

# **Sustainability at OSU**

**31 March 2008**

## **Sustainability and OSU's Land Grant Mission**

As early as October 2001, OSU Extension introduced Oregon citizens to a new way of thinking with an *Oregonian* insert—*Looking for Oregon's Future: What is Sustainability?* OSU is updating its long commitment to research, education, and outreach to critical Oregon sectors including agriculture, forestry, fishing, and engineering to focus on emerging issues related to sustainable management of natural resource systems and sustainable technologies.

The university is a natural laboratory for society to test new ideas. OSU, Oregon's Land Grant, Space Grant, Sea Grant, and Sun Grant University, provides the space and opportunity to further knowledge about sustainability and sustainable practices, develop new technologies that decrease costs while increasing community and environmental benefits, and transfer results to the citizens of Oregon.

OSU scientists are leaders in understanding earth systems, both natural and man-made, and are working to apply their knowledge to developing new sustainable, resilient technologies. OSU is committed to institutionalizing sustainability through its land grant missions and in its day-to-day operations and practices.

## **OSU's Sustainability Inventory Framework**

Building on efforts dating from 2000 when the Center for Water and Environmental Sustainability was established, the Provost recently initiated a comprehensive assessment of OSU's capacity to practice, educate and engage citizens, and conduct research about sustainability. This comprehensive assessment will be completed in September 2008 and will provide a more complete picture of OSU's sustainability efforts than can be provided here. The inventory will be available to students looking for education that focuses on sustainability, researchers looking for collaborators on innovative projects, and citizens and decision makers looking for the latest knowledge about sustainable systems.

## **OSU's Sustainability Uniqueness**

OSU's excellence in sustainability has been recognized in the Sustainable Endowments Institute's 2008 "College Sustainability Report Card," an assessment of sustainability in higher education. In its assessment of the 200 public and private universities with the largest endowments in the United States and Canada, OSU was ranked in the Top 25 for 2008. The "College Sustainability Report Card" is the only independent sustainability evaluation of campus operations and endowment investments and focuses on two primary areas— campus management and endowment practices.

Sustainability at OSU crosses all aspects of the university. OSU has an outstanding level of student and faculty engagement for sustainability, which is epitomized by numerous multi-

disciplinary centers, programs, and initiatives dedicated to sustainability. Most of the work at OSU contributes to one or more of the components of sustainability – environment, economy, culture – but trying to balance these three components is challenging how we think and do our teaching and scholarship. Only a few of the many notable examples of OSU’s sustainability efforts are highlighted here.

## **Education**

Multiple colleges and departments offer individual classes, certificate programs, “master” training programs, and short course training sessions on sustainability topics. Industry needs and student employability have driven changes in the Colleges of Business, Engineering, Forestry, and Health and Human Sciences—all sectors leading the way in innovative sustainability efforts.

- The **College of Agricultural Sciences** is responding to existing and new constituents to ensure that graduates understand sustainable agricultural practices. The College also hosts the OSU Organic Growers Club—an all-volunteer, student-run, organic farming project that began in 2000. The OSU Organic Growers Club farm is located on approximately 2-acres of OSU agricultural research land. The club has over 300 members and 400 community clients. Proceeds from sales go directly into farm operations, fund summer internships, and are used to support philanthropic activities in the Corvallis area.
- **Graduate Certificate Program in Sustainable Natural Resources.** This 18-credit online certificate is designed for all students, especially private sector and agency employees who desire more training in assessing and solving complex sustainability problems.
- **College of Business.** OSU MBA’s program has been ranked among the top 100 programs in the world, by the Aspen Institute, for its proven integration of social and environmental issues into the curriculum. At the undergraduate level, faculty have recently approved a new undergraduate course, *Social Entrepreneurship*, which provides students the opportunity to learn about contributing to society through examination of how business and entrepreneurial skills can affect social change.
- A new **Conservation and Sustainability Option** is being developed in the undergraduate Environmental Sciences degree program. The Option has core courses in the science of conservation as well as in sociology, anthropology, and economics. The Option was designed to be offered online through ECampus as well as on campus.
- The **Water Resources Program** has over 80 faculty members from six colleges training graduate students in the chemistry, ecology, socio-politics, and physics of water and watersheds. These interdisciplinary degree programs prepare graduate students to address the complex problems of water resource sustainability facing the world.

## **Research**

Researchers throughout the university are exploring a range of alternative energy sources including bio, wind, wave, and solar. And others are seeking ways to shift from hydrocarbon based products to those based on biological processes. OSU was named one of only five national Sun Grant universities in recognition of its ability to bring many participants together to focus on bio-based energy and sustainable agricultural production.

- **Wave Energy.** Scientists across OSU are working to sustainably capture the power of the ocean, from work on a cutting edge new wave generator in the College of Engineering (**Annette VonJouanne**), to research by the Marine Mammal Institute on potential impacts on whale migration (**Bruce Mate**), to Sea Grant extension agents working with affected communities to assure compatibility with existing ocean users (**Flaxen Conway**). This research on technology, ecological effects and human dimensions of wave energy is attracting scholars and graduate students to OSU where they know they can help develop sustainable energy solutions for the future.
- **New Packaging.** A thin Saran Wrap-like film has been developed by scientists (**Yanyun Zhao, Mark Daeschel, and Su-il Park**) in OSU's Department of Food Science and Technology. Not only does it prevent food from spoiling, it can be eaten along with the food that it wraps. It can even be fortified with vitamins and minerals so the food and the film together make for a more nutritious lunch.
- **Sustainable Rural Communities Initiative.** Director **Bruce Weber** works with colleagues within OSU and across OUS to coordinate teaching, research, and outreach focused on the environmental and economic sustainability of rural communities and their social and cultural well-being. Approaches include generating new knowledge, preparing the next generation of citizens, expanding citizen and policy-maker understanding, and empowering communities to develop appropriate strategies.
- **Green Building and Construction Products from Renewable Materials.** Researchers in the College of Forestry have developed composites using formaldehyde-free adhesives, higher value products from modified plantation-grown poplar, low-toxicity preservatives for protecting doors and window systems from biodeterioration, wood-plastic composites for sustainable highway perimeter products and new methods for removing volatile organic compounds from dry kiln emissions.

In addition to these activities, OSU faculty researchers are engaged in five OUS multi-institutional, interdisciplinary research institutes related to sustainability. These research institutes include the **Oregon Bio-Economy and Sustainable Technologies Center**, the **Institute for Natural Resources**, the **Oregon Transportation Research and Education Consortium**, the **Oregon Climate Change Research Institute**, and the **Oregon Water Institute**. (See Appendix A for more information).

### **Outreach and Engagement**

OSU had the first Extension position in the U.S. focusing on sustainable living education. And, like the sustainability newspaper insert introducing many Oregonians to ideas of sustainability suggest, OSU has been finding innovative ways to connect with interested citizens across the state through established outreach programs like Master Gardner as well as innovative programs like Sustainable Living.

- **Oregon Invests!** In 2000, The College of Agricultural Sciences' accountability database was put on the Web, offering information on the College's agricultural research. Each project or program in the database is rated on a scale of -3 to +3 on how the project impacts each of three sustainability components (economic, environmental, and social).

- **Sustainable Living Education.** Since its inception in 1998, 7500 people have participated in sustainable living workshops, receiving research-based information to help them make intelligent consumer decisions. More than 698,000 browsers have also explored the program website. *Viviane Simon-Brown* also directs the National Network for Sustainable Living Education (NNSLE)—a network of more than 50 Extension faculty from 24 land-grant universities working collaboratively on sustainable living programming. The network also has a database of sustainable living education programs and is developing green guidelines for adult and youth camps.
- **Community Involvement.** OSU is also very involved in the local community, which is committed to sustainability. OSU is a member of the Corvallis Sustainability Coalition, a leader in the Corvallis Energy Challenge, and has been instrumental in the Corvallis and Benton County Economic Vitality Partnership—a consortium of fifteen economic development, government and social service organizations working together to keep Benton County a vibrant place to live and work.

### **Operations and Facilities**

As the state's land, sea, and space-grant university, OSU is ready to support and lead both public and private sector organizations to find sustainable approaches, educate future leaders and citizens who understand and practice sustainability, and demonstrate sustainable practices in the University's day-to-day operations.

- **Green Building.** OSU has two LEED certified buildings including Kelley Engineering (Gold) and the renovated historic Weatherford Hall (Certified). OSU has committed to all new construction and major remodels being certified at least as LEED Silver. A new Energy Center will cut OSU's greenhouse gas emissions by about 38% and is designed to be certified as LEED Platinum.
- **Climate.** OSU is a Charter Signatory of the American College and University Presidents Climate Commitment. The commitment requires OSU to launch a two-year planning process to outline its path toward becoming climate neutral. In addition to planning for climate neutrality, the Commitment requires OSU to conduct a greenhouse gas inventory and take specified interim steps to reduce its greenhouse gas emissions. The inventory will be completed in Spring 2008.
- **Transportation.** As of March 2008, OSU has partnered with UO to gain access to an *Electronic Rideshare System*, a powerful online ride-matching service. The system will be introduced in April, after it has been tailored to meet OSU's needs. OSU's main campus was designated by the US EPA as one of the *Best Workplaces for Commuters*, recognizing efforts to provide alternatives to single occupancy vehicles. OSU has agreements with four local transit systems that allow students, faculty, and staff to ride free.
- **Energy.** In 2003, OSU became the first public university in Oregon to direct a portion of its 3% public purpose charge to go to the Bonneville Environmental Foundation's (BEF) Green Tags program. In turn, BEF directs these funds to support the production of five million kilowatt hours of renewable wind and other energy resources in the Pacific Northwest. OSU currently offsets 75% of campus electrical use with a green tags purchase funded by students.

- **Food and Recycling.** OSU Housing and Dining Services spend 40% of their food expenditures on local, organic, or otherwise environmentally preferable food and offer a variety of vegetarian options at the three campus dining centers. They estimate over 20% of their meals are vegetarian-compatible.

### **Other OSU activities**

- **Student Sustainability Initiative/Student Sustainability Center.** In April 2007 OSU students voted to increase student fees by \$8.50 per student per term to fund 100% renewable energy for the university. Recently, the SSI has funded interns to work on the restoration of Oak Creek and the renovation of the Student Sustainability Center, as well as supported the Green Roof Project, composting on campus, several energy efficiency and infrastructure improvement studies.
- **Industrial Assessment Center.** The OSU-IAC is one of 26 centers supported by the U.S. Department of Energy (DOE) at universities across the country and provides no cost energy, waste and productivity assessments to small and medium-sized manufacturers primarily in WA, OR and ID. The OSU-IAC has been commended by the DOE for its work, and has also contributed to a national award for Environmental Sustainability presented to DOE by Renew America, Inc. IAC teams have visited more than 500 Northwest manufacturers, and have made recommendations totaling more than \$86 million in annual savings.
- **Oregon Explorer.** Citizens, government officials, and scientists all call for more changes in natural resources policy, management, business practices, and research to achieve sustainability goals. The Oregon Explorer uses the power of today's cutting edge information technology to create a state-of-the-art web-accessible natural resources digital library building on, accessing, and integrating data from state and federal agencies, local governments, university scientists and citizens to support informed decisions and actions by people concerned with Oregon's natural resources and environment.

## **Oregon State University**

### **Appendix A: Summary Descriptions of Sustainability Research Institutes**

**Oregon Bioeconomy and Sustainable Technologies Center.** The Oregon Bio-Economy and Sustainable Technologies (Oregon BEST) Signature Research Center has been established in response to the Oregon Innovation Council's (OregonInc) interest in identifying areas where Oregon's natural, physical, and human resources give it a global competitive advantage in emerging market areas with significant economic potential. The establishment of BEST was endorsed by OregonInc in 2006 following a rigorous and competitive proposal process. BEST will bring together Oregon's significant R&D strengths in the key emerging areas of clean energy, bio-based products, green building/green development and other related sectors. BEST builds on Oregon's international reputation as a leader in renewable energy and green building, and seeks to spur the creation of new, value-added bio products. As a Signature Research Center, BEST's primary goal is to accelerate cutting-edge research and to facilitate public/private partnerships to turn that research into on-the-ground business opportunities. BEST partners include Oregon State University, Portland State University, the University of Oregon and Oregon Institute of Technology—each of which is home to a wealth of faculty expertise and research facilities in each of the areas named above—as well as numerous private businesses and organizations.

**Oregon Climate Change Research Institute.** The Oregon State Legislature established the Oregon Climate Change Research Institute (OCCRI) within the Department of Higher Education in 2007. The OCCRI is administered by Oregon State University and its institutional partners within the Oregon University System (OUS). The OCCRI will help Oregonians, government agencies, and the private sector understand the potential impacts of climate change on the state, for example through “downscaling” of science-based climate assessments. The Institute will also help individuals, agencies, and companies develop new strategies for both preparation for and mitigation of climate change. The Institute will encourage the flow of knowledge and information between the Oregon University System partners and government and private sector organizations. OCCRI will be responsible for 1) outreach to interested agencies, researchers, and other organizations and companies, 2) coordination of climate change related activities through electronic means such as web pages, blogs, etc., and through topical workshops, 3) regular assessment of the progress of the Institute, and 4) development of innovative partnerships and funding mechanisms to advance the Institute’s mission.

**Institute for Natural Resources.** The Institute for Natural Resources (INR) was created in 2001 as part of legislation establishing the Oregon Sustainability Board. Oregon State University was designated as the lead university to administer INR; however, a new administrative council of academic partners from OSU, PSU and University of Oregon is now being set up to make INR truly multi-institutional, engaging researchers from throughout OUS. INR’s Portland Office will co-locate with other OUS facilities in Portland. INR was created to utilize the resources of the OUS to: (1) Assure good science is used to measure resource use, environmental health, and costs; (2) Establish clear measurable goals and targets to guide state efforts towards sustainability; and (3) Enable citizens and policy makers to access the best scientific information in order to improve resource policymaking and citizen engagement. INR helps decision makers

identify and use relevant science in making critical policy choices about natural resources and the environment. INR and the OSU Libraries have worked with faculty at UO and PSU to start the *Oregon Explorer*, a digital library provided integrated natural resource and environmental information through a web portal. INR also maintains the biodiversity conservation database for the State of Oregon and works closely with the Progress Board on environmental and natural resource performance indicators. INR works with state agencies and local governments and the Oregon Solutions program to bring science to bear on a wide variety of natural resource management problems and on the development of environmental indicators. Current research focuses on environmental effectiveness evaluation, permit streamlining and ecosystem service market development. INR's advisory board includes state and local government leaders, business and environmental groups. The University of Oregon and Portland State University are represented on the board.

**Oregon Transportation Research and Education Consortium.** A four university consortium (Portland State University in partnership with the University of Oregon, Oregon State University and the Oregon Institute of Technology) has been designated by the U.S. Congress as a National University Transportation Center (UTC), as part of the Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (SAFETEA-LU). SAFETEA-LU authorizes the Federal surface transportation programs for highways, highway safety, and transit for a 5-year period. Within the overall UTC program, only ten (including Oregon) are designated as National centers. There is a need to improve our transportation systems to make the more sustainable through advanced and applied research. Building upon our collective efforts to make Oregon a place where innovation, creativity, and collaboration lead to sustainable communities, we look forward to working together to create a vibrant, multimodal, multidisciplinary university transportation center that is an exciting place for students to learn and be enriched by an active faculty and compelling research program.

**Oregon Water Institute.** The Oregon Water Institute (OWI) will be the implementing agency of the OUS Water Initiative, which was developed collaboratively during 2007. It will be a joint enterprise of OSU, PSU, and UO and administered by a Director and an Executive Board (EB). The OWI will harness the water expertise of OUS institutions to create a trenchant consortium to address Oregon's water and related issues. All OUS institutions can participate. The OWI will:

- Advance collaborative research, teaching, and outreach activities among OUS institutions
- Coordinate water activities within the OUS
- Provide water resource and related advice to communities and policy- and decision-makers
- Administer state-provided operational funds
- Administer a state-supported research program
- Develop joint degree programs

**Oregon State University**  
**APPENDIX B: Other OSU Sustainability Examples**

**PLANNED**

**Large Solar Electric Systems.** Working under guidance and a master agreement from OUS, we are far along in working with solar consultants to install large solar electric systems. These systems will be installed summer 2008 and owned and operated for about 10 years by a third party who can utilize tax credits and other incentives that OSU, as a non-profit (public agency), cannot utilize. Systems will be several hundred thousand watts in size and located on buildings accessible to researchers, party visible to the public, and will offset some of the campus electrical needs with fully renewable, clean energy.

**Utility Data Online.** The campus community will be able to access electrical, steam, natural gas, and water consumption figures for OSU properties beginning spring 2008. A new set of tools will allow viewers to create trends from historical meter data, troubleshoot building system issues, and understand the financial and environmental costs associated with OSU infrastructure. Eventually, up-to-the-minute consumption data will be available through this system.

**Rural Studies Program.** During the coming year, the Rural Studies Program will focus on three major initiatives. First, we will begin the development of a Long Term Community Research program, an interdisciplinary panel study of rural community dynamics. As a step in the development of this project, RSP faculty will examine the responses of rural counties to changes in Federal shared-revenue policy related to reduced timber harvests on Federal land. Second, in collaboration with the OSU Library, we will develop the Rural Community Explorer, a web-based portal and archive that will allow community residents and leaders to access economic, social, cultural and environmental information specific to their communities, and archive community data for their own use. Third, we will complete development of an interdisciplinary PhD minor in Rural Sustainability. This effort will build a faculty-student research and learning community that trains PhD students in social and environmental sciences to understand the dynamics of complex rural economic and social systems.

**CURRENT**

**Sustainable Wine Grape Production.** Researchers with OSU's Viticulture and Enology Program are helping Oregon's \$33 million wine-grape industry develop integrated production systems with far less environmental impact. New research helps growers meet certification standards of sustainable production and open new marketing possibilities.

**Biofuels.** Biofuels from agricultural and forest residues may provide low-carbon fuels for the future. Work by *Mike Penner*, a food chemist at OSU's College of Agricultural Sciences, is a good example of innovative research that may have applications for alternative energy. Penner is studying leftover grass seed straw and fruit pulp to find compounds that may be used to make other products, such as ethanol. There is a tremendous amount of straw left in the Willamette Valley after grass seed harvest each year. In addition, fruit processors in Oregon are interested in

finding uses for the pulp left over from product processing. As it stands now, many growers and vintners have to pay to have such waste material hauled away for disposal. In OSU's Department of Biological and Ecological Engineering, *Roger Ely* takes a different angle on bio-based energy generation. Ely, an environmental engineer, and *Frank Chaplen*, a bioprocess engineer, are harnessing cyanobacteria to use solar energy to produce hydrogen for fuel cells. Hong Liu is working on development of a microbial fuel cell that can use sewage or wastewater from animal and crop production to generate electricity, simultaneously cleaning the water. Biodiesel has recently become the rallying cry of a group of OSU students interested in developing alternative fuels who have banded together to form the OSU Biodiesel Initiative. "We are looking for easier and more efficient ways to make biodiesel," said *David Hackleman*, the Linus Pauling Chair of Chemical Engineering. "Another goal is to develop small-scale biodiesel production platforms that can be efficiently operated by individual farmers, state and community government organizations, and commercial vehicle fuel outlets." OSU researchers including *Tom Chastain*, crop scientist in Corvallis, and *Don Wysocki*, OSU Extension soil scientist at the OSU Columbia Basin Agricultural Research Center near Pendleton, are evaluating canola, an oilseed crop, for Oregon production. It can be grown as a rotation crop with wheat.

**ONAMI.** *Goran Jovanovic*, Chemical Engineering, has developed a microreactor for processing biodiesel. Using microreactors, biodiesel could be produced between 10 and 100 times faster than traditional methods, said Jovanovic, who is also developing a method for coating the microchannels with a non-toxic metallic catalyst. This would eliminate the need for the chemical catalyst, making the production process even more simple, a key to widespread use.

**Sun Grant.** The Sun Grant Initiative is a national program established to create new solutions for America's energy needs and to revitalize rural communities by working with land-grant universities and their federal and state laboratory partners on research, education, and extension programs. Oregon has been conducting further R&D into biomass production and conversion (especially in the areas of agricultural and timber residues, which represent major feedstock opportunities in the Western states), biogas from animal and urban wastes, and transportation fuels, in conjunction with power generation and co-product development. Examples of valuable co-products under investigation are industrial proteins and enzymes, pharmaceuticals and nutraceuticals, "natural" crop control chemicals, and structural materials that could be obtained from each state's unique crops and plants. Oregon investigators are also conducting R&D in processing technology that includes microbial and solar driven hydrogen fuel cells, microprocessing of biodiesel production, and processing biosensors. In the area of bioremediation, scientists at Oregon State University's Klamath Experiment Station have been investigating the possibility of using fast-growing hybrid poplars and other crops to treat sewage effluent

### **Green Buildings**

- **Green Roofs.** As part of Portland's efforts to promote sustainable development, city leaders are encouraging the use of green roofs as a lightweight, low maintenance, vegetated alternative to conventional rooftop materials on both residential and commercial buildings. Planting green roofs is more than blanketing a roof with sedums and succulents and hoping for the best, according to *David Sandroek*, a researcher in OSU's Department of Horticulture. "The science behind creating a successful green roof

is still in its infancy," he said. "This is a brand new landscape where nothing is truly native. There's a lot to learn and a lot to explore." To help explore this new frontier, OSU joined into a partnership with the city of Portland to study the green roof on top of the Portland Building in the heart of the city's downtown area.

- **Non-Toxic Adhesives.** *Kaichang Li* has invented ways to convert bark and rotted wood to effective, environmentally friendly wood glues. Even though rotting wood may seem to be everywhere as you walk through a forest, harvesting enough from natural sources to allow commercial production of adhesives is too expensive and time-consuming. Li's team now is trying to find ways to produce rotted wood on a large scale. The formaldehyde-free wood glues are good for replacing the resins used in exterior wood composites, but the dark glue lines that they produce are undesirable for interior finishes. To replace the resins used in interior wood composites, Li has developed another formaldehyde-free wood glue based on soy flour. The glue lines are light, and the glue is water-resistant and safe.

**Habitat Restoration.** Farmers need fertile land to produce the food we all consume. Is there a way to help keep coastal streams cool and clean for fish, while still allowing farmers to graze cattle and grow crops in their riparian pastures? Scientists *Badege Bishaw* and *Bill Emmingham* (College of Forestry, Forest Science), and *Bill Rogers* (Extension Agent, Newport) set up a study to find out. They planted tree buffers or "filter belts" of red alder trees in pastures along Beaver Creek in the Oregon Coast Range. After 8 years, farmers could let cattle graze in the shade beneath the young trees, as long as the fence was kept in place to protect the stream bank. Overall, the project demonstrated that tree buffers can be established and provide significant benefits to the stream in just a few years.

**Solar Energy.** Working together, OSU chemists and engineers, like *Doug Keszler*, are developing novel compounds that could give new life to the solar energy industry. These advanced solar-cell compounds absorb more light, produce higher voltage, and work more efficiently, which is why they could lead to an exponential expansion of sun-based power generation. With funding from the National Renewable Energy Laboratory, OSU researchers are investigating oxides as the optimal materials to replace yesterday's solar cell mainstays—silicon, cadmium telluride, and copper indium diselenide.

**Bioremediation.** Working with OSU botanists, microbiologists, and plant pathologists, environmental engineering professor **Lew Semprini**, who directs the Western Region Hazardous Substance Research Center at OSU, is using microorganisms to transform highly toxic chlorinated solvents like Trichloroethylene (TCE) into inert components. Widely used as an industrial degreaser and dry cleaning agent, TCE now contaminates vast areas of soil where it was carelessly dumped. In collaboration with Stanford University, Semprini and environmental engineering professor **Mark Dolan** have successfully engineered ways to inject contaminated soils with microbes and then use DNA testing to track how the organisms do the cleanup.

**OSU Rural Studies Program** built on its unique experiential courses in rural places and created several new courses including an Ethnographic Field School that focused on a remote rural county. RSP faculty and students have secured external funding to expand their research on issues of concern in rural Oregon (land use, food systems, housing, migration, poverty and food

insecurity, for examples). With the support of the Ford Family Foundation, RSP faculty and students developed community indicators for tracking the progress of rural communities toward increased social and economic vitality and environmental sustainability.

**Fish and Wildlife Habitat in Managed Forests Research Program.** The Oregon Forest Research Laboratory invests about \$375,000 of Harvest Tax receipts in a collaborative program to provide new information about sustaining fish and wildlife habitats and native species diversity within Oregon's actively managed forests through research, technology transfer, and service activities. Projects focus on enhancing the scientific information base that informs state regulations under the Oregon Forest Practices Act and also Oregon's actively managed federal forestlands. The goals are to provide the information needed by forest managers to guide responsible stewardship of fish and wildlife habitat resources consistent with land management objectives, and by policy makers to establish and evaluate informed forest policy and regulations.

**Watersheds Research Cooperative.** The Watersheds Research Cooperative (WRC) is a long-term research and demonstration program to fill gaps in scientific knowledge identified through the Oregon Plan for Salmon and Watersheds. Directed by Forest Engineering faculty member Dr. **Arne Skaugset**, it is a cooperative and collaborative public-private program of research and outreach to evaluate the cumulative environmental effects of contemporary forestry practices on water quality, native fish, amphibians, and aquatic insects at the watershed scale. Three major studies are underway in the Hinkle Creek, Trask River, and Alsea River watersheds in western Oregon.

**Center for Forest Transportation (CFT).** The Forest Engineering Department is evaluating the viability of a cooperative center for forest transportation research and development to support the competitiveness of the region's forest products industry. Potential savings of \$15-\$25 million annually through cost reductions and productivity improvements have been projected, along with improved air quality from reduced diesel emissions and improved forest health through more acres of cost-effective biomass utilization. Cost savings will be derived from changes to transport vehicles, road maintenance practices, road construction practices, and fleet management. A preproposal was recently submitted to the Oregon Innovation Council for start-up support.

**Forest Log Value Recovery Initiative.** This initiative led by Dr. **Glen Murphy** applies innovative technology, creative problem solving approaches, and new decision support models to help the PNW forest sector control costs, allocate logs to the most appropriate markets and milling processes, and maximize the wood value of the forest at the time of harvest. The result is greater economic value and a competitive edge for the Pacific Northwest, as well as improved forest sustainability, lower fuel consumption, and less waste.

**Landscape Planning Models to Support Community and Forest Sustainability.** The Forest Engineering Department is a world leader in the development of spatially explicit combinatorial optimization models that can be used to guide the management of forest landscapes to meet often conflicting societal goals. OSU Distinguished Professor and Stewart Professor Dr. John Sessions has recently developed models that supported Oregon Department of Forestry planning efforts for almost 700,000 acres of State Forests, with simultaneous goals for revenue to support local communities, biological diversity, and forest sustainability.

**Predicting Ungauged Basins.** Dr. **Jeff McDonnell** recently completed a 2 yr term as Chair of the International Association of Hydrological Sciences International Decade on Prediction in Ungauged Basins (PUB). In this capacity he coordinated efforts of 65 member countries and 3 UN Water Agencies (UNESCO, WMO and IAEA). Two key PUB goals are to: 1) Advance the ability of hydrologists worldwide to predict the fluxes of water and associated constituents from ungauged basins, along with estimates of predictive uncertainty; and 2) Advance the scientific foundations of hydrology, and provide a scientific basis for sustainable river basin management.

**Oregon Wood Innovation Center** evaluation of new products and business practices. Other new product development: environmentally-friendly adhesives for a variety of applications, cellulose-reinforced biopolymers to replace petroleum-based plastics. Life-cycle analysis and inventory to rationally identify the environmental burdens associated with building materials and methods to determine carbon budget, global warming potential and other factors for various residential and light industrial/commercial constructions.

Economic and social science research on policies for **sustaining biodiversity in forests and other wildlands** (Albers, Montgomery, Adams, Shindler, Needham)

**Sustainability of forested ecosystems in the face of global climate change:**

- COF Forests and Climate Change Initiative (Harmon and Krankina led, but involves faculty from across college)
- Leadership of AmeriFlux - 100+ terrestrial monitoring stations in N and S America (Law + a multitude of collaborators)
- Assessment of impacts of disturbance and climate change on forest productivity and health (Law, Krankina, Turner, Harmon)
- Recent renewal proposal for Andrews LTER with focus on impacts of climate change on mountain systems (Bond + Team)

New **regional Forest Management and Climate Change Initiative** to examine genetic and silvicultural options for dealing with climate change impacts on forests through adaptation (Howe, St Clair, others)