

**GEO 6938:**  
**LAND COVER LAND USE CHANGE COURSE (LCLUC)**  
**Instructor: Dr. J. Southworth**



**Time and room:** Monday 1:55 p.m.–4:55 p.m. (TUR 3006)

**Office hours:** Monday 10 to 12 a.m. and any other time by appointment or ‘drop-by’ TUR 3129

**Class Packet:** Class packets will be handed out on the first day of class. This must be purchased from the Department. The cost is \$40.00 and checks should be made out to the ‘Geography department’ and must be paid by January 21<sup>st</sup>.

**LCLUC** is an interdisciplinary scientific theme concerned with improving the understanding of land use and land cover change dynamics and their relationships with global environmental change. The strong interest in land use and land cover results from their direct relationship to many of the planet's fundamental characteristics and processes, including the productivity of the land, the diversity of plant and animal species, and the biogeochemical and hydrological cycles. Land cover is continually molded and transformed by land use due to human cultural, social, and economic activities.

**LCLUC Research Goals:**

- Develop the capability to perform repeated global inventories of land-use and land-cover from space
- Develop the scientific understanding and models necessary to simulate the processes taking place
- Evaluate the consequences of observed and predicted changes
- Further the understanding of the consequences of land-use and land-cover changes on environmental goods and services, the carbon and water cycles and the management of natural resources
- Improve understanding of human interaction with the environment, and thus provide a scientific foundation for sustainability, vulnerability and resilience of land systems and their use.

**LCLUC Key Science Questions:**

- Where are land cover and land use changing, what is the extent and over what time scale?
- What are the causes and what are the consequences of LCLUC?
- What are the projected changes of land use and land cover and their potential impacts?
- What are the impacts of climate variability and changes on LCLUC and what is the potential feedback?

**This Course**

In keeping with the theme of LULCC this course will integrate GIS, remote sensing, spatial analysis, and modeling, and will focus on land use and land cover change theory, research approaches, and analytical techniques. All scientific disciplines concerned with patterns and processes that are heterogeneous in space must have methods for collecting, storing, analyzing,

and displaying spatial data. The relatively recent advent of powerful geographic information system (GIS) software on personal computers has given practitioners and academics in various disciplinary fields the ability not only to collect and analyze their own data, but also to collaborate with other disciplines to examine data in a common context. Furthermore, the use of remotely sensed data allows for an historical (aerial photography since the early 1930s and satellite based sensors since the mid 1970s) trajectory of change at a large range of spatial and temporal scales, across a wide range of fields.

Most people recognize that training in the application of GIS, spatial analysis, modeling and remote sensing is not just useful within specific disciplines, but represents the central mechanism of coordination for and communication of all spatially heterogeneous information, whether socioeconomic, anthropological, or ecological. Nonetheless, many of the geographic concepts that are fundamental to GIS are not addressed in traditional disciplinary studies yet are necessary for effective application of spatial data with GIS or other approaches. This course will address the fundamentals and application of these geographic technologies, which are essential for all students, and will include a mandatory 1-week field course in which these different techniques which have been used in class will then be related to and tested with real world data. Applying GIS, spatial analysis, modeling, and remote sensing as analytical tools in common is a powerful way to understand jointly the multiple factors involved in LULCC.

### **Course Description and Goals:**

The main goal of this seminar is to provide a semester long “environment” in which your individual research interest (research paper or proposal related to “LCLUC”) can be “nurtured” and discussed with an interdisciplinary group of graduate colleagues. Your overall goal is to work on a single research paper or proposal (dissertation or funding based) during the whole semester while interacting with colleagues in our class. Additional assignments and projects will also be undertaken throughout the semester and are outlined in more detail in the section on ‘Assignments and Grading’. The course is divided in three parts. **First**, I will provide a core bibliography (listed below) aiming to establish a common language across the seminar participants and to support your initial paper/proposal development. During this part, you need to develop an outline of your paper, start your specific bibliographical review, and start to process your data for the fieldwork component of the course. In the **second** part, you will be responsible to prepare, present, and share a bibliographical review covering your area of particular interest, that is, directly related to your paper/proposal. Finally, the **third** part of this seminar will be directed towards your paper presentation and discussion with your peers. During this phase you will have the chance to incorporate comments and criticism from the group and improve your paper/proposal manuscript prior to final submission.

### **Course Schedule:**

The class will be based on seminar type discussion and intensive readings. You will be purchasing a reader binder from the Geography Department in the first week of classes. This binder contains most of the readings assigned to the class, including the course text (*Seeing the Forest and the Trees*), which is currently under review with MIT press and not yet published, and hence had to be copied privately. This text cannot be shared with anyone outside the class. The course outline is as follows in terms of topics to be covered etc.

### **Books/Journal Special Issues of Special Interest:**

These are books you may wish to consider purchasing/downloading/ordering for use in your future research if you will be working in the area of LULCC.

- Fox, J., R. Rindfuss, S. Walsh, and V. Mishra, eds. 2003. *People and the Environment: Approaches for Linking Household and Community Surveys to Remote Sensing and GIS*. Boston: Kluwer Academic Publishers.\*\*
- Geist, H. J., and E. F. Lambin. 2000. *What drives tropical deforestation? A Meta-Analysis of Proximate and Underlying Causes of Deforestation Based on Subnational Scale Case Study Evidence*. LUC Report Series, No. 4. Louvain-la-Neuve, Belgium: LUC International Project Office, University of Louvain. (Can request a copy form the website of obtain as a pdf)
- Jensen, J.R., 1996 (2<sup>nd</sup>. Edition). *Introductory Digital Image Processing*. New York: Prentice-Hall.
- Kaimowitz, D. and A. Angelsen. 1998. Economic models of tropical deforestation: A review. Bogor, Indonesia: CIFOR. (Can request a copy form the website of obtain as a pdf)
- Liverman, D., E. F. Moran, R. R. Rindfuss, P. C. Stern (1998) People and Pixels: Application of Remote Sensing Technology in Social Sciences. National Academy Press, Washington, DC. (Cheap, ~ \$30)
- Mannion, A. M. (2002). *Dynamic World. Land-cover and land-use change*. New York, NY: Arnold Press.
- McGarigal K and Marks B. (1995). *Fragstats : Spatial pattern analysis for quantifying landscape Structure*. Forest Service. PNW-GTR-351. (Can obtain online)
- Walsh S. J. and K. A. Crews-Meyer Eds., 2002. *Linking People, Place and Policy: A GIScience Approach*, Boston: Kluwer Academic Publishing.
- Also check out the Special Issue of 'Agriculture, Ecosystems and Environment' Vol. 85, available online through UF library e-journals.

### **And the following Websites:**

For an amazing reference section and links see the LUC information at Columbia

[http://sedac.ciesin.columbia.edu/tg/guide\\_frame.jsp?rd=lu](http://sedac.ciesin.columbia.edu/tg/guide_frame.jsp?rd=lu)

And for a Great Online Book on Land Use Change see:

Briassoulis, H. (2000). *Analysis of Land Use Change: Theoretical and Modeling Approaches* [Online book]. Regional Research Institute, West Virginia University.

<http://www.rri.wvu.edu/WebBook/Briassoulis/contents.htm>

Note: As the Professor I do reserve the right to change the readings / schedule as we go along. However a preliminary schedule is attached.

### **Week      Date                      Topic**

#### ***PART I: HUMAN DIMENSIONS OF GLOBAL CHANGE (HDGC) & LCLUC RESEARCH***

- |          |   |   |
|----------|---|---|
| <b>1</b> | <b>12<sup>th</sup> January</b><br><i>Readings</i> | <b>HDGC and LCLUC Research – An Introduction</b><br><i>1. Chapter 1: Seeing the Forest and the Trees</i><br><i>2. Lambin et al., 1999. Land-Use and Land-Cover Change (LUCC): Implementation Strategy. IGBP Report #48 and IHDP Report #10.</i> |
|----------|---|---|

3. Turner et al., 1995. IHDP Report #7: Land-Use and Land-Cover Change Science/Research Plan.
4. Special Issue of BioScience V44 n5 1994. The following papers:
  - i. Skole et al., Physical and Human Dimensions of deforestation in Amazonia.
  - ii. Kummer and Turner, The human causes of deforestation in Southeast Asia
  - iii. Riebsame et al. Integrated modeling of land use and cover change.
  - iv. Houghton, The Worldwide extent of land-use change.
  - v. Ojima et al., The global impact of land-use change.

2     **19<sup>th</sup> January**

**NO CLASSES – MARTIN LUTHER KING DAY**

3     **26<sup>th</sup> January**

**Theories Underlying the study of Human Dimensions of Global Environmental Change**

*Readings*

1. *Chapter 2: Seeing the Forest and the Trees*

2. Read Chapters 1 (Rindfuss et al), 10 (Malanson) and 11 (Axinn and Barber) in: Fox, J., R. Rindfuss, S. Walsh, and V. Mishra, eds. 2003. *People and the Environment: Approaches for Linking Household and Community Surveys to Remote Sensing and GIS*. Boston: Kluwer Academic Publishers.

3. Lambin et al., 2001. The causes of land-use and land-cover change: moving beyond the myths. *Global Environmental Change*, 11 pp. 261-269.

4. Lambin E.F., and H.J. Geist n.d. Global land-use and land-cover change: what have we learned so far? LUCG website.

5. Geist, H.J. and E.F. Lambin, 2002. Proximate causes and underlying driving forces of tropical deforestation. *BioScience*, 52:2, pp. 143-150.

6. Goeghan et al., 1998. "Socializing the Pixel" and "Pixelizing the Social" in *Land-Use and Land-Cover Change*, Chapter 3, pp. 51-69. In D. Liverman et al. (eds.) People and Pixel: Linking remote sensing and social sciences. Washington: National Research Council.

4     **2<sup>nd</sup> February**

**Forest Ecosystems Ecology, Landscape Ecology, and the Human Dimension**

*Readings*

1. *Chapter 3: Seeing the Forest and the Trees*

2. Foody et al., 2003. Predictive relations of tropical forest biomass from Landsat TM data and their transferability between regions. *Remote Sensing of Environment*, 85 pp.463-474.

3. Bockstael, N. E. 1996. Modeling Economics and Ecology: The Importance of a Spatial Perspective. *American Journal of Agricultural Economics* 78(5):1168–1180.

4. Helmer, E. H., 2000. The landscape ecology of Tropical secondary forest in montane Costa Rica. *Ecosystems*, 3, 98-114.

5. Nagendra, H., J. Southworth, and C. Tucker, 2003. Accessibility as a determinant of landscape transformation in Western Honduras: linking pattern and process. *Landscape Ecology*, 18 pp. 141-158.

Additional papers which may also be of interest:

Brown S., Gillespie A.J.R. and Lugo A. 1989. Biomass estimation methods for tropical forests with applications to forest inventory data. *Forest Science* 35(4):881-902.

Singh, A. (1989). Digital change detection techniques using remotely-sensed data. *International Journal of Remote Sensing*, 10(6):989-1003.

Skole D. and C.J. Tucker, 1993. Tropical Deforestation and Habitat Fragmentation in the Amazon: Satellite Data from 1978 to 1988. *Science* 260: 1905-1910.

Behrens, C.A.; Baksh, M.G. and M. Mothes, 1994. A Regional Analysis of Bari Land Use Intensification and its Impact on Landscape Heterogeneity. *Human Ecology* 22(3): 279-316.

Nagendra, H. 2001a. Using Remote Sensing to Assess Biodiversity. *International Journal of Remote Sensing* 22(12):2377-2400.

Nagendra, H., and M. Gadgil. (1999) Biodiversity Assessment at Multiple Scales: Linking Remotely Sensed Data with Field Information. *Proceedings of the National Academy of Sciences of the United States of America* 96(16):9154-9158.

5 **9<sup>th</sup> February** **Scaling: Scales of Space, Time and Human Decision Making**

*Readings*

1. *Chapter 4: Seeing the Forest and the Trees*

2. Turner, M.G.; Dale V.H. and R.H. Gardner, 1989. Predicting Across Scales: Theory Development and Testing. *Landscape Ecology* 3(34): 245-252.

3. Atkinson, P.M., and N.J. Tate, 2000. Spatial Scale Problems and Geostatistical solutions: A Review. *Professional Geographer*, 52:4 pp. 607-623.

4. Gibson, C. C., Ostrom, E., & Ahn, T. K., 2000. The concept of scale and the human dimensions of global change: a survey. *Ecological Economics*, 32, 217-239.

5. Chapters 2 and 3 from 'Text: Scale and Geographic Inquiry: Nature, Society, and Method', 2003. Eds. E. Sheppard and R.B. McMaster, Blackwell Publishing.

i. Chapter 2: Population and Environment Interactions: Spatial considerations in landscape characterization and modeling. By: Walsh et al., 2003.

ii. Chapter 3. Crossing the Divide: Linking global and local scales in human-environment systems. By: Easterling and Polsky, 2003.

Additional papers which may also be of interest:

Allen T.F.H. and Star T.B. 1982. *Hierarchy: Perspectives for Ecological Complexity*. Chicago: University of Chicago Press.

Meentemeyer, V. and E.O. Box, 1987. Scale Effects in Landscape Studies. In M.G. Turner (ed.). *Landscape Heterogeneity and Disturbance*. New York: Springer-Verlag (pp.15-34).

- Marceau, D.J., 1999. The scale issue in social and natural science. *Canadian Journal of Remote Sensing*, 25(4):347-356
- O'Neill, R.V.; Johnson A.R. and A.W. King, 1989. A Hierarchical Framework for the Analysis of Scale. *Landscape Ecology* 3(3-4):195-205.
- Rosen R. 1987. Similitude, similarity, and scaling. *Landscape Ecology*, 3(3/4):207-216.
- Turner, M.G. 1989. Landscape Ecology: the effect of pattern on process. *Annual Review of Ecological Systems*. 20: 171-197.
- Turner, S.J.; O'Neill, R.V.; Conley, W.; Conley, M.R.; H.C. Humphries, 1991. Pattern and Scale: Statistics for Landscape Ecology. In M.G. Turner and R.H. Gardner (eds.). *Quantitative Methods in Landscape Ecology*. New York: Springer-Verlag.
- Schellas J. and Russel G. (ed.) 1996. *Forest Patches*. Washington: Island Press.
- Turner, M., W. H. Romme, R. H. Gardner, R. V. O'Neill, and T. K. Kratz. 1993. A Revised Concept of Landscape Equilibrium: Disturbance and Stability on Scaled Landscapes. *Landscape Ecology* 8(3):213-227.
- Woodcock, C.E. and A.H. Strahler, 1987. The Factor of Scale in Remote Sensing. *Remote Sensing of Environment* 21:311-332.

## **PART II: METHODS FOR HDGC/LCLUC RESEARCH**

- 6**      **16<sup>th</sup> February**      **Using Remote Sensing to Study HDGC/LCLUC**  
*Readings*
1. *Chapter 5: Seeing the Forest and the Trees*
  2. Turner, M.D., 2003. Methodological reflections on the use of remote sensing and GIScience in human ecological research. *Human Ecology*, 31:2 pp.255-279.
  3. Kerr J.T. and M. Astrovsy, 2003. From space to species: ecological applications for remote sensing. *TRENDS in Ecology and Evolution*, 18:5 pp. 299-305.
  4. Jansen, L. J. M., & Di Gregorio, A., 2002. Parametric land cover and land-use classification as tools for environmental change detection. *Agriculture, Ecosystems and Environment*, 91, 89-100.
  5. Mertens, B., W. D. Sunderlin, O. Ndoye, and E. F. Lambin. 2000. Impact of Macroeconomic Change on Deforestation in South Cameroon: Integration of Household Survey and Remotely Sensed Data. *World Development* 28:983-999.
  6. Alex de Sherbinin, Deborah Balk, Karina Yager, Malanding Jaiteh, Francesca Pozzi, Chandra Giri, Antoinette Wannebo , 2002. A CIESEN Guide To: Social Science Applications of Remote Sensing, pp. 69.

Additional papers which may also be of interest:

- McCracken, S., E. S. Brondizio, D. Nelson, E. F. Moran, A. D. Siqueira, and C. Rodriguez-Pedraza. 1999. Remote Sensing and GIS at the Farm Property Level: Demography and Deforestation in the Brazilian Amazon. *Photogrammetric Engineering and Remote Sensing* 65:1311-1320.
- Chen, K., 2002. An approach to linking remotely sensed data and areal census data. *Int. J. Rem. Sen.* 23(1): 37-48.

- Cihlar, J., 2000. Land cover mapping of large areas from satellites: status and research priorities. *Int. J. Rem. Sen.* 21(6&7): 1093-1114.
- Lambin, E. F., 1997. Modelling and monitoring land cover change processes in tropical regions. *Progress in Phys. Geog.* 21(3): 375-393.
- Nelson, R. F., D. S. Kimes, W. A. Salas, and M. Routhier. 2000. Secondary Forest Age and Tropical Forest Biomass Estimation Using Thematic Mapper Imagery. *Bioscience* 50:419–431.
- Mertens, B., Lambin, E.F., 2000. Land cover-change trajectories in Southern Cameroon. *Annals Assoc. Amer. Geog.* 90(3): 467-495.
- Rogan J, Franklin J, Roberts DA. 2002. A comparison of methods for monitoring multitemporal vegetation change using Thematic Mapper imagery. *Remote Sensing Of Environment* 80: 143-156.

7      **23<sup>rd</sup> February      Human-Environment Research, spatially Explicit Data Analysis and GIS**

- Readings*
1. *Chapter 6: Seeing the Forest and the Trees*
  2. Foody, G.M. (2003). Uncertainty, knowledge discovery and data mining in GIS, *Progress in Physical Geography* 27, 1 pp. 113-121.
  3. Walker, R., 2003. Mapping Process to Pattern in the Landscape Change of the Amazonian Frontier. *Annals of the Association of American Geographers*, 93(2), 376-398.
  4. Anselin, L. 2001. Spatial Effects in Econometric Practice in Environmental and Resource Economics. *American Journal of Agricultural Economics* 83:705–710.
  5. Goodchild, M. F., L. Anselin, R. P. Appelbaum, and B. H. Harthorn. 2000. Toward Spatially Integrated Social Science. *International Regional Science Review* 23(2) pp. 139–159.
  6. Read Chapter 4 (Walsh et al.) in: Fox, J., R. Rindfuss, S. Walsh, and V. Mishra, eds. 2003. *People and the Environment: Approaches for Linking Household and Community Surveys to Remote Sensing and GIS*. Boston: Kluwer Academic Publishers.

Additional papers which may also be of interest:

- Veldkamp, A., & Lambin, E. F. (2001). Predicting land-use change. *Agriculture, Ecosystems and Environment*, 85(1-3), 1-6.
- Elhorst, J. P. 2001. Dynamic Models in the Space and Time. *Geographical Analysis* 33(2):119–140.
- Turner, M. 1990. Spatial & Temporal Analysis of Landscape Patterns. *Landscape Ecology* 4:21–30.

8      **1<sup>st</sup> March      Institutional Analysis in Multidisciplinary Research of HDGC/LCLUC**

- Readings*
1. *Chapter 7: Seeing the Forest and the Trees*
  2. Ostrom, E., J. Burger, C. B. Field, R. B. Norgaard, and D. Policansky. (1999). Revisiting the Commons: Local Lessons, Global Challenges. *Science* 284(5412): 278–282.

3. Nyerges, E. A., and G. M. Green. 2000. The Ethnography of Landscape: GIS and Remote Sensing in the Study of Forest Change in West African Guinea Savanna. *American Anthropologist* 102(2): 272–290.
4. Schweik, C., and C. Thomas. 2002. Using Remote Sensing for Evaluating Environmental Institutions: A Habitat Conservation Planning Example. *Social Science Quarterly* 83(1): 244–62.
5. Nelson, G. C., V. Harris, and S. Stone. 2001. Deforestation, Land Use and Property Rights: Evidence from Darien, Panama. *Land Economics* 77: 187–205.

9      8<sup>th</sup> March      **SPRING BREAK – YUCATAN FIELD TRIP**

10     15<sup>th</sup> March     **Modeling LULCC: Exploring the Dynamics of Human-Environment Relationships : \*\*\*\*\* AAG Conference, Make-UP Date Needed, No Class on March 15<sup>th</sup>!!!! \*\*\*\*\***

*Readings*

1. *Chapter 8: Seeing the Forest and the Trees*
2. Parker et al., 2003. Multi-agent systems for the simulation of land-use and land-cover change: A review. *Annals of the Association of American Geographers*, 93:2 pp. 314-337
3. Huigen, M.G.A., 2003. Agent Based Modelling in Land Use and Land Cover Change Studies, Interim Report IR-03-044
4. Hubacek K. and J.C.J.M. van den Bergh, 2002. The Role of Land in Economic Theory. Interim Report IR-02-037.
5. Hubacek, K. and J. Vazquez, 2002. The Economics of Land Use Change. Interim Report IR-02-015.
6. Irwin, E. G., & Geoghegan, J. (2001). Theory, data, methods: developing spatially explicit economic models of land use change. *Agriculture, Ecosystems and Environment*, 85(1-3), 7-23.
7. Agarwal, C., Green, G. M., Grove, J. M., Evans, T. P., & Schweik, C. M. (2002). *A Review and Assessment of Land-Use Change Models: Dynamics of Space, Time, and Human Choice* (General Technical Report NE-297). Newton Square, PA: USDA Forest Service, CIPEC Indiana University.
8. Chomitz, K. M., and D. A. Gray. 1996. Roads, Land Use, and Deforestation: A Spatial Model Applied to Belize. *World Bank Economic Review* 10:487–512.
9. D'aquino, P., August, P., Balmann, A., Berger, T., Bousquet, F., E., B., Brown, D. G., Couclelis, H., Deadman, P., Goodchild, M. F., Gotts, N. M., Gumerman, G. J., Hoffmann, M. J., Huigen, M. G. A., Irwin, E., Janssen, M. A., Johnston, R., Kholer, T., Law, N. L. R., Lee, V., Le Page, C., Lim, K., Manson, S. M., McConnell, W. J., McCracken, S., Moran, E. F., Najlis, R., Nassauer, J. I., Opaluch, J. J., Page, S. E., Parker, D. C., Polhill, G. J., Robinson, D., Thompson, R., Torrens, P., & Warren, K. (2001). *Agent-Based Models of Land-Use and Land-Cover Change* (LUCC Report Series No. 6). Bloomington, IN: LUCC Focus 1 Office.

**PART III: COMPARISON: GENERALIZING FROM CASE STUDIES**

- 11**      **22<sup>nd</sup> March**  
**Readings**
- Amazon**
1. *Chapters 9 & 11: Seeing the Forest and the Trees*
  2. Wood, C.H. and Skole D. 1998. Linking satellite, census, and survey data to study deforestation in the Brazilian Amazon. In D. Liverman et al. (eds.) People and Pixel: Linking remote sensing and social sciences. Washington: National Research Council.
  3. Evans, T. P., A. Manire, F. de Castro, E. Brondízio, and S. McCracken. 2001. A Dynamic Model of Household Decision Making and Parcel-Level Land Cover Change in the Eastern Amazon. *Ecological Modelling* 143(1-2): 95–113. Available through <http://www.sciencedirect.com/web-editions> (subscription required).
  4. Moran, E.F.; Brondizio, E.S.; Mausel, P. and W. You (1994). Deforestation in Amazonia: Land use change from ground and space level perspective. Bioscience 44(5): 329-339.
  5. Brondizio E.S., Moran E.F., Mausel P. and Y. Wu, 1996. Changes in land cover in the Amazon estuary: Integration of thematic mapper with botanical and historical data. Photogrammetric Engineering and Remote Sensing 62(8): 921-929.
  6. Dale, V.H.; O'Neill, R.V.; Pedlowiski, M. and F. Southworth, 1993. Causes and Effects of Land-Use Change in Central Rondonia, Brazil. Photogrammetric Engineering and Remote Sensing. 59(6): 997-1005.
  7. Brondízio, E.S.; Moran, E.F.; Mausel, P. and Y. Wu, 1994a. Land Use Change in the Amazon Estuary: Patterns of Cabloco Settlement and Landscape Management. Human Ecology 22(3): 249-278.
- 12**      **29<sup>th</sup> March**  
**Readings**
- Meso-America**
1. *Chapter 10: Seeing the Forest and the Trees*
  2. Geoghegan et al., 2001. Modeling tropical deforestation in the Southern Yucatán peninsular region: comparing survey and satellite data. *Agriculture, Ecosystems and Environment*, 85 pp. 25-46.
  3. Farrow, A., & Winograd, M., 2001. Land use modelling at the regional scale: an input to rural sustainability indicators for Central America. *Agriculture, Ecosystems and Environment*, 85, 249-268.
  4. Munroe, D., J. Southworth, and C. M. Tucker. 2002. The Dynamics of Land-Cover Change in Western Honduras: Exploring Spatial and Temporal Complexity. *Agricultural Economics* 27(3): 355–369.
  5. Southworth, J., & Tucker, C., 2001. The influence of accessibility, local institutions, and socioeconomic factors on forest cover change in the mountains of western Honduras. *Mountain Research and Development*, 21(3), 276-283.
- 13**      **5<sup>th</sup> April**  
**Readings**
- Africa & Asia**
1. *Chapter 12: Seeing the Forest and the Trees*
  2. Schweik et al., 2003. Using satellite imagery to locate innovative forest management practices in Nepal. *Ambio*, 32:4 pp. 312-319.
  3. Mertens, B., and E. F. Lambin. 1997. Spatial Modelling of Deforestation in Southern Cameroon. *Applied Geography* 17:143–162.

4. Mertens, B., and E. F. Lambin. 2000. Land-Cover-Change Trajectories in Southern Cameroon. *Annals of the Association of American Geographers* 90:467-495. URL:

[http://www.geo.ucl.ac.be/LUCC/MODLUC\\_Course/PDF/E.%20Lambin.pdf](http://www.geo.ucl.ac.be/LUCC/MODLUC_Course/PDF/E.%20Lambin.pdf)

5. Sussman, R. W., G. L. Green, and L. K. Sussman (1994). Satellite imagery, human ecology, anthropology, and deforestation in Madagascar. *Human Ecology* 22(3): 333-354.

14     **12<sup>th</sup> April**  
         *Readings*

**Meta-Analysis of Agricultural Change**

1. *Chapter 13: Seeing the Forest and the Trees*

2. Lambin, E. F., Rounsevell, M. D. A., & Geist, H. J. (2000). Are agricultural land-use models able to predict changes in land-use intensity? *Agriculture, Ecosystems and Environment*, 82, 321-331.

**PART IV: EPILOGUE**

15     **19<sup>th</sup> April**  
         *Readings*

**New Directions in LCLUC/HDGC Research**

1. *Chapter 14: Seeing the Forest and the Trees*

2. Evans, T. P., and E. F. Moran. 2002. Spatial Integration of Social and Biophysical Factors Related to Landcover Change. *Population and Environment: Methods of Analysis*, ed. W. Lutz, A. Prskawets, and W. C. Sanderson. Population and Development Review, supp. to vol. 28. New York: Population Council.

3. National Research Council (NRC). 2001. *Grand Challenges in Environmental Sciences*. Report from the Committee on Grand Challenges in Environmental Sciences. Washington, D.C.: National Academy Press. Executive Summary

4. Meeting in the Middle: The challenge of Meso-Level Integration. 2000. Eds. McConnell and Moran. LUCC Report Series No. 5

5. HDGEC 1998 Report from the National Academy Press, Chapter 7.

Additional papers which may also be of interest:

1. National Science Foundation (NSF). 2003. *Complex Environmental Systems: Synthesis for Earth, Life and Society in the 21<sup>st</sup> Century*. Report from the Advisory Committee for Environmental Research and Education. Arlington, Va.: National Science Foundation.

2. International Geosphere-Biosphere Programme (IGBP). In preparation. *The Land Project: A Science Plan and Implementation Strategy for Integrated Research on Coupled Human-Environment Systems on Land*. IGBP Report Series. Stockholm, Sweden: IGBP.

3. National Research Council (NRC). 2001. *Grand Challenges in Environmental Sciences*. Report from the Committee on Grand Challenges in Environmental Sciences. Washington, D.C.: National Academy Press. I have this full report for those who wish to view it.

4. National Research Council (NRC). 1999a. *Human Dimensions of Global Environmental Change: Research Pathways for the Next Decade*. Report from the

**FieldTrip Schedule: Yucatan, Mexico, Thursday March 4<sup>th</sup> – Friday March 12<sup>th</sup>**

<b>Date</b>	<b>Location</b>	<b>Tasks</b>
Thursday March 4 <sup>th</sup>	Arrive in Merida, Mexico	Arrive
Friday March 5 <sup>th</sup>	Hobonil	a.m. lectures p.m. drive to Hobonil, stops along the way include: kitchen gardens, and recording land cover/land uses Evening – Group Discussion
Saturday March 6 <sup>th</sup>	Hobonil	Training samples, Ground Control Points (GCPs), Interviews – local to site Evening – Group Discussion
Sunday March 7 <sup>th</sup>	Hobonil	More TS's, Visit Archeological site Evening – Group Discussion
Monday March 8 <sup>th</sup>	Hobonil	a.m. – Archeological fieldtrip p.m. – Land Cover Change Models Testing – change TS's Evening – Discussion & presentations of predictive models
Tuesday March 9 <sup>th</sup>	Hobonil	Testing of predictive surfaces created in class at UF – Land Cover Change Models Evening – Discussion & development of own group projects: schedule creation and decisions for Wednesday's fieldwork
Wednesday March 10 <sup>th</sup>	Hobonil	Implement own group projects Evening – final presentations of predictive models and own group projects
Thursday March 11 <sup>th</sup>	Retrun to Merida	a.m. Return to Merida p.m. – free time, shopping etc. in Merida evening – final group dinner & evening out
Friday March 12 <sup>th</sup>	Merida	Fly out of Merida

Readings for FieldTrip will be handed out in the class as we go along.

**Course Assignments**

1. Class Participation **20%**
2. Fieldwork Presentation and write-up **20%**
3. Paper/Proposal (Max. length 30 pages double-spaced) **40%**
4. Evaluation of fellow-student paper/proposals (2 page max. single spaced, 2 per student) **10%**
5. Annotated Bibliography (papers, books, websites) on specified topics related to weekly class topics and textbook chapters. Students will select these topics in the first 3-4 weeks of class **10%**

**GRADING SCHEME:**

[A= 90 and above] [B+=85-89.9] [B=80-84.9] [C+=75-79.9] [C = 70-74.9] [D+ = 65-65.9] [D = 60-64.9]  
 [E = <60]

**Predictive Models of Land Cover/Land Use Changes across the Study area to be tested by groups during the FieldTrip**

Images already obtained for Study area to be used in groups for surface predictions are:

Date	Type
01/15/1978	MSS Landsat 2
04/14/1986	TM Landsat 5
04/27/1988	TM Landsat 5
04/04/1994	TM Landsat 5
11/06/2000	ETM Landsat 7
03/14/2001	ETM Landsat 7

**A very preliminary list of Journals of interest:**

(Students will be asked to contribute to the list of Journals as they engage in reading discussion assignments)

-Human Ecology; Forest Ecology and Management; Ecosystems; Photogrammetric Engineering and Remote Sensing; International Journal of Remote Sensing; Remote Sensing of the Environment; Applied Geography; Landscape Ecology; Professional Geographer; Advances in Physical Geography; Journal of Ethnobiology; Geocarto International; American Anthropologist; Ethnology; Research in Economic Anthropology; Acta Amazonica; Interciencia; Economic Botany; Human Ecology; Advances in Economic Botany; Human Organization; Conservation Biology; American Anthropologist; Ambio; Bioscience; Ecological Economics; Conservation Ecology; Biotropica; Journal of Ecology; Ecology; Advances in Human Ecology; Latin American Research Review; Global Change Biology; Nature; Science; Ecological Economics; Vegetatio; Land Degradation and Rehabilitation; Political Ecology; Mountain Research and Development; Agriculture, Ecosystems and Environment; Landscape Research; Agricultural Economics; Journal of Tropical Ecology.

Most of these journals are available through the online e-journals at UF in full text form.

**Some important Links:**

(Students will be asked to contribute to the list of Web sites)

Center for the Study of Institutions, Populations and Environmental Change (CIPEC, at Indiana University [www.cipec.org](http://www.cipec.org))

Research Groups using Agent-Based Modeling for Land Use / Land Cover Change

<http://www.dlesecommunity.carleton.edu/resources/371.html>

USGCRP LCLUC Website <http://www.usgcrp.gov/usgcrp/ProgramElements/land.htm>

NASA LCLUC Homepage <http://lcluc.gsfc.nasa.gov/>

The International Geosphere-Biosphere Programme <http://www.igbp.kva.se/cgi-bin/php/frameset.php>

LUCF Focus 1 Office <http://www.indiana.edu/~act/focus1/>

FAO <http://WWW.fao.org/>

UNEP/GRID <http://www.grida.no/>

Earth Science data on the Global land information system <http://edcwww.cr.usgs.gov/webglis>

Global land cover characteristics data base  
[http://edcwww.cr.usgs.gov/landdaac/glcc/globdoc1\\_2.html#app2](http://edcwww.cr.usgs.gov/landdaac/glcc/globdoc1_2.html#app2)

INPE (Instituto Nacional de Pesquisas Espaciais, Brasil) <http://www.inpe.br>

EMBRAPA (Empresa Brasileira de Pesquisa Agropecuaria) <http://www.embrapa.br>

Multispec (Purdue/LARS) <http://dynamo.ecn.purdue.edu/~biehl/MultiSpec/>

Fragstats <ftp://ftp.fsl.orst.edu/pub/fragstats.2.0/>

ERDAS IMAGINE <http://www.erdas.com/>

CIESIN <http://www.ciesin.org/>

Earth Resources Observation Systems (EROS) <http://edcwww.cr.usgs.gov/>

Spot Image, French SPOT Satellite Images <http://www.spot.com/>

Land Tenure Center, University of Wisconsin-Madison <http://www.wisc.edu./ltc/>

IMAZON: Instituto Homem e Ambiente da Amazonia  
<http://www.bio.psu.edu/People/Faculty/Uhl/IMAZON/index2.htm>

IPAM: Instituto de Pesquisa Ambiental da Amazonia <http://www.ipam.org.br/homept.htm>

Woods Hole Research Center (Forest Fires Project)  
<http://www.whrc.org/science/tropfor/setrisque.htm>

Oak Ridge National Laboratory (Distribute Archive Active Center) <http://www-eosdis.ornl.gov/>

Journal of Political Ecology <http://dizzy.library.arizona.edu/ej/jpe/>

USGS Global Land 1-KM AVHRR Project  
<http://edcwww.cr.usgs.gov/landdaac/1KM/1kmhomepage.html>

Online vegetation and plant distribution map <http://www-sul.stanford.edu/depts/branner/vegmaps.htm>

Global land cover characteristics database  
[http://edcwww.cr.usgs.gov/landdaac/glcc/globdoc1\\_2.html](http://edcwww.cr.usgs.gov/landdaac/glcc/globdoc1_2.html)

People and Plants online <http://www.rbgekew.org.uk/peopleplants/>

AGRICOLA (National Agriculture Library search engine)  
<http://www.nal.usda.gov/ag98/ag98.html>

Non Timber Forest Products (US) <http://www.ifcae.org/ntfp/>

Forest Products Website <http://www.sfp.forprod.vt.edu/>

Landsat 7 Data User's Manual  
[http://ltpwww.gsfc.nasa.gov/IAS/handbook/handbook\\_toc.html](http://ltpwww.gsfc.nasa.gov/IAS/handbook/handbook_toc.html)

USGS EOS Data Center EarthExplorer <http://edcsns17.cr.usgs.gov/EarthExplorer/>

Tropical Rain Forest Information Center at Michigan State University  
<http://www.bsrsi.msu.edu/trfic/>

Global Land Cover Facility - University of Maryland (nearly 20,000 free satellite images)  
<http://glcf.umiacs.umd.edu/index.shtml>

Chesapeake Bay & Mid-Atlantic from Space at Towson State University  
<http://chesapeake.towson.edu/data/>

Florida Geographic Data Library <http://www.fgdl.org/>

Florida DEP GIS Data <http://www.dep.state.fl.us/gis/>

Florida Land Boundary Information System <http://www.LABINS.ORG/>  
TerraServer Site for Recent 1-m spatial resolution air photos (DOQQ) AND USGS Topo Quads  
(DRG) <http://terraserver-usa.com>  
SRTM (Shuttle Radar Topography Mission) <http://seamless.usgs.gov/>  
Great Site with Many Links to Data Sites <http://unr.edu/homepage/daved/gislinks.html>  
ESRI On-line Data Site (some free, some fee) <http://www.esri.com/data/index.html>  
Digital Chart of The World Download Site (Penn State) <http://www.maproom.psu.edu/dcw/>  
USGS National Elevation Dataset (30-m grid) <http://edcnts12.cr.usgs.gov/ned/default.htm>  
U.S. National Atlas of the United States <http://www.nationalatlas.gov/atlasftp.html>  
Geospatial Data Clearinghouse Entry Points <http://fgdclearhs.er.usgs.gov/>  
USGS Digital Elevation Model and Other Data Downloads (free)  
<http://data.geocomm.com/dem/demdownload.html>  
National Resources Conservation Service (Formerly Soil Conservation Service)  
[http://www.ftw.nrcs.usda.gov/ssur\\_data.html](http://www.ftw.nrcs.usda.gov/ssur_data.html)  
GLOBAL LAND INFORMATION SYSTEM of the US Geological Survey -  
<http://edcwww.cr.usgs.gov/Webglis/glisbin/glismain.pl>  
Goddard Distributed Active Archive Center (DAAC) <http://xtreme.gsfc.nasa.gov/>  
Includes SeaWIFS, AVHRR NDVI. Especially Earth-Science related data  
Land Cover Characterization Program (USGS) <http://edcwww.cr.usgs.gov/programs/lccp/>  
National Vegetation Classification System <http://biology.usgs.gov/fgdc.veg>  
Pointers to Vegetation Maps Worldwide <http://www-sul.stanford.edu/depts/branner/vegmaps.htm>  
USGS and other Federal Agencies Spatial Data Transfer Standard web page  
<http://mcmcweb.er.usgs.gov/sdts/>  
EROS Data Web GLIS (Global Land Information System) <http://edcwww.cr.usgs.gov/webglis>  
Data Depot (has many free downloads e.g. TIGER 1994 files, but also charges for some)  
<http://www.gisdatadepot.com/>  
ESRI (Environmental Systems Research Institute - Developers of Arc/INFO, ArcView, etc.)  
<http://www.esri.com/data/index.html>  
Land Info International <http://www.landinfo.com/>  
Microsoft TerraServer <http://terraserver.microsoft.com/>  
The Idrisi Project - <http://www.idrisi.clarku.edu/>