Update on Land Use Steering Group activities

Based on ideas discussed in 2005

1. NRC Study

Title

- **Needs and Research Requirements for Land-Change Modeling**

Sponsors

- **USGS and NASA**

Statement of Task

A National Research Council committee will

- review the present status of spatially explicit land-change modeling approaches and
- describe future data and research needs

so that model outputs can better assist the science, policy, and decision-support communities.

Future needs for higher resolution and more accurate projections will require improved coupling of land-change models to climate, ecology, and biogeochemistry models; improved data inputs; improved validation of land-change models; and improved estimates of uncertainty associated with model outputs. The study will provide guidance on the verification strategies and data, and research requirements needed to enhance the next generation of models.

The study committee will:

1. Assess the analytical capabilities and science and/or policy applications of existing modeling approaches.
2. Describe the theoretical and empirical basis and the major technical, research, and data development challenges associated with each modeling approach.
3. Describe opportunities for improved integration of land observation strategies (including ground-based survey, satellite, and remote sensing data) with land-change modeling to improve land-change model outputs to better fulfill scientific and decision making requirements.

Committee Members

- Dr. Daniel G. Brown (Chair), University of Michigan
- Ms. Kathleen O'Neill Green, Kass Green and Associates
- Dr. Eric F. Lambin, University of Louvain
- Dr. Elena G. Irwin, The Ohio State University
- Dr. Karen C. Seto, Yale University
- Dr. Robert G. Pontius, Jr., Clark University
- Dr. Lawrence E. Band, University of North Carolina at Chapel Hill
- Dr. Peter H. Verburg, Vrije University Amsterdam
- Dr. Atul Jain, University of Illinois at Urbana-Champaign
- Dr. B. L. Turner, II, Arizona State University

Status of Study

- Two meetings held – one in DC, one in NC
  - Charge from agency sponsors
  - Input from broad community on strengths and weakness of multiple modeling approaches
- One scheduled for May
- Writing underway

- Report due Q2 2013

2. Land Use and Carbon Book

Title

- Land Use and the Carbon Cycle: Advances in integrated science, management, and policy

Publisher

- Cambridge University Press

Publication Date

- Late 2012 or early 2013

Based (to some extent) on workshop

- May 2009, Ann Arbor, MI – with funding from USGS

Section 1: Introduction

Linking land use and the carbon cycle
Derek T. Robinson, Daniel G. Brown, Nancy H.F. French, and Bradley C. Reed

An introduction to carbon cycle science
Galina Churkina

The contribution of land-use and land-use change to the carbon cycle
R. A. Houghton

An economic analysis of the effect of land use on terrestrial carbon storage
Robert Mendelsohn

Section 2: Measurement and modeling

- Remote sensing for mapping and modeling land-based carbon flux and storage
  Nancy H.F. French, Laura. L. Bourgeau-Chavez, Michael J. Falkowski, Scott Goetz, Liza K. Jenkins, Philip Camill, Collin S Roesler, and Daniel G. Brown
- Identifying geographical sources and sinks of carbon from atmospheric observations
  A. M. Michalak
- Overview of current limitations, challenges, and solutions to integrating carbon dynamics with land-use models
  Tom P. Evans, Derek T. Robinson, and Mikaela Schmitt-Harsh
- Modeling for integrating science and management
  Virginia H. Dale and Keith L. Kline

Section 3: Integrated science and research applications

- Carbon emissions from land-use change: Model estimates using three different datasets
  Atul Jain, Prasanth Meiyappan and Tosha Richardson
- A system to integrate multi-scaled data sources for improving terrestrial carbon balance estimates
  Jordan Golinkoff and Steve Running
- Simulating biogeochemical impacts of historical land-use changes in the U.S. Great Plains from 1870 to 2003
  William J. Parton, Myron P. Gutmann, Melannie D. Hartman, Emily R. Merchant, Susan M. Lutz and Stephen J. DelGrosso
- Carbon signatures of development patterns along a gradient of urbanization
  Marina Alberti and Lucy Hutyra

Section 4: Land policy, management, and the carbon cycle

- Managing carbon: ecological limits and constraints
  R. César Izaurralde, Wilfred M. Post and Tristram O. West
- Effects of wildland fire management on carbon stores
  Matthew D. Hurteau
- Soil carbon dynamics in agricultural systems
  Cynthia A. Cambardella and Jerry L. Hatfield
- U.S. policies and greenhouse gas mitigation in the agriculture
  Carol Adaire Jones, Cynthia J. Nickerson, and Nancy Cavallaro
- Opportunities and challenges for offsetting greenhouse gas emissions with forests
  Sandra Brown and Timothy Pearson
- Opportunities and challenges for carbon management on U.S. public lands
  Lisa Dilling, Richard Birdsey, and Yude Pan
- Design and planning of residential landscapes to manage the carbon cycle: Invention and variation in land use and land cover
  Lauren Lesch Marshall and Joan I. Nassauer

Section 5: Synthesis and future directions

Forests, carbon, and the global environment: New directions in research
David L. Skole, Jay Samek, Michael Smalligan, Walter Chomentowski, and Oscar Castaneda

Carbon cycle sustainability and land use
Dennis Ojima, Josep G. Canadell, Richard Conant, Christine Negra, and Petra Tschakert

Perspectives on land-change science and carbon management
Daniel G. Brown, Derek T. Robinson, and Nancy H.F. French