



Director's Message

John Calhoun, Director



Many factors contribute to the success of our programs at UW ONRC. The continued support of our state and federal elected officials is crucial. As Director, one of most important duties I have is to develop positive, informative relationships with our elected officials.

In 1989, when the Washington State Legislature created UW ONRC at the University of Washington, it had in mind a program of research, education, and service supported by a field station located in Forks to serve the public good. Now, nearly 15 years later, some of the founding legislators are still in office and new ones have come on board. All expect delivery of services to their constituents and continue to support the programs at UW ONRC, ensuring our success.

At the federal level, we have enjoyed financial support for our research programs for the past ten years, and we anticipate continued funding. United States Congressman Norm Dicks (D-Wash.) was instrumental in initiating funding and is active each year ensuring its continued support. Equally important ef-

not be possible without the direct intervention of a key legislator, Washington State Senator Jim Hargrove (D-Hoquiam). Our growing cooperative relationship with the Washington State Department of Natural Resources is working because of the personal support of State Lands Commissioner Doug Sutherland.

The UW ONRC and the people we serve owe much to those elected officials that make specific efforts to support our programs and activities.

orts from our state legislators provide ongoing financial support for programs important in achieving our mission.

Collectively, we are helping to improve the quality of life in the region.

This issue of the *ONRC Update* highlights programs that require outside funding. The Olympic Region Harmful Algal Bloom (ORHAB) project is supported by state authority, creating a manageable, predictable funding source. This would

The UW ONRC and the people we serve owe much to those elected officials that make specific efforts to support our programs and activities. As Director, I never forget who makes this happen even while continuing to suggest new ways to enhance the services we might provide.

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Regional Teachers To Attend Math Institute

Ellen Matheny, Director, Education & Outreach

UW ONRC staff and UW faculty collaborate again this summer to present the second half of a professional development course for educators in rural, timber-dependent communities in western Washington. In 2004, UW ONRC received another round of funding from the Washington State Higher Education Coordinating Board to design and conduct a professional development course in mathematics for regional educators. The funds provided a two-summer institute to be offered here at UW ONRC in Forks and expand on the work done in the 2003 summer institute.

The project is making inroads into enhancing the mathematics curriculum in our very rural communities. Participants hail from several rural communities in Pacific, Mason, and Grays Harbor counties as well as the northwest Clallam County communities of Forks and Clallam Bay. All total, 40 teachers certified to teach mathematics as a part of their curriculum (elementary, middle, and high schools) from 19 rural schools are participating.

The overall course focus is teaching mathematics using inquiry-based models and instruction. All of the teachers arrive at the training with a basic knowledge of mathematics. However, not all have been exposed to mathematics taught from the perspective of discovery, making connections between concepts the person is already familiar

with and the new material. Studies in cognitive learning theory show memory retention increases when the newly introduced concept can be linked to something the person already knows. The teachers will experience these techniques firsthand by furthering their understanding of global warming realities through the mathematics of the carbon cycle.

The goal of our Math Institute is to provide some content knowledge in mathematics and build on this with individual and



group activities. By grappling with an unfamiliar concept, our participants will discover new ways to view a particular mathematic concept while adding to their overall knowledge of the concept and how it is applied in our world.

Forestry Focus of Summer Institute

The carbon cycle and global warming will provide the focus of this summer's instruction. Activities will begin with experiential exercises designed to facili-

tate learning about the carbon cycle. Participants will explore mathematically how increasing concentrations of atmospheric carbon are causing global warming. Physical representation of the carbon cycle will involve using buckets of water, measurement cups, and stop watches to model transfers of carbon between the atmosphere, living things, and fixed sources such as fossil fuels. All grade levels will find this exercise relevant, beginning with the basic mathematical relationships at the elementary school level and progressing to the higher level mathematical modeling of rates using calculus. The participants will travel to forest sites, a local sawmill, and the nearby beach as a part of our fact gathering.

The carbon cycle, as a closed system movement of carbon between the biosphere, atmosphere, oceans, and geosphere, contains various stores (sinks) of carbon and processes by which the various sinks exchange carbon. Most people are familiar with how the atmosphere and vegetation exchange carbon (photosynthesis). People may be less familiar with how changing land use, including agriculture, deforestation, and reforestation, negatively or positively affects carbon dioxide concentration in the atmosphere and thus impacts the climatic changes on our planet. These

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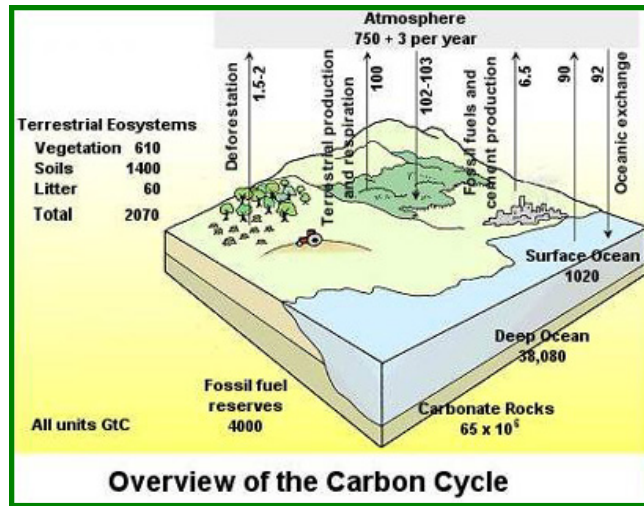
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are some of the factors we plan to measure in our investigations this summer.

We will experience how forests sequester carbon, helping to remove carbon dioxide from the atmosphere and thus positively affect the problem of excess carbon dioxide in the atmosphere. We will verify that forests are an important part of the global carbon cycle and its contribution is needed to help address years of carbon release from deforestation worldwide. Even though forestry solutions can form only part of any climate-change mitigation strategy, forests play a major role in decreasing atmospheric concentrations of carbon dioxide. There is growing evidence that increases in atmospheric concentrations of carbon dioxide may increase the rate of global climate change due to the greenhouse effect.

The amount of carbon stored by a forest is influenced by a variety of factors: type of vegetation, soil type, age of forest, and climate. We will take a look at these factors in our region and measure how they contribute to the problems and solutions associated with global warming. We will also explore the activities we as stewards of the earth do that can affect the flows of carbon into and out of forests. Some of the influences we will consider include:

- establishing new forests (planting trees)
- deforestation (converting forests to other uses)
- harvesting (taking timber



Scottish Forest Alliance • www.scottishforestalliance.org.uk

away, but maintaining the land as forest)

- deposition of sulphate and nitrogen (negatively affecting tree growth)
- increasing the atmospheric carbon dioxide concentrations (which may increase plant growth rates)
- lifecycle analysis of inputs in carbon cycle of various building materials

UW Collaboration

The Math Institute will be co-led by three faculty members from UW. Professor Bob Lee from the College of Forest Resources will focus on the forestry applications including instruction in the carbon cycle. Dr. Virginia "Ginny" Warfield from the College of Arts & Sciences Department of Mathematics will conduct exercises in the basic mathematic concepts we will grapple with. Associate Professor Lani Horn from the College of Education Department of Curriculum & Instruction will lead practical exercises in using these concepts in the current mathematics curriculum. We will be ably assisted by two graduate

students, Eric Hamilton from the College of Education Cognitive Studies and Amber Hamilton from the College of Arts & Sciences Department of Earth & Space Sciences.

References Used

Classroom of the Future, Wheeling Jesuit University • www.cotf.edu; Scottish Forest Alliance • www.scottishforestalliance.org.uk.

THE IMPORTANCE OF INQUIRY-BASED LEARNING

Inquiry-based learning can best be described within this familiar old adage: "Tell me and I forget, show me and I remember, involve me and I understand." By involving a person in the learning process, the person better understands new information and increases his or her overall recall of previously learned material. Each person enters a new learning experience with certain skills and attitudes. The person builds on these skills and attitudes as he or she seeks answers to questions and issues, ultimately constructing new knowledge.

Some of our best inquiry learners are babies. Gathering information through their senses – seeing, hearing, touching, tasting, and smelling – they explore the world and make sense of it through the continuous cycle of questioning, gathering information, and making connections between what they know and what they newly experience.

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Washington State Legislature Enacts Carryover of Biotoxin Monitoring Funds

Ellen Matheny, Director, Education & Outreach

Over the past five years, UW ONRC has actively participated in the Olympic Region Harmful Algal Bloom (ORHAB) partnership, studying and measuring the presence of the biotoxin domoic acid in Pacific razor clams along the Washington coast. The periodic toxicity of this popularly harvested shellfish is an important public health concern. The goal of ORHAB is to assist the Washington State Department of Health in maximizing safe clam digging days.

Part of the funding for this biotoxin testing and monitoring comes from a surcharge on recreational shellfish license fees. During its recent legislative session, the Washington State Legislature enacted a bill (SB 5169, *Biotoxin Testing and Monitoring—*

Funds, 5/11/05), permitting the carryover from biennium to biennium of these funds. The original legislation (SB 6073, *Recreational Shellfishing—Fees*, 7/1/03) instituted the surcharge but did not



Washington Department of Fish & Wildlife

allow one biennium's funds to flow into the next. UW ONRC administers the first \$150,000 collected annually from this surcharge and uses the funds, among other things, to pay for two highly-trained technicians.

Realizing the need to have a continuous flow of funds to maintain the continuity of the monitoring program, we requested this modification to the original legislation.

The funding of the needed biotoxin monitoring along the Pacific coast of Washington state would not have been possible without the active support and participation of our Washington State Senator Jim Hargrove (D-Hoquiam). Senator Hargrove not only sponsored the bills but provided us guidance each step of the way in communicating effectively with our legislative representatives on the need for this program. We are grateful to work with Senator Hargrove and be the benefactors of his expertise and high energy in dealing with natural resource issues.

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Many of you have experienced a more traditional educational system. Students were encouraged to listen and repeat the expected answers. Though questions were solicited, students were encouraged not to ask too many questions but rather to focus on learning the subject content.

However, inquiry implies "emphasis on the development of inquiry skills and the nurturing of inquiring attitudes or habits of mind that will enable individuals to continue the quest for knowledge throughout life." Said another way, the more psyched a person is about a topic and the more important and relevant it is to one's life, the more likely the learner will engage meaningfully and with gusto in the steps needed to achieve it. Inquiry-based learning fosters that enthusiasm for learning and achievement by empowering the learner to reach his or her own conclusions through questioning and personally exploring a new concept.

The fact is, nowadays, our world is expanding at

an accelerated rate. In days gone by, memorizing facts and information may have provided a sufficient basis of knowledge to negotiate in the world. However, facts quickly change and information is now more readily available. Making sense out of all this mass of data is paramount to personal and academic success.

To better prepare students for life, schools must go beyond data and information accumulation. They must move toward the generation of useful and applicable knowledge which are the processes supported by inquiry learning.

In the end, inquiry learning should provide useful knowledge about our world. One of the greatest challenges in inquiry learning continues to be the art of balancing the still needed task of learning specific content with the need to generate an understanding and knowledge of the content by questioning and searching for answers.

Reference Used: *Concept to Classroom*, Educational Broadcasting Corporation • www.thirteen.org.