FORMATH FORUM 2011

森林資源管理と数理モデリング
国際フォーラム
Forest Resource Management and Mathematical Modeling
International Forum

期間：11月21日（月）11:00　～　11月22日（火）16:00
場所：政策研究大学院大学　21日　会議室1
　　22日　想海楼ホール

Date : Nov. 21(Mon) - 22(Tue), 2011
Venue : Lecture Room 1 (Nov. 21)
Soukairou Hall (Nov. 22)
National Graduate Institute for Policy Studies
7-22-1 Roppongi, Minato-ku, Tokyo

Organizers
Risk Analysis Research Center, Institute of Statistical Mathematics
Ecosystem Adaptability Global COE, Tohoku University

Co-Organizer
Japan Society of Forest Planning

FORMATH FORUM 2011 Tokyo
Program: November 21 (Mon) - 22 (Tue)

Date	**November 21, 2011**		
11:00 ～	Registration		
12:00 ～13:00	**Forest Modeling Project Discussion**		
13:00 ～13:30	**Lunch**		
13:00 ～13:30	Three dimensional measurement and modeling as tool for better management decision support	Peter Surový	Institute of Statistical Mathematics
13:30 ～14:00	Comparison of pruning regimes for Stone Pine using FSP models	Róbert Marušák	Czech University of Life Sciences
14:00 ～14:30	Comparing effects of harvest and replanting on national-level carbon dynamics between major planting species in Japan	Yasushi Mitsuda	Shikoku Research Center, Forestry and Forest Products Research Institute
14:30 ～15:00	**Coffee Break**		
15:00 ～15:30	Future Scenarios for Global Forest Development	Florian Kraxner	ESM, IIASA Dpt.
15:30 ～16:00	The expansion of the forest industry in Chile. The role of afforestation policies and harvest planning	Mario Niklitschek	Southern University of Chile
16:00 ～16:30	Swedish Forestry and Climate Change	Ola Sallnäs	The Swedish University of Agricultural Sciences
16:30 ～17:00	**Coffee Break**		
17:00 ～17:30	Spatial forest management for mitigation biological disturbances due to climate change	Masashi Konoshima	University of the Ryukyus
17:30 ～18:00	Brain to Brain EEG / fMRI connectivity	Jorge Bosch	National Institute for Physiological Research, NIPS, Okazaki
18:00 ～20:00	**Evening Discussion on Modeling Approach to Forestry**		

Date	**November 22, 2011**		
10:30 ～11:00	Advances in optimization modeling	Takashi Tsuchiya	GRIPS
11:00 ～11:30	Estimation Issues in Stochastic Market Modeling	Juan Carlos Jimenez	Instituto de Cibernética, Matemática y Física
11:30 ～12:00	Community forestry for sustainable forest management: Experiences from Bangladesh	Mohammed Jashimuddin	The University of Tokyo
12:00 ～13:00	**Lunch**		
13:00 ～13:30	A social-ecological systems framework for understanding human adaptability to ecological perturbations	Stanley Asah	University of Washington College of Forest Resources, U.S.
13:30 ～14:00	ECOSEL: A New Market for Forest Ecosystem Services	Sándor F. Tóth	University of Washington College of Forest Resources, U.S.
14:00 ～14:30	**Coffee Break**		
14:30 ～15:00	Selecting Growth Function for "Better" Projection of Carbon Sequestrated	Ken-ichi Kamo	Sapporo Medical University
15:00 ～15:30	Spatial concerns and formulation for harvest scheduling	Atsushi Yoshimoto	Institute of Statistical Mathematics
15:30 ～16:00	**Closing**		

Organizing Committee

Takashi Tsuchiya, GRIPS
Naoto Matsumura, Mie University
Atsushi Yoshimoto, ISM

Abstracts

Day 1

Peter Surovy (ISM, Japan)

Three dimensional measurement and modeling as tool for better management decision support

Modeling and prediction of growth and production is since long time one of the main focus of forest research. Traditional models can be divided into empirical models where the main background is statistical evaluation of measured growth, mechanistical (or process) models which aim to model the processes in plant like photosynthesis, transpiration and so on in order to predict growth, and the last group called structural models where the main aim is to estimate the development of the tree architecture.

In recent years the combination of these techniques leaded to creation of Functional Structural Plant Modeling (FSPM) approach where all the three modeling techniques are combined in order to produce modeling environment capable of incorporation of any new knowledge found in any level of tree research (leaves, stem, roots…). The presence of three-dimensional architecture allows on one hand direct visualization of the modeled trees on other it allow the measurement of for example light changes in side and below crown directly in the computer during simulation.

In this work we present the digitized data from Stone Pine tree (Pinus Pinea L.) the observed data correlation extracted from this measurement (branching angles, branch elongation and their dependencies on position on tree). The FSPS model code in XL - language with some explication is presented and its compilation through GroIMP environment as the resulting tree is shown.

Róbert Marušák (Czech University of Life Sciences Prague, Czech.)

Principles of derivation of tree volume on the base > of terrestrial digital photos

The paper is aimed at methodology of local model of stem shape developed for purposes of total tree volume calculation of trees on the base of terrestrial photogrametry. We applied system DendroScanner, which uses digital picture of the evaluated tree and its measurable parameters – tree height and diameter at breast height. Originally it was derived for calculation of stem volume of coniferous trees and broadleaved trees of regular form. The system is based on measuring of tree parameters on the digital picture. To evaluate precision and accuracy of this method stem volume derived from the pictures and real stem volume of cut trees was compared. Mean quadratic error of ±2% was obtained. The paper presents principles of tree parameters measuring on the digital pictures and following derivation of local model of tree volume.

Yasushi Mitsuda (Shikoku Research Center, Forestry and Forest Products Research Institute)

Comparing effects of harvest and replanting on national-level carbon dynamics between major planting species in Japan

We have developed a national-level system for simulating the forest carbon dynamics of Sugi and Hinoki planted forests in Japan, consisting of a forest database and a stand-level carbon cycle model. Using this system, we simulated the carbon dynamics of Sugi and Hinoki planted forests for the whole of Japan from 2005 to 2050 for several scenarios of harvest and replanting activities. These simulations yielded time-series trajectories of total living stock biomass, annual change in biomass, enabling us to compare the effects of harvest and following replanting on national-level carbon dynamics in the near future.

Florian Kraxner (ESM, IIASA Dpt., Laxenburg)

Future Scenarios for Global Forest Development

This presentation summarizes the joint efforts of IIASA/ESM and WWF International during the International Year of Forests 2011. We present the idea of Zero Net Deforestation and Degradation (ZNDD) by 2020 and how such an ambitious.

Mario Niklitschek (Southern University of Chile, Chile)

The expansion of the forest industry in Chile. The role of afforestation policies and harvest planning

Over the last three decades, the area under forest plantationts in Chile has increased by more than 1.5 million hectares. This afforested area is the resource base of a forest industry oriented to the production of pulp, sawnwood, and panels; contributing with 10 percent of the country´s exports. Economy wide (trade opening and land tenure security) and sector specific (plantation cost sharing) policies played a role in the industry emergence. Because of the Chilean comparative advantage in plantation forestry, trade opening significantly increased land rents in forestry use relative to farming. More recently, equity considerations and concerns on allocation distortions of high quality land have resulted in the reorientation of cost sharing incentives toward small landholders, and to fragile or degraded soils. Harvest planning using LP optimization models, at the strategic and tactical levels, have contributed to achieve more efficient timber resource allocation and decision making on the location, timing and sizing of pulp, panel and saw mills. Because of the strong dependence on exports, the two largest companies are in the process of certifying their forest management with FSC. A new challenge for forest company managers, and to harvest scheduling modeling, emerges from the certification requirements which involve spatial constraints on harvesting activities.

Ola Sallnäs (Swedish University of Agrcultural Sciences)

Swedish Forestry and Climate Change

I discuss how the probable climate change has influenced the professional discussion inside Swedish forestry and forestry practices. Since Sweden is a country situated far north climate change is expected to have positive effects on primaty forest production but also to potentially lead to increased risk for storm damage, attacks from pataogenes and insects etc. Linked to the climate change debate is the growing demand for renewable energy sources which implies significant changes for the forest sector of Sweden.

Jorge Bosch (National Institute for Physiological Research, NIPS, Okazaki)

Brain to Brain EEG / fMRI connectivity

A method for elucidating correlations in a high dimensional space, for example, between two different brains registered (with EEG/MEG/fMRI) at the same time.

Abstracts

Day 2

Juan Carlos Jimenez (Instituto de Cibernética, Matemática y Física, Cuba)

Estimation Issues in Stochastic Market Modeling

Basic issues on inference problems and methods in stochastic market modeling will be presented. As illustration, an application to the Japanese log market will be shown.

Mohammed Jashimuddin (The University of Tokyo, Japan)

Community forestry for sustainable forest management: Experiences from Bangladesh

The present forest management in Bangladesh is quite different from the past one in respect of its objectives including not only to produce timber but also to provide clean air, clean water, healthy habitat for wildlife and to act as a major source of biodiversity and nature-based tourism, and in philosophy to involve people in the management and create an environment so that people can feel that they have some stakes on trees growing on the forestland and to improve living standard of the people residing in the vicinity of the forests so that dependency on forests can be reduced. The history of scientific forest management in the Indian subcontinent including Bangladesh dates back to the nineteenth century with defined forest policies and laws adopted by British colonial period and followed with more or less same fashion of resource exploitation by successive Pakistan and Bangladesh period. Due to various socio-economic and socio-political factors, forest cover of the country reduced drastically and all such policy initiatives proved ineffective. Huge population and limited land area compelled policy makers to think about alternatives to traditional forest management. As such, community forestry has been introduced in the late 1970s and proved to be successful in the expansion of forest cover benefiting thousands of poor people. But, there are some failure stories as well due to top down bureaucratic nature of the approach and poor governance system. However, the traditional community based forest management practiced by the indigenous people of the Chittagong Hill Tracts (CHT) can be a model system of sustainable forest management and useful guide for the policy maker to formulate new policies for sustainable forest management involving local people.

Stanley Asah (University of Washington College of Forest Resources, U.S.)

A social-ecological systems framework for understanding human adaptability to ecological perturbations

In practice, social and ecological systems are coupled. This configuration as coupled social-ecological systems is of prime importance in our efforts to better understand and manage human adaptability to ecological perturbations. I use such a configuration to present a systematic framework for characterizing, managing and monitoring the ability to cope with and adapt to fine and coarse scale ecological perturbations. Based on a rigorously developed theoretical framework, I discuss four main attributes, and their inherent sub-attributes, of social-ecological systems. These main attributes include: (i) the system's ability to deal with change and uncertainty; (ii) ability to renew and reorganize itself; (iii) ability to combine different types of knowledge for learning and; (iv) capability of the system to create opportunities for self-organization. I discuss how a close exploration of this framework, its attributes and sub-attributes, help determine the extent to which such systems can accommodate ecological perturbations. I also discuss how such framework of attributes and sub-attributes facilitate understanding, management, and monitoring of system changes.

Sándor Tóth (University of Washington, Seattle)

ECOSEL: A New Market for Forest Ecosystem Services

ECOSEL is a voluntary market that matches willing sellers of forest ecosystem services with willing buyers. Multi-objective optimization is used in conjunction with a public good subscription mechanism to generate and market management alternatives that lead to Pareto-optimal bundles of ecosystem services on a piece of forestland. ECOSEL allows the public to subscribe to the competing alternatives by means of a web-based bidding platform. The management alternative that attracts the highest total of bids over the associated opportunity cost (a.k.a., threshold cost) wins the auction. The landowner is legally bound to implement the winning plan for a profit that arises between the proceeds and the costs of the plan. We provide a few examples of how ECOSEL can be used in practice and show how the mechanism can bypass the problem of additionality and minimize free riding. We will also report on a series of experimental auctions that were used to test the design of the mechanism to maximize social surplus and seller revenues. With this talk, we intend to bring experimental game theory to the forefront of natural resource economics to encourage the community to take a serious look at voluntary mechanisms for monetizing and funding forest ecosystem services.