2008 isee User Conference

MAKING CONNECTIONS

Poster Abstracts

October 9th, 5:00 – 7:00 PM

1. **Nonlinear Feedback Loops with Stochastic Inputs: A Long-run Model of Oil Prices**
   by William Strauss, FutureMetrics, LLC

   A stochastic model for oil price forecasting that uses both STELLA and @RISK (an Excel based Monte-Carlo simulation software). In essence, key STELLA inputs are linked to Excel cells that can take on random values (within probability distribution and covariance rules) so that each run of the STELLA simulation is an iteration in a Monte-Carlo simulation. Multiple time paths are generated producing an expected value and confidence bands for future oil prices.

2. **Mechanistic Simulation Models for Fusarium Head Blight and Deoxynivalenol**
   by Mizuho Nita, Kansas State University

   Fusarium Head Blight (FHB) of wheat and barley is an important plant disease that causes loss of millions of dollars in an epidemic year. In the 1990's, estimated crop loss due to the disease was $3 billion in the U.S. alone. In order to prevent the outbreak of the disease, previous studies developed empirical models with a mathematical equation as a part of disease forecasting systems.

   In this study, STELLA was utilized to create mechanistic simulation models for FHB and deoxynivalenol (DON) based on the results of past studies on disease development and pathogen biology. This model estimates a distribution of Fusarium damaged kernels among heads of wheat and DON accumulation of the grain based on environmental conditions. Major steps in the disease cycle were expressed as differential equations that use environmental conditions as input variables. These equations were connected in a logical manner, and using weather data, a theoretical disease cycle of FHB was simulated over time.

3. **Diagnosis of Adult ADHD: Experimental Results from the Adult ADHD Patient Flow Model**
   by Julie Stafford, AXIA Management Consultants, LLC.

   We constructed a dynamic simulation model of pathways that can lead to the diagnosis of ADHD in adults in the U.S. Using this model we tested the impact of altered flow rates along the pathways to correct diagnosis on the number of patients correctly diagnosed. The results demonstrate that combined interventions simulating successful patient and physician educational interventions can result in greater increases in populations of patients with a correct diagnosis of ADHD compared with either intervention alone.

4. **Exploring Alternate Conceptions of Flowering Phenology with a Model of Alfalfa Pollination**
   by Karen Strickler, Pollinator Paradise

   A model of alfalfa seed production is used to explore alternative assumptions about the dynamics of pollination and seed set. How does the timing of foraging by leafcutting bees relative to initiation of bloom impact flowering phenology and seed yield over a range of bee population sizes? In one model, the rate of bud opening is initially rapid and declines exponentially over time, i.e. the rate of bloom is intrinsic to the plant. In another model, the rate of bud opening is initially rapid but declines exponentially in response to the accumulation of seed pods, i.e., rate of bloom depends on the rate of pollination. The poster presents a sample of results. Conference participants can examine the underlying model structure and try it themselves.

5. **Environmental Implications of High Altitude Tourism in Aosta Valley, Italy**
by Riccardo Beltramo and Stefano Duglio, University of Torino, Dipartimento di Scienze Merceologiche (Department of Commodity Science).

This two year project was completed by the University of Torino, in collaboration with the Mountain Safe Foundation of Courmayeur and the support of the Interreg III Alcotra Italy-France European program. The goal of the research was to use a STELLA model to determine the environmental implications of hosting a growing number of tourists in mountain huts in Aosta Valley, Italy.

The research included a complete analysis of technological devices and management systems adopted in 46 out of 52 mountain huts. STELLA has been useful at two levels: the first one being the individual mountain huts and the processes performed to offer services to tourists and the environmental implications; the second level aggregates the individual models and describes the whole behavior, according to various strategies at an aggregate level. The final goal is to provide environmental and economic cost-benefit analysis depending on alternative budget allocations and public environmental policies.

6. **On-line Courses in System Dynamics**
by Pam Shelley, Worcester Polytechnic Institute

WPI offers credit and non-credit courses in System Dynamics. The completely on-line curriculum allows students from any location to enroll in individual courses, a graduate certificate, or a Master of Science program. Stop by to find out more about the courses offered and WPI's distinguished faculty, including conference presenters Khalid Saeed and Andrew Ford.

7. **Transforming the Development of Australian Standards**
by Kevin Austin and Janelle Edgar, Enzyme International

Standards Australia, on behalf of the Australian community has taken on an immense workload in the development and review of Standards. To maintain a modern, consistent, flexible and internationally aligned Standards setting infrastructure, we need to prioritize, focus and invest our resources where they can add the maximum amount of Net Benefit to relevant Australian communities. After extensive consultation with industry, community and Government stakeholders in recent years, Standards Australia has developed a New Business Model. Extensive use of interactive modeling and *iThink* has been used to assist not only generation of hundreds of innovative ideas for improvement but also as a key communications tool.

8. **An Integrated Planning Model for Community Health Care Services**
by Yixen Chen, Vancouver Coastal Health

The Community Care Network (CCN) is an integrated part of Vancouver Coastal Health (VCH) strategic direction for a sustainable and accountable health care system. CCN provides Vancouver residents a variety of community health care services, which can be grouped into four core areas: Al Home Services, Supported Living, Residential Care and Transitional Care. The Integrated Planning Model (IPM) aims at understanding CCN core services as an integrated and interrelated system. The model captures interactions between services by looking at client transfers from one area to another. As a population based model rather than past utilization based, the model takes clients population characteristics (e.g. age profile) and their probability to switch services as driving factors for future demand. This way, the model provides high level demand projections under various scenarios, which enables the organization to allocate resources over time on a cross-service basis.

9. **Applications in Water Resource Management and Coastal Environmental Problems**
by Stephen Mecca, Providence College

Models and applications of systems dynamics using STELLA in two areas, Water Resource Management and Coastal Environmental Problems, are shown. Model structure, validation and results applied to real problem situations are summarized. References and results from the author's recent papers are provided and the progress of current research in our laboratory is outlined.

10. **Forecasting Enrollments for New Academic Programs**
by Basil Cleveland, Northeastern University

In order to evaluate effectively whether a new academic program should be launched, it is necessary to access a variety of possible outcomes based on dynamic enrollment, expense, and revenue expectations. This application allows the user to simulate the launch of a new program by dialing these variables and comparing their effects on overall profitability and student population levels. The application also includes a separate module for applying time-delayed trends to simulation results, offering the user a way to evaluate the impact of demographic data sets.

11. **Engaging Students in the Carbon Cycle through STELLA Modeling**
by Mary Martin, The GLOBE Carbon Cycle Project

Climate change is an important, yet complex topic, so how do you break it down for students to understand? The GLOBE-Carbon Cycle project joins NASA carbon cycle science with the International GLOBE Education program to bring the most cutting edge research and research techniques in the field of terrestrial ecosystem carbon cycling into K-12 classrooms. The GLOBE Carbon Cycle team, funded by NSF, is working with teachers to use modeling as a tool for teaching a major factor in climate change, the carbon cycle. Modeling is introduced to students via simple classroom activities, moves through a one-box model focused on the role of terrestrial ecosystems in the global carbon cycle, and progresses to a global carbon cycle model, which allows students to see the impact of fossil fuel use and land use change on the global cycle. Both simple and more complex models provide students with the opportunity to understand general system behavior and the nature of modeling, including the ability see how models can be used to ask scientific questions and how the results of modeling may lead to additional research questions. The GLOBE Carbon Cycle project also provides opportunities for students to connect modeling activities with field data collection and basic remote sensing concepts.

12. **Developing Systems Citizens in K-12 Education**
by Lees Stuntz, Creative Learning Exchange

The Creative Learning Exchange (CLE) is dedicated to developing Systems Citizens in K-12 education who use systems thinking and system dynamics to meet the interconnected challenges that face them at personal, community, and global levels. We support our mission by facilitating communication and sharing of materials among K-12 schools and teachers to help create a network of schools using Systems education.

13. **Aquatic Chemist**
by Stephen Page, Freshwater Institute: Fisheries and Oceans Canada

Over the past few decades, scientists have observed significant changes in the state of Lake Winnipeg, which has in turn spawned an environmental awareness for many Manitobans and Canadians. Since the 1990s, algal blooms on this great lake have increased in size, frequency and intensity: a threatening indicator of a deteriorating ecosystem. While these algal blooms have often been linked to increased human activities in the watershed (e.g. municipal sewage, septic fields, industrial discharge, livestock manure, agriculture, urban runoff), climate related events may be having a more significant and pressing influence on their occurrence and extent. We employ a STELLA based nutrient loading model which simulates lake nutrient concentrations (carbon, nitrogen and phosphorus) from 1913 to 2006 based on historical river inputs. In addition, we then use the same model to predict future lake concentrations based on various flow regimes as well as to estimate the impact of various proposed nutrient management strategies.