

**GEOGRAPHY 770: SEMINAR IN ENVIRONMENTAL AND RESOURCE CONSERVATION:  
CAUSES AND CONSEQUENCES OF LAND-USE CHANGE  
SPRING 2008  
THURS 9:00-11:40, STORM HALL 321**

**GENERAL INFORMATION:**

**Instructor:** Dr. Kathleen A. Farley  
**Office:** Storm Hall 313  
**Phone:** 594-8472 (worst way to reach me!)  
**Email:** kfarley@mail.sdsu.edu (best way to reach me!)  
**Office hours:** Tues 1-3, or by appointment (don't hesitate to make an appointment; I am happy to meet with students individually)

**COURSE OVERVIEW:**

Land-use change has been examined through a variety of lenses and disciplines, including geography, ecology, biology, soil science, anthropology, sociology, and others. A large body of literature now exists on both the physical and biological processes and the socioeconomic and political processes associated with land-use change. And, increasingly, efforts have been made to combine these biophysical and social science perspectives to gain a better understanding of both the causes and consequences of land-use change. The evaluation of how land use, and other types of environmental change, occurs in these coupled natural-human systems requires combining existing methods from various disciplines and developing novel approaches. This class will cover literature from social and ecological sciences that addresses different aspects of land-use change. The literature selected emphasizes research conducted by geographers, but also includes key papers and perspectives from a number of other disciplines, and an explicit effort has been made to include examples of a variety of methods and approaches to the study of land-use change.

By the end of the semester I hope that you will be able to:

- understand the key arguments, as well as the assumptions, of the authors we read over the semester
- identify a variety of approaches to and methods for the study of land-use change
- distinguish among approaches and the ways they are/can be applied to specific research questions and locations, and recognize the limitations of those approaches
- evaluate the ways in which some of the approaches and methods might be applicable to your own research
- appreciate the value of combined biophysical and social science approaches to understanding land-use change specifically, as well as human-environment interactions generally
- work effectively with each other to share ideas and provide insight and input towards each other's research objectives

**GRADING:**

Grading for the class will be divided as follows:

- Participation: 30%
- Discussion facilitation for one week: 10%
- Final presentation: 15%
- Synthesis paper: 45%

**ADDITIONAL INFORMATION ON GRADING AND ASSIGNMENTS:**

1. Participation: This grade will consist of student participation in class discussion and weekly written assignments.

- Participation in discussion: Every week, you are expected to read all the assigned readings prior to class and to think about them critically in preparation for participation in class discussions. Please be sure to bring all of the articles with you to class each week so that you can fully participate in the discussion.
- Weekly written assignments: As you do the reading each week, write out an analytical comment on each one. These can be comments on the approach taken by the authors, the interpretation of their results, the consistency between results and conclusions, or any other comment you may have on the readings. You must bring a printed copy and your comments will be handed in at the end of class each week.

2. Discussion facilitation: Students will take turns leading discussions each week. Each student will sign up to be the leader of one class discussion, beginning in week 3. The discussion leader should be prepared to synthesize and contrast or critique the week's readings and to lead the discussion on the week's topic. The leader is welcome - but by no means required - to suggest an additional reading for the week, or to bring in other relevant information for the discussion.

3. Synthesis paper and final presentation: For the final paper, each student should choose a topic related to land-use change on which to write a paper synthesizing the existing research on the topic. The topic can be a cause or consequence of land-use change that has not been covered in class; a more specific aspect of one of the areas already covered in class; or a particular set of methods used to approach questions of land-use change. Students are welcome to propose other topics for these papers as well. On the week prior to the presentation, each student should assign one key paper for the rest of the class to read in preparation for the presentation and discussion. Final papers are due on the last day of class (8 May).

**SCHEDULE:**

DATE	TOPIC	READING
<b>Conceptualizing human-environment interactions</b>		
1/24	Introduction	{DeFries et al. 2006}
1/31	Studying land-use change: human interactions with biophysical systems	Kates et al. 1990*; Turner et al. 2007; Robbins 2004*; Haberl et al. 2001; {Young et al. 2006}
<b>Examining the causes of land-use change</b>		
2/7	Why does land-use change occur?	Lambin et al. 2003; Lambin et al. 2001; Blaikie 1985*
2/14	Types of land-use change: agriculture and aquaculture	Rindfuss et al. 2007; Campbell et al. 2005; Luers et al. 2006; Homewood et al. 2001
2/21	Types of land-use change: deforestation	Hecht 1993; Mena et al. 2006; Geist and Lambin 2001; Carr et al. 2006
2/28	Types of land-use change: reforestation and afforestation	Rudel et al. 2005; Hecht and Saachi 2007; Nagendra 2007; Farley 2007; {Mather 1992}
3/6	Types of land-use change: urbanization	Schneider et al. 2005; Liu et al. 2005; {Berry 1990*}; [Grove et al. 2006]; [Aguayo et al. 2007]
<b>Examining the consequences of land-use change</b>		
3/13	What are the biophysical outcomes of land-use change?	DeFries et al 2004; Foley et al 2005; {Foley et al 2005 supplement}; {MEA 2005, pp 26-48}; [Robbins et al. 2006]
3/20	Effects on biodiversity and habitat	Barlow et al. 2007; Vester et al. 2007; Hansen et al. 2005; [Jetz et al. 2007]
3/27	Effects on the carbon cycle	Guo and Gifford 2002; Houghton 2003; Naughton-Treves 2004
4/3	<b>Spring break: no class</b>	
4/10	Effects on water resources	Scanlon et al. 2007; Farley et al. 2005; Piao et al. 2007; Mark and Dickinson 2008

Student Presentations		
4/17	AAG Annual Meeting, Boston: no class	
4/24	Student presentations	TBD
5/1	Student presentations	TBD
5/8	Student presentations	TBD

{ } = skim; [ ] = optional

#### READINGS:

Note: all readings will be posted on Blackboard except those with an asterisk, which will be handed out in class.

- DeFries R, Asner GP, Foley J. 2006. A glimpse out the window: landscapes, livelihoods, and the environment. *Environment* 48(8): 22-36. (skim)
- Kates, R.W., B.L. Turner II, and W.C. Clark. 1990. The great transformation. In: Turner, B.L., W.C. Clark, R.W. Kates, J.F. Richards, J.T. Mathews, and W.B. Meyer (Eds.), The Earth As Transformed by Human Action: Global and Regional Changes in the Biosphere over the Past 300 Years. Cambridge: Cambridge University Press with Clark University, pp.1-17.
- Turner BL, Lambin EF, Reenberg A. 2007. The emergence of land change science for global environmental change and sustainability. *Proceedings of the National Academy of Sciences* 104(52): 10666-20671.
- Robbins P. 2004. Political Ecology: A Critical Introduction. Malden, MA: Blackwell, pp 87-106.
- Haberl H, Batterbury S, Moran E. 2001. Using and shaping the land: a long-term perspective. *Land Use Policy* 18: 1-8.
- Young OR, Lambin EF, Alcock F, Haberl H, Karlsson SI, McConnell WJ, Myint T, Pahl-Wostl C, Polsky C, Ramakrishnan PS, Schroeder H, Scouvar M, Verburg PH. 2006. A portfolio approach to analyzing complex human-environment interactions: institutions and land change. *Ecology and Society* 11(2): 31. (skim)
- Lambin EF, Geist HJ, Lepers E. 2003. Dynamics of land-use and land-cover change in tropical regions. *Annual Review of Environment and Resources* 28: 205-41.
- Lambin EF, Turner BL, Geist HJ, Agbola SB, Angelsen A, Bruce JW, Coomes OT, Dirzo R, Fischer G, Folke C, George PS, Homewood K, Imbernon J, Leemans R, Li X, Moran E, Mortimore M, Ramakrishnan PS, Richards JF, Skånes H, Steffen W, Stone GD, Svedin U, Veldkamp TA, Vogel C, Xu J. 2001. The causes of land-use and land-cover change: moving beyond the myths. *Global Environmental Change* 11: 261-269.
- Blaikie, P. 1985. The Political Economy of Soil Erosion in Developing Countries. London: Longman, pp117-137.
- Rindfuss RR, Entwisle B, Walsh SJ, Mena CF, Erlien CM, Gray CL. 2007. Frontier land use change: synthesis, challenges, and next steps. *Annals of the Association of American Geographers* 97(4): 739-754.

- Campbell DJ, Lusch DP, Smucker TA, Wangui EE. 2005. Multiple methods in the study of driving forces of land use and land cover change: a case study of SE Kajiado District, Kenya. *Human Ecology* 33(6): 763-794.
- Luers AL, Naylor RL, Matson PA. 2006. A case study of land reform and coastal land transformation in southern Sonora, Mexico. *Land Use Policy* 23: 436-447.
- Homewood K, Lambin EF, Coast E, Kariuki A, Kikula I, Kivelia J, Said M, Serneels S, Thompson M. 2001. Long-term changes in Serengeti-Mara wildebeest and land cover: pastoralism, population, or policies? *Proceedings of the National Academy of Sciences* 98(22): 12544-12549.
- Hecht, S.B. 1993. The logic of livestock and deforestation in Amazonia. *Bioscience* 43(10): 687-695.
- Mena CF, Bilsborrow RE, McClain ME. 2006. Socioeconomic drivers of deforestation in the northern Ecuadorian Amazon. *Environmental Management* 37(6): 802-815.
- Geist HJ and Lambin EF. 2001. Proximate causes and underlying driving forces of tropical deforestation. *BioScience* 52(2): 143-150.
- Carr DL, Suter L, Barbieri A. 2006. Population dynamics and tropical deforestation: state of the debate and conceptual challenges. *Population and Environment* 27(1): 89-113.
- Rudel TK, Coomes OT, Moran E, Achard F, Angelsen A, Xu J, Lambin E. 2005. Forest transitions: towards a global understanding of land use change. *Global Environmental Change* 15: 23-31.
- Hecht SB and Saatchi SS. 2007. Globalization and forest resurgence: changes in forest cover in El Salvador. *BioScience* 57(8): 663-672.
- Nagendra H. 2007. Drivers of reforestation in human-dominated forests. *Proceedings of the National Academy of Sciences* 104(39): 15218-15223.
- Farley KA. 2007. Grasslands to tree plantations: forest transition in the Andes of Ecuador. *Annals of the Association of American Geographers* 97(4): 755-771.
- Mather AS. 1992. The forest transition. *Area* 24(4): 367-379. (skim)
- Schneider A, Seto KC, Webster DR. 2005. Urban growth in Chengdu, Western China: application of remote sensing to assess planning and policy outcomes. *Environment and Planning B: Planning and Design* 32(3): 323-345.
- Liu J, Zhan J, Deng X. 2005. Spatio-temporal patterns and driving forces of urban land expansion in China during the economic reform era. *Ambio* 34(6): 450-455.
- Berry BJL. 1990. Urbanization. In: Turner, B.L., W.C. Clark, R.W. Kates, J.F. Richards, J.T. Mathews, and W.B. Meyer (Eds.), The Earth As Transformed by Human Action: Global and Regional Changes in the Biosphere over the Past 300 Years. Cambridge: Cambridge University Press with Clark University, pp 103-119. (skim)
- Grove JM, Troy AR, O'Neil-Dunne JPM, Burch WR, Cadenasso ML, Pickett STA. 2006. Characterization of households and its implications for the vegetation of urban ecosystems. *Ecosystems* 9: 578-597. (optional)
- Aguayo MI, Wiegand T, Azócar GD, Wiegand K, Vega CE. 2007. Revealing the driving forces of mid-cities urban growth patterns using spatial modeling: a case study of Los Angeles, Chile. *Ecology and Society* 12(1): 13. (optional)
- DeFries RS, Foley JA, Asner GP. 2004. Land-use choices: balancing human needs and ecosystem function. *Frontiers in Ecology and the Environment* 2(5): 249-257.
- Foley JA, DeFries R, Asner GP, Barford C, Bonan G, Carpenter SR, Chapin FS, Coe MT, Daily GC, Gibbs HK, Helkowski JH, Holloway T, Howard EA, Kucharik CJ,

- Monfreda C, Patz JA, Prentice C, Ramankutty N, Snyder PK. 2005. Global consequences of land use. *Science* 309:570-574 + supplement. (read article; skim supplement)
- Millennium Ecosystem Assessment. 2005. Ecosystems and Human Well-Being: Synthesis. Washington DC: Island Press, pp 26-48. (skim; focus on tables)
- Robbins P, McSweeney K, Waite T, Rice J. 2006. Even conservation rules are made to be broken: implications for biodiversity. *Environmental Management* 37(2): 162-169. (optional)
- Vester HFM, Lawrence D, Eastman JR, Turner BL II, Calmé S, Dickson R, Pozo C, Sangermano F. 2007. Land change in the southern Yucatán and Calakmul Biosphere Reserve: effects on habitat and biodiversity. *Ecological Applications* 17(4): 989-1003.
- Jetz W, Wilcove DS, Dobson AP. 2007. Projected impacts of climate and land-use change on the global diversity of birds. *PLoS Biology* 5(6): 1211-1219.
- Barlow, J, Gardner TA, Araujo IS, Ávila-Pires TC, Bonaldo AB, Costa JE, Esposito MC, Ferreira LV, Hawes J, Hernandez MIM, Hoogmoed MS, Leite RN, Lo-Man-Hung NF, Malcolm JR, Martins MB, Mestre LAM, Miranda-Santos R, Nunes-Gutjahr AL, Overal WL, Parry L, Peters SL, Ribeiro-Junior MA, da Silva, MNF, da Silva Motta C, Peres CA. 2007. Quantifying the biodiversity value of tropical primary, secondary, and plantation forests. *Proceedings of the National Academy of Sciences* 104(47): 18555-18560.
- Hansen AJ, Knight RL, Marzluff JM, Powell S, Brown K, Gude PH, Jones K. 2005. Effects of exurban development on biodiversity: patterns, mechanisms, and research needs. *Ecological Applications* 15(6): 1893-1905.
- Guo LB, Gifford RM. 2002. Soil carbon stocks and land use change: a meta analysis. *Global Change Biology* 8: 345-360.
- Houghton RA. 2003. Revised estimates of the annual net flux of carbon to the atmosphere from changes in land use and land management 1850-2000.
- Naughton-Treves L. 2004. Deforestation and carbon emissions at tropical frontiers: a case study from the Peruvian Amazon. *World Development* 32(1): 173-190.
- Scanlon BR, Jolly I, Sophocleous M, Zhang L. 2007. Global impacts of conversions from natural to agricultural ecosystems on water resources: quantity versus quality. *Water Resources Research* 43(3).
- Piao S, Friedlingstein P, Ciais P, Noblet-Ducoudré N, Labat D, Zaehle S. 2007. Changes in climate and land use have a larger direct impact than rising CO<sub>2</sub> on global river runoff trends. *Proceedings of the National Academy of Sciences* 104(39): 15242-15247.
- Farley KA, Jobbágy EG, Jackson RB. 2005. Effects of afforestation on water yield: a global synthesis with implications for policy. *Global Change Biology* 11: 1565-1576.