RMA Newsletter

Resource Modeling Association *www.resourcemodeling.org*

Fall 2005

Presidential Pondering

by Bill Smith

The 'High Water Mark'* of the RMA 2005 World Conference in Natural Resource Modeling in Arcata was the honor of naming Rollie Lamberson and Bob McKelvey as the first members designated as RMA Fellows.

Rollie was founder and first president of the Resource Modeling Association and hosted the first meeting at Humboldt State University in 1982. He assisted Bob McKelvey in the establishment of **Natural Resource Modeling** and was managing editor from 2002-2003. Rollie developed the mathematical modeling graduate program at HSU and serves as Director of Environmental Systems Graduate Programs at HSU (although he claims to be retired). He was the HSU scholar of the year 1993 and received the Humboldt Medal for research 1994. Among his contributions to conservation and resource management he developed the models for the conservation plan for the northern spotted owl and was appointed to Independent Scientific Advisory Board for the Columbia River Basin

Bob was Founder and first editor of Natural Resource Modeling and the third president of RMA. He founded the Rocky Mountain Mathematics Consortium and their flagship journal, Rocky Mountain Journal of Mathematics (RMMC is publisher of NRM). Bob was the Organizer of two National Science Foundation summer institutes on biological modeling which got many into the field (including the current RMA President, President-Elect, Newsletter Co-Editors, and RMA's Writer Laureate). His contributions to conservation and resource management include his research on optimizing transboundary fisheries management (many papers over the past 15 years) and current international activities on the influence of global warming.

*This was almost literally true! A Tsunami occurred of the coast of northern California during the presentation. Incidentally Rollie predicted that it was likely that one would occur at that location.

Next Year in Norway!

The dates for the RMA meeting in Bergen will be 25 - 28 June 2006. More information will be in the next newsletter. Address questions to Stein Steinshamn (Centre for Fisheries Economics, Norwegian School of Economics and Business Administration / SNF) [Stein.Steinshamn@snf.no]

Natural Resource Modeling News

by Catherine A. Roberts, Editor

The year 2005 marks Volume 18 of our journal NATURAL RESOURCE MODELING. We will publish four issues this year with a total of 25 papers, including 16 in two special issues devoted to Modeling & Control of Natural Resources (edited by Suzanne Lenhart and Horst Thieme).

The first three issues are already available online at http://rmmc.eas.asu.edu/. If your library is an institutional member, then online access to NRM is automatic. If you are an individual subscriber through your membership in RMA, then you must send an email to rmmc@asu.edu to set up a username and password for online access to the journal.

Volume 19 will include special issues from RMA meetings in Beaufort, North Carolina (edited by Bob Fray) and Australia (edited by John Hearne). We have two special issues in the pipeline: Integrated Modeling of Economics & Ecosystems from the Diversitas workshop in Nov 2004 in Paris (edited by John Tschirhart) and Economic Effects of Climate Change on Fisheries from a workshop in June 2005 in Bergen (edited by Rögnvaldur Hannesson). A special issue will also be published from the RMA meeting in Arcata (edited by Roland Lamberson and Sharon Brown).

Our senior editors are Greg Amacher (Forestry), Carlos Castillo-Chavez (Biology/Ecology), Shandelle Henson (Ecology), Jim Ianelli (Fisheries), E.J. Milner-Gulland (Conservation), and Stein Steinshamn (Economics). Our associate editors are Erwin Bulte (Forestry), Graziela Ana Canziani (Ecology), Harry Clarke (Economics), Jon Conrad (Economics), Jim Cushing (Biology), Ray Hilborn (Fisheries), Vincent Hull (Ecology), and John Schnute (Fisheries).

The top priority for NRM this year is to get listed in Science Citation Index. We are already included in several citation indices and are looking forward to being considered this summer by the Science Citation Index.

We need to increase the circulation of our journal! Please do your part by encouraging both individual and institutional subscriptions. Here's the information you'll need:

Individual Subscriptions to NRM: The journal is a benefit of membership in the Resource Modeling Association (www.resourcemodeling.org): Send payment for $60 (US) to Ken Lyon, RMA Treasurer, Economics Department, Utah State University, Logan UT 84322-3530 USA. Your check or money order should be payable to RMA. Questions can be directed to klyon@econ.usu.edu

Institutional Subscriptions to NRM: Send $295 US for printed version or electronic version ($295 for both) to the Rocky Mountain Math Consortium, Arizona State University, Box 871904, Tempe AZ 85287-1904 USA. Price includes surface postage for printed version. Your check or money order should be payable to RMMC. Request Volume 18 (2005). Questions can be directed to rmmc@asu.edu

Report from Humboldt State

by Mike Strub

The 2005 Conference on Natural Resource Modeling was held at the Humboldt State University campus in Arcata, California. This area has massive redwood forests to awe and inspire. The first event of the conference was a white water rafting trip down the Trinity River. The weather was hot, the water was cold and the class three rapids were exciting. Luckily no one fell out of the boats into the icy water.

The keynote speakers included John Goss-Custard's presentation of an excellent overview of decades of measurement and modeling of waterfowl populations. He introduced the basic ideas of Individual Based Models (IBM) which were discussed in detail in other presentations and at the Saturday workshop. Carlos Castillo-Chavez discussed the modeling of disease spread and control. His case study of tuberculosis illustrated many of the techniques used common to other natural resource modeling efforts. Steve Railsback discussed the modeling of fish habitat and demonstrated simulation software that provide graphic display of model outcomes.

There was a variety of eclectic talks. These included modeling of birds, fish, sea lions, nematodes, ocean waves, groundwater, landmines, trees and tree diseases. Many of the talks covered use of models in decision making. The poster session also covered a variety of topics with fisheries the most popular topic. Other topics included ant populations and oat sprouts. Sharon Brown had the quote of the conference: "I don't do discrete." After making this comment she went on to describe in detail current literature on the subject.

The Saturday outing on the HSU Research Vessel, the Coral Sea was canceled due to high seas and the weather was rainy putting a damper on other outdoor ventures. This resulted in greater than expected attendance at the Individual Based Models (IBMs) Workshop presented by Steve Railsback. Steve discussed the ideas behind IBMs, that simple rules can be used to describe the actions of individuals and that these rules can result in complex behavioral patterns that are observed in natural populations. A crash course in two simulation languages used to display and summarize models was presented.

Our many thanks go to Rollie Lamberson, Sharon Brown and the staff and graduate students at Humboldt State who made this conference a memorable experience.

Arcata Reflections

Observations on the 2005 World Conference by Lee Badger

Knowledge is a slippery concept. It's hard to know if you know. In 1990 at the Missoula meeting Dan Goodman spoke about "the big lie" that is modeling – "Well, no those resources really don't grow logistically, but if they did, then here's your quota."

Modeling has changed – from global assumptions about growth and harvesting detailed enough to be plausible but simple enough to solve analytically, to tracking individuals optimizing some criteria as they switch between habitat cells, growing and reproducing or preying and dying in some IBM running on a desktop Mac. John Goss-Custard showed how he uses Individual Based Models to understand birds and Steve Railsback did so with fish. Others fleshed out this IBM bass beat by sharing their more detailed uses of them – J.A. Tyler linked hydrologic flow models into the IBMs, John McManus taught us how to incorporate schooling, Bill Chivers modeled species interaction, Eric Stewart compared wild and hatchery salmonids, Michael Fuller used them with network analysis to study forest structure. There were others.

Rick Moll openly questioned if these models were revealing new (and subsequently observed) behavior or if they were merely reflecting what they were programmed to reflect. Perhaps these IBM's do help us "know" more than the old analytic models, but still I like the equations. Certainly I would rather watch a pair of bluebirds build a nest and rear their brood than squint at cells flashing on a computer screen. And sometimes I can't resist recalling that bit of advice – "If you would know, consult two old men."

There was some econ in the cool rain of Arcata too, though less than usual it seemed to me. Keith Criddle marketed halibut; Ken Lyons told us the optimal rate to clean up waste dumps; Magnus Hennlock modeled common property resources and pollution sinks in the Baltic. Ken constrained his variable discount rate to be positive. I silently wondered why we shouldn't allow it to be negative – like those Soviet botanists who starved during the siege of Leningrad rather than eat their seed stock. But I didn't ask, so I guess I'll have to wait `til next year in Bergen.

Actually, along with the rest of my table at the banquet, I completely discount the future value of morning-after clear thinking and an ache-free head as I ordered up another bottle of red. When Bill Coles reads, the present is sufficient.

Student Award Winners

Brandy Wiegers is currently a fourth year Ph.D. candidate at the University of California, Davis. She came to Davis from The University of Idaho, where she received BS's in Biological Systems Engineering and Mathematics. These degrees provided the motivation for her graduate pursuit of Applied Mathematics and her current research, modeling the water movement in the 10mm long growth section of plant roots. This is an applied mathematical biology problem that uses scientific computation, numerical methods, linear algebra, and partial differential equations.

Abstract: Primary plant root growth occurs in the 10 mm root tip segment where cells expand by stretching the rigid cell wall that constricts their growth. The mainly longitudinal growth occurs as water enters the cells and forces the walls to move. The direction of water flow is dictated by the plant cell water potential, the measurement of the free energy of water, and can be used to model water movement related to primary root growth. This presentation will provide an overview of the plant physiology required to create the root growth model and will examine current progress achieved on the model and discuss possible future work.

Beyond school, Brandy's extra time is dedicated to community service. As a 20 year member of Girl Scouting, Brandy is a mentor for the local high school scouts and a trainer for adult Girl Scouting members. She is also involved in creating programs for graduate students to get involved in community service through the UC Davis Professors for the Future Program.

Traveling to Arcata and attending the RMA Conference in June was inspirational for Brandy who was excited to hear about the many topics that are being researched in this area. This experience influenced Brandy's goal to continue doing research in this area as a postdoc after she completes her PhD in June, 2007

Jeff Galef reports that his main goal is to become a groundwater modeler. Groundwater is a precious resource that must be properly-managed to avoid water shortages and negative environmental impacts. Through modeling, one can get an idea of how various pumping schemes can affect the hydraulic potential of the associated aquifer.

In addition to groundwater flow simulation, he is interested in applying optimization techniques to determine the mathematically-optimal pumping schedule, including the optimal numbers of wells to implement, the locations to place these wells, and the pumping rates to set for each of the wells. Finally, he has recently become very interested in investigating the uncertainty associated with imperfect knowledge of the parameters associated with the subsurface. This uncertainty can lead to unreliable results associated with the results from the simulation and optimization models.

After graduating from Humboldt State University, he hopes to work for agencies such as the California Department of Water Resources, or the U.S. Geological Survey, or for consulting firms that specialize in complex modeling of the subsurface. He would like to develop optimal water allocation plans, or deal with the remediation of polluted aquifers.

Robert Gerrity is an undergraduate mathematics major at Pomona College in Claremont, California. He will be starting his senior thesis this fall following up on research he performed this summer with Pomona Mathematics Professor Richard Elderkin into modeling interference competition. Robert plans to move on to law school after graduating from Pomona to pursue a career in intellectual property and patent law.

Aside from pursing his degree, Robert has spent countless hours during his past three years at Pomona editing and managing the student newspaper there, *The Student Life*. He is also an avid video game enthusiast and thoroughly enjoys backpacking, rock climbing, and white water rafting.

A Visit to the Sempervirens

By Ralph Amateis

Arriving at Redwood National Park, I felt the anticipation building within me as we exited the bus and approached the trail-head. Two days of light but steady rain had transformed the root-ribbed forest foot-path into a spongy trail through the domain of the "always living" Sempervirens. Surely these patriarchs had seen innumerable days just like this one and once again welcomed the dampness that has sustained their lives for eons. Walking among them, I felt like a trespasser stealing precious moments from their history unable to return in kind. "Not a problem," they whispered. "The Ancient of Days has given us many to share, with more yet to come, so help yourself." The invitation was welcoming. I slowed my pace, allowing the rest of the group to disappear into the mist ahead.

"How long have you been here," I asked? "From the Beginning," they replied. "Look beneath your feet and you'll see the remains of us who have gone before. You are standing on us even now". I realized I was standing on these witnesses even as they stood over me! A twinge of guilt accompanied that thought. "How did you get here?" I asked. "We were placed here as a repository of His Presence. Can you feel it?" they replied. "How can I feel it?" I asked. "Come forward and stretch out your arms around me", one of the biggest said. "Press your fingers deep into the fissures of my bark and look straight up". I did so, my chin now straddling a fissure and the back of my head between my shoulder blades. My gaze followed the spiraled bark ridges that rose to the top of Sequoia.

There at the top, many meters above, I could see multiple terminal shoots rising out of the main bole at different angles, with some bending over and others straight. Our guide had said that the tops of these trees contained more biological diversity than could be found on the ground beneath. I closed my eyes as the droplets of rain water from above approached my face. Direct hits found their way down my chin and cheeks, neck and onto my chest. A sudden wave of awe and wonder flooded over me. I was so small and they were so big. I was so young and they so old. I had seen so little and them so much.

I felt my outstretched arms getting tired and I was losing my grip on the fissured bark "Did you feel it?" asked Sequoia. "Yes I did, thank you," I whispered. "I did too", said Sequoia. "Please come again". As I hurried to catch up with the group, I thought about how nice it would be to stay among these giants for awhile, walking the trails and contemplating my own life-journey. Boarding the bus, I looked back one more time feeling sure I would be back here again one day for more.

Beres & Beres, Co-editors
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First Class Mail

HONORED RMA FELLOWS

Two of our founders were designated as ***RMA Fellows*** at the 2005 World Conference on Natural Resource Modeling in Arcata, CA, USA, June 2005. **Robert W. McKelvey** and **Roland H. Lamberson** were each presented with a placque and the following citation, "In recognition as a scholar in natural resource modeling and for sustained leadership and service to the advancement of the scientific approach to conservation and resource management" signed by our president W.D. Smith. Kudos!

Welcome Reception and Banquet

by Bill Chivers

The conference kicked off with a reception Tuesday evening in the Karshner lounge at the University Center. Finding this venue was the first opportunity for many of us to attempt to navigate around the beautiful HSU campus, which proved to be a non-trivial task. Having all found it, however, we began the important business of catching up with colleagues sharing similar interests, a process facilitated by the food and local beers available. A very important part of the evening was the recognition of the initiative and work of Rollie Lamberson and Bob McKelvey over many years in the formation and success of the Resource Modeling Association. I personally have spent many years looking for an association like this one: academic, supportive, friendly, active and multidisciplinary, and I am very grateful to Rollie, Bob and all the others who have made this association what it is. Bob and Rollie are the first two Fellows of RMA.

During the reception a few of us may have felt that perhaps the local beer was a little too strong, or perhaps that the walking around the hilly campus was causing some type of physiological palpitations, but actually the slight moments of vertigo or disorientation were caused by a undersea earthquake. The epicenter was some dozens of miles west. On arriving back at our accommodation at around 9:30pm a few of us were told by other residents that there was a tsunami warning, and that we should stay at the top of the hill where the Creekview Apartments are located. No phone, no car, a long way from home and a tsunami warning. I will remember that feeling for a long time. No tsunami eventuated, of course, although someone reported that the water in San Francisco rose about one meter. Someone else cleverly quipped: "may all your movements be horizontal", as was the tectonic movement!

The friendly and social nature of RMA conferences was well illustrated on the Thursday we went to the Redwood National Park and then returned for the conference banquet at the University Center. The banquet food and wine were excellent and the conversation and company were a great mixture of academic discussion, unrelated interests and humor. What a great way to organize the next paper! The highlight of the evening, apart from the members who thought that they had secured more wine for $3 per bottle which turned out to be an error of one order of magnitude, was the reading by Bill Coles. These days Bill can at last admit that he is a mathematician. He no longer wears the typical mathematician's blue shirt with violet features, or even the one-size-fits-all cap with "Dynamic Tool" embroidered on it. He has found that he has a great talent for writing and that writing has been wonderful therapy. Bill may not have realized it, but he was actually talking to a crowd hooked on partial differential equations although we were forgetting our mathematics with the help of the wine. We will not, however, forget Bill's dry humor and incisive wit in