest.

Oregon

Laurence Schimleck, Kaichang Li, and Linc Cannon

Renewable Materials at Oregon State University

The Wood Science and Engineering Department at Oregon State University is a globally recognized center of expertise in wood science and renewable materials and is the only comprehensive program in the western United States. We help society sustainably meet its needs for renewable materials and American businesses increase their global competiveness through science, technology, engineering, and sound business practices. Our undergraduate program has undergone several recent changes both in response to the needs of our stakeholders who want business savvy, globally aware graduates with excellent communication skills and students who were concerned that a degree in wood technology was too restrictive and were more interested in a broad based degree that allowed a high degree of flexibility. In response to the changes, and an active marketing effort, we have seen a significant increase in enrollment and our program continues to grow. The aim of this presentation will be to describe the development of our new program, our research on renewable natural resources, and how we partner with industry to add value to the economy.

Maine

Stephen Shaler

Associate Director Advanced Structures and Composites Center
Forest Bioproducts Research Institute, University of Maine
Director and Professor of Wood Science, School of Forest Resources, University of Maine

Stephen Shaler is Director and Professor of the School of Forest Resource at the University of Maine. He received his PhD from Pennsylvania State University, was on the faculty at Michigan Tech University for six years and has been at the University of Maine for the last 21 years. He has published over 60 peer reviewed Journal articles and has received the received the Marra Award (3 times) and Markwardt Wood Engineering Award (3 times) for excellence in research and writing. Stephen has also been principal or co-principal investigator on over $30 million of research with a primary research interest related to the mechanics and processing of composite materials. He serves as Associate Director of the Advanced Structures and Composites Center and was co-principal investigator (serving as Scientific Director) of the $6.9 million National Science Foundation grant which founded the Forest Bioproducts Research Institute at the University of Maine.

"Maine is the most forested state in our country. Over 90% is covered with forests that host a great variety of plant species and wildlife habitat, thousands of rivers and lakes, and diverse forest products and tourism industries.. The fast evolving field of forest bioproducts offers new economic formulas to support the retention of Maine's forests as undeveloped landscapes."

Michael Bilodeau

Associate Director, Forest Bioproducts Research Initiative, University of Maine
Director of Pulp and Paper Process Development Center, Chemical and Biological Engineering Department, University of Maine
Forest Bioproducts Research Institute, University of Maine

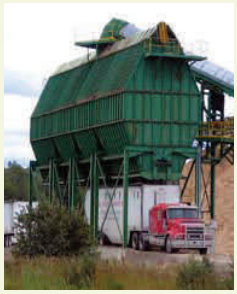
Mike Bilodeau is currently the Director of the Process Development Center at the University of Maine in Orono which provides research and technical services to private companies and public agencies, primarily those engaged in the Forest Products Industry. Mike is also an advisor to several early stage companies and non-profit groups. Prior to joining the University of Maine in 2003, Mike worked in research and development and in corporate engineering for a global paper company for nearly 20 years. Mike received a baccalaureate degree in chemical engineering from the University of Maine in 1983.

Maine

Douglas Denico

Maine State Forester, Director of Maine Forest Service, Department of Agriculture, Conservation and Forestry

Brought up on a farm in rural Central Maine, he was first initiated into the woods in 1962, on T16R12 WELS, hand loading 4' pulp. In spite of that experience, he attended Forestry School at the University of Maine at Orono, obtaining a BS in Forest Management and MS in Forest Economics. Upon graduation, he worked in Northern Maine for International Paper briefly before joining Scott Paper Company for a 37 year career on the same land base. His experiences covered the breadth of possible activities, including being a lobbyist in Augusta. Along the way, he acquired forest properties which have provided a great deal of satisfaction to own and manage. After an unsuccessful stint in retirement, he returned to active duty at the young age of 67 as Director of the Maine Forest Service, possibly his most rewarding job to date.



John McNulty

President Seven Islands Land Company, Maine

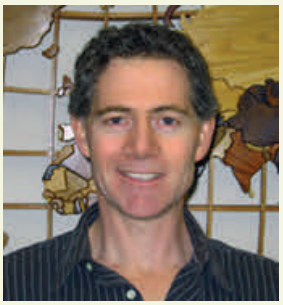
John McNulty is President of Seven Islands Land Company (www.sevenislandscompany.com). Seven Islands is a Maine-based forestland resource and management company. Certified in the practiced skills of sustainability, the Seven Islands professional team of land managers, foresters, and operating personnel work together in a cost effective, efficient, and environmentally sound manner. Formed in 1964 for the purpose of long-term sustainable stewardship of the Pingree forest, Seven Islands has grown to become a family of forestry-based businesses that include land management, harvesting, road construction and maintenance, consulting, milling, chipping, and quality hardwood lumber and flooring production.

James St.Pierre

Old Town Fuel & Fiber, Old Town, Maine

James St.Pierre has served in the Maine pulp and paper industry for 30+ years. As a Univ. of Maine mechanical engineering graduate, he has worked in project engineering, engineering management and operations supervision for most of his career. Since 2008, he has managed a biorefinery development with Old Town Fuel & Fiber in Old Town, Maine. He is licensed as both a Professional Engineer in Maine as well as a 1st class Stationary Steam Engineer in Maine. Red Shield Acquisition, LLC dba as Old Town Fuel & Fiber, is a recipient of a DOE award and working to design, construct and operate a demonstration scale biorefinery to produce 14 MGPY of transportation grade ethanol from wood. Three patents have been filed in association with technology development in OTFF's efforts to convert wood to higher value products. Work has passed through the R&D stages and OTFF looks to build the ethanol facility in 2014.

Oregon



Laurence Schimleck

Professor, Department Head, Renewable Materials, Wood Science and Engineering, College of Forestry, Oregon State University

Dr. Laurence Schimleck is Professor and Head of the Wood Science and Engineering Department in the College of Forestry at Oregon State University (OSU). Prior to joining OSU Dr. Schimleck was Professor of wood quality with the Warnell School of Forestry and Natural Resources at the University of Georgia. His research has focused on the development of tools for the nondestructive evaluation of wood properties and examining the impact of silvicultural treatments on wood quality. His research has resulted in over 100 peer-reviewed publications and numerous conference presentations. Dr. Schimleck has a PhD and MS in forestry from Melbourne University, Australia.

Kaichang Li

Professor, Renewable Materials, Wood Science and Engineering, College of Forestry, Oregon State University

Dr. Kaichang Li is a Professor with the Wood Science and Engineering Department in the College of Forestry at Oregon State University. His research has focused on the development and commercialization of "green" adhesives and new natural fiber reinforced polymer composites. His research has resulted in over 80 peer-reviewed publications and, owing to the innovative nature of his work, 14 patent applications. His research group has received several prestigious awards, including The 2007 Presidential Green Chemistry Award. Dr. Li has a PhD in Wood Chemistry from Virginia Tech, a MS in Organic Synthesis and BS in Applied Chemistry both from the South China University of Technology, China.

Linc Cannon

Director, Forest Resources & Taxation, Oregon Forest Industries Council

Linc Cannon is the Director of Forest Resources and Taxation for the Oregon Forest Industries Council (OFIC), a trade association representing more than 50 Oregon forestland owners and forest products manufacturing-related firms. Its members own more than 90% of Oregon's private large-owner forestland base. For over 20 years, Linc has been responsible for representing industrial |forestland owners and forest products manufacturers on a wide range of issues including forest economics, taxation, land use, environmental regulation, transportation, bioenergy, green building and climate change. He works with the Oregon Legislature and executive-branch departments and has served on innumerable working groups and advisory committees. Linc has a B.S. in Forest Management (minor in Business Administration) from Utah State University and an M.S. in Forest Economics from Oregon State University.

Virginia

Bob Smith

Department Head of Sustainable Biomaterials, Professor, and Associate Dean, College of Natural Resources and Environment, Virginia Tech

Bob is the head of the Department of Sustainable Biomaterials and Associate Dean for the College of Natural Resources and Environment, and a Professor in Forest Products Business at Virginia Tech. Bob holds a Ph.D. from Virginia Tech in Forest Products Marketing, a MBA from the University of Wisconsin at Oshkosh, and a B.S. in Wood and Fiber Utilization from Michigan Tech. Bob has taught undergraduate and graduate courses in the areas of wood science, business management, and forest products marketing. He is the Director of the Center for Forest Products Business (a collaborative effort among the forest products industry, state and federal agencies, and the university). His research efforts have focused in industrial marketing and new opportunities for wood in world markets. Prior to completing his Ph.D., he worked for a major U.S. manufacturer of wood products for 14 years as a production manager and sales representative in the Midwest.

Charles William Becker III

Utilization and Marketing Manager, Virginia Department of Forestry

Charlie has worked for the Virginia Department of Forestry for over 26 years, first as an area forester in southwest Virginia and then as the Resource Conservation & Development (RC&D) Forester. For the last 14 years he has served as the Utilization & Marketing Manager. His duties include developing information on forest products, innovations, resources, markets, and the economic importance of Virginia's forest resources, with an emphasis on improving utilization, increasing value-added, addressing changing markets and promoting economic development. He has obtained and administered over one million dollars in grant funds including projects dealing with biomass energy, forest markets promotion, forest certification, urban wood utilization and specialty forest products. Several of these projects included partnering with Universities, other agencies and non-government organizations. Charlie is a certified forester and obtained his B.S. Degree in Forestry and Wildlife from Virginia Tech and a Masters Degree in Forestry from the University of Tennessee, Knoxville.

Dave Nutter

Faculty, Office of Economic Development, Virginia Tech

Dave Nutter has been an administrative faculty member at Virginia Tech for 24 years working in the communications and marketing and for the last nine years with the Office of Economic Development. Dave has worked on a number of projects for OED that included active community participation. Other projects Dave worked on include a target market study for Bath County, New River Valley Nanotechnology Cluster Study, Life Sciences market analysis for the Roanoke and New River Valley, Southern Virginia polymer industry cluster outreach initiative and the multi-million dollar Department of Labor workforce training grant that prepared students and incumbent workers for mandatory requirements of electronic health records. Dave served in the Virginia House of Delegates from 2002 – 2012 where he served on the Committee on Science and Technology, Committee on Health, Welfare and Institution and the Joint Commission on Health Care. He is enrolled in Virginia Tech's master of public health program and will complete his degree in summer 2014. Governor McDonnell appointed him to the State Board of the Virginia Community College System. He also serves on the board of One Care of Southwest Virginia, a substance abuse organization, and the board of the Virginia Rural Health Council.

Scott Rennecker

AssociateProfessor, Department of Sustainable Materials, Virginia Tech

Scott Renneckar is an associate professor in the Department of Sustainable Biomaterials at Virginia Tech. Dr. Renneckar studied at Virginia Tech and the University of California, Berkeley where he received his BS/PHD and MS degrees, respectively. His research is interdisciplinary related to the materials chemistry of converting biomass into useful materials and feedstocks. He is an affiliate faculty member of VT's Macromolecular Science and Engineering program, VT's Materials Science and Engineering Department, VT's Institute of Critical Science and Technology, and the Joint Bioenergy Institute-a Lawrence Berkeley Lab affiliate. He teaches courses on biomass conversion, and the physical properties of biobased materials. Current research projects involve the characterization and fractionation of biomass, development of nanocellulose composites, extruded lignin based thermoplastics, and novel adhesives for wood composites. He is passionate about developing materials based on modern day CO_2 for long-term sustainable solutions. Currently, Dr. Renneckar serves as secretary of the Cellulose and Renewable Materials Division of the American Chemical Society.

North Carolina

Steve Kelley

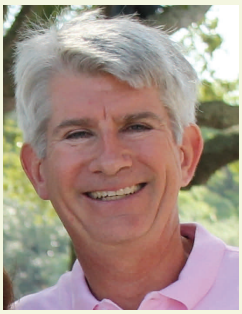
Professor, Department Head Forest Biomaterials, North Carolina State University.

Dr. Steve Kelley is a Professor and the Head of the Department of Forest Biomaterials at North Carolina State University. He has also worked on private industry, Eastman Chemical Co., and for the US DOE National Renewable Energy Laboratory. His research interests include the sustainable production of energy and materials from biomass, the application of novel analytic tools to biomass characterization, and life cycle analysis of wood products and energy systems. He has taught classes in Sustainable Building Materials; Wood Chemistry; and Wood Composites. Working with other faculty he supervises five PhD students working on energy production technology, and systems approaches to evaluating the deployment of large scale bioenergy systems. He currently serves on the Editorial Boards of three international science and technology journals, is the President of CORRIM, an organization focused on using life cycle analysis tools to evaluate the performance of materials used in home construction, is a member of the Executive Board of the Institute for Forest Biotechnology, a nonprofit studying the social and environmental opportunities and risks of genetic engineering.

Richard Lemaster

Research Professor, Director of Wood Machining and Tooling Research Program, North Carolina State University

Dr. Richard L. Lemaster is a Research Professor, and Director of the Wood Machining and Tooling Research Program. He graduated with a B.S. in Forestry from Oklahoma State University and a M.S. in Wood Science from Colorado State University. While working on his M.S. he worked as a Research Assistant in the Department of Forestry at Colorado State University. He then worked as an Assistant Specialist in the Forest Products Laboratory at the University of California at Berkeley. He has worked as a Program Leader and a Research Leader at the University of California at Berkeley as well. Mr. Lemaster joined the Department of Wood and Paper Science in 1993 as a Research Associate. He is a member of the Society of Wood and Science Technology, the Forest Products Society, the American Society for Non-Destructive Testing, the Acoustic Emission Working Group, and Sigma Xi. He is also serving the Sustainable Materials and Technology Program as the lead for undergraduate recruiting, and he teaches classes focused on Sustainable Building Materials and Wood Products Manufacturing.



Richard E. Mullen

Research Chemist, Domtar

Richard Mullen has 36 years experience in the paper industry. He graduated with a BS in Biochemistry from Michigan State, and a MBA in Marketing from the University of Wisconsin. He started his career as a research chemist with Allied Paper in Kalamazoo, and he has also worked for International Paper, Georgia Pacific Corp., and for the last 12 years for Domtar. His three daughters have graduated from SEC schools, but are recovering well.

Speaker Biography

Keynote Speaker

David Shonnard

Richard and Bonnie Robbins Chair in Sustainable Materials, Department of Chemical Engineering and
Director, Sustainable Futures Institute
Michigan Technological University

Evaluating Forest Biomaterials with Environmental Life Cycle Assessment

Abstract

The global carbon cycle (GCC) produces terrestrial biomass at a rate of about 120 GtC/yr, and with more than 50% involving the Earth's forests. Michigan's forests cover about 55% of the state's land area, providing outdoor recreation opportunities and support 150,000 jobs, contribute over $12 billion to Michigan's economy each year, and increase in growth above current harvest levels (MI DNR, http://www.michigan.gov/dnr/0,4570,7-153-30301---,00.html). Before considering more intensive harvesting of MI forests for biomaterials, it is important to consider possible environmental impacts. This presentation will discuss how a method termed environmental life cycle assessment (LCA) can provide comprehensive understanding of forest products at a systems level and can help identify opportunities and challenges in forest-based biomaterials.

Biography

Dr. Shonnard received a B.S. in Chemical/Metallurgical Engineering from the University of Nevada-Reno in 1983, an M.S. in Chemical Engineering from the University of California-Davis in 1985, a Ph.D. from the University of California-Davis in 1991, received postdoctoral training in bioengineering at the Lawrence Livermore National Laboratory from 1990-1993, and was a visiting instructor at the University of California, Berkeley in 1993. He has been on the faculty in the Department of Chemical Engineering at Michigan Technological University since 1993. Dr. David Shonnard has over 20 years of academic experience in sustainability issues in the chemical industry and green engineering. He is co-author of the textbooks "Green Engineering: Environmentally-Conscious Design of Chemical Processes", published by Prentice Hall in 2002, and "Sustainable Engineering: Concepts, Design, and Case Studies", published by Prentice Hall in 2012. His current research interests are in forest-based biofuel processes, environmental life cycle assessments of advanced biofuels, and K-grey (kindergarten – senior citizen) engineering education. His experiences in LCA methods and applications include a 1-year sabbatical at the Eco-efficiency Analysis Group at BASF AG in Ludwigshafen, Germany and contributions to National Academy of Sciences publications on green chemistry / engineering / sustainability in the chemical industry. Dr. Shonnard has co-authored over 100 peer-reviewed publications, conference proceedings papers, and technical reports. He and received numerous honors and awards for teaching and research into environmental issues of the chemical industry, including the1998 NSF- Lucent Technologies Industrial Ecology Research Fellowship, 2003 Ray Fahien Award from the American Society for Engineering Education, and a Richard and Bonnie Robbins Chair Professorship in Sustainable Use of Materials, 2009.

Conference Worksheet

Michigan Biomaterials, MI SAF Conference Worksheet, October 3-4, 2013

Educational Process

Learning Objectives/ Outcomes	2-yr	4-yr	Graduate	Continuing
Knowledge				
Skills/Abilities				
Behaviors				

Research

Technology

Preferred alternatives to the name "Biomaterials":

Ecosystem Materials
Ecomaterials
Sustainable Biomaterials
Forest Biomaterials
Ecosystem Products
Bio-based Products
Bioproducts
Sustainable Natural Products
Forest Products
Ecosystem Provisioning Services
Sustainable Natural Resources
Others?....

Soft Skills Clusters

1. **Communication Skills:**
   - Listen effectively
   - Communicate accurately and concisely
   - Effective oral communication
   - Communicate pleasantly and professionally
   - Effective written communications
   - Ask good questions
   - Communicate appropriately and professionally using social media
2. **Decision Making/Problem Solving:**
   - Identify and analyze problems
   - Take effective and appropriate action
   - Realize the effect of decisions
   - Creative and innovative solutions
   - Transfer knowledge from one situation to another
   - Engage in life-long learning
   - Think abstractly about problems
3. **Self-Management Skills:**
   - Efficient and effective work habits
   - Self-starting
   - Well-developed ethic, integrity and loyalty
   - Sense of urgency to address and complete tasks
   - Work well under pressure
   - Adapt and apply appropriate technology
   - Dedication to continued professional development
4. **Teamwork Skills:**
   - Productive as a team member
   - Positive and encouraging attitude
   - Punctual and meets deadlines
   - Maintains accountability to the team
   - Work with multiple approaches
   - Aware and sensitive to diversity
   - Share ideas to multiple audiences
5. **Professionalism Skills:**
   - Effective relationships with customers, businesses and the public
   - Accept and apply critique and direction in the work place
   - Trustworthy with sensitive information
   - Understand their role and realistic career expectations
   - Deal effectively with ambiguity
   - Maintain appropriate décor and demeanor
   - Select appropriate mentor and acceptance of advice
6. **Experiences:**
   - Related work or internship experiences
   - Teamwork experiences
   - Leadership experiences
   - Project management experiences
   - Cross disciplinary experiences
   - Community engagement experiences
   - International experiences
7. **Leadership Skills:**
   - See the "big picture" and think strategically
   - Recognize when to lead and when to follow
   - Respect and acknowledge contributions from others
   - Recognize and deal constructively with conflict
   - Build professional relationships
   - Motivate and lead others
   - Recognize change is needed and lead the change effort

Reproduced from: Comparative Analysis of Soft Skills: What is Important for New Graduates? Crawford, Lang, Fink, Dalton, & Fielitz 4 August 2011

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