

Fundamental Landscape Ecology

Optional Readings--Spring 2004

WEEK 1: Landscape ecology: definitions and brief history

- Opdam, P., R. Foppen, and C. Vos. 2001. Bridging the gap between ecology and spatial planning in landscape ecology. *Landscape Ecology* 16:767-779.
- Pickett, S.T.A. and M.L. Cadenasso. 1995. Landscape ecology: Spatial heterogeneity in ecological systems. *Science* 269:331-334.
- Reiners, W.A., and K.L. Driese. 2001. The propagation of ecological influences through heterogeneous environmental space. *Bioscience* 51:939-950
- Risser, P.G., J.R. Karr, and R.T. T. Forman. 1984. Landscape ecology: directions and approaches. Special Publ. No. 2, Ill. Natural History Survey, Champaign.
- Urban, D.L., R.V. O'Neill, and H.H. Shugart. 1987. Landscape ecology. *Bioscience* 37:119-127.
- Wiens, J. A. 2002. Riverine landscapes: taking landscape ecology into the water. *Freshwater Biology* 47:501-515

WEEK 2: Concepts of scale

- Addicott, J.F., J.M. Aho, M.F. Antolin, D.L. Padilla, J.S. Richardson, and D.A. Soluk. 1987. Ecological neighborhoods: scaling environmental patterns. *Oikos* 49: 340-346.
- Baker R.G., E. A. Bettis, D. P. Schwert, D. G. Horton, C. A. Chumbley, L. A. Gonzalez, and M. K. Reagan. 1996. Holocene paleoenvironments of northeast Iowa. *Ecological Monographs* 66: 203-234.
- Turner, M.G., V.H. Dale, and R.H. Gardner. 1989. Predicting across scales: theory development and testing. *Landscape Ecology* 3: 245-252.
- Turner, M.G. R.V. O'Neil, R.H. Gardner, and B.T. Milne. 1989. Effects of changing spatial scale on the analysis of landscape patterns. *Landscape Ecology* 3: 153-162.
- Wiens, J.A. 1989. Spatial scaling in ecology. *Functional Ecology* 3:385-397.

WEEK 3: Causes and changes in landscape pattern

- Black, A. E., P. Morgan, and P. F. Hessburg. 2003. Social and biophysical correlates of change in forest landscapes of the interior Columbia Basin, USA. *Ecological Applications* 13:51-67.
- Bonan, G.B. 1989. Environmental factors and ecological processes controlling vegetation patterns in boreal forest. *Landscape Ecology* 3: 111-130.
- Cousins, S. A. O. and O. Eriksson. 2002. The influence of management history and habitat on plant species richness in a rural hemiboreal landscape, Sweden. *Landscape Ecology* 17:517-529.
- Dupouey, J. L., E. Dambrine, J. D. Laffite, and C. Moares. 2002. Irreversible impact of past land use on forest soils and biodiversity. *Ecology* 83:2978-2984.
- Helmer, E.H. 2000. The landscape ecology of tropical secondary forest in montane Costa Rica. *Ecosystems* 3:98-114.
- Kramer, M. G., A. J. Hansen, M. L. Taper, and E. J. Kissinger. 2001. Abiotic controls on long-term windthrow disturbance and temperate rain forest dynamics in southeast Alaska. *Ecology* 82:2749-2768.
- Motzkin, G., W.A. Patterson III and D.R. Foster. 1999. A historical perspective on pitch pine-scrub oak communities I the Connecticut Valley of Massachusetts. *Ecosystems* 2: 255-273.

- Parshall, T., D. R. Foster, E. Faison, D. MacDonald and B.C.S. Hansen. 2003. Long-term history of vegetation and fire in pitch pine-oak forests on Cape Cod, Massachusetts. *Ecology* 84:736-748.
- Smith T.M. and M.L. Huston. 1989. A theory of the spatial and temporal dynamics of plant communities. *Vegetatio* 83:49-69.
- Soranno, P.A., K.E. Webster, J.L. Riera, T.K. Kratz, J.S. Baron, P.A. Bukaveckas, G.W. Kilng, D.S. White, N. Caine, R.C. Lathrop, and P.R. Leavitt. 1999. Spatial variation among lakes within landscapes: Ecological organization along lake chains. *Ecosystems* 2: 395-410.
- Urban, D.L., C. Miller, P.N. Halpin, and N.L. Stephenson. 2000. Forest gradient response in Sierran landscapes: the physical template. *Landscape Ecology* 15:603-620.
- Watt, A.S. 1947. Pattern and process in the plant community. *Journal of Ecology* 35:1-22.
- Wondzell, S.M., G.L. Cunningham, and D. Bachelet. 1996. Relationships between landforms, geomorphic processes, and plant communities on a watershed in the northern Chihuahuan Desert. *Landscape Ecology* 11: 351-363.

WEEKS 4 and 5: Quantifying landscape pattern I and II

- Cain, D.H., K. Ritters, and K. Orvis. 1997. A multi-scale analysis of landscape statistics. *Landscape Ecology* 12:199-212.
- Dorner, B., K. Lertzman, and J. Fall. 2002. Landscape pattern in topographically complex landscapes: issues and techniques for analysis. *Landscape Ecology* 17:729-743.
- Mladenoff, D.J., M.A. White, J. Pastor, and T.R. Crow. 1993. Comparing spatial pattern in unaltered old-growth and disturbed forest landscapes. *Ecological Applications* 3: 293-305.
- Moilanen, A., and M. Nieminen. 2002. Simple connectivity measures in spatial ecology. *Ecology* 83:1131-1145.
- Riitters, K.H., R.V. O'Neill, C.T. Hunsaker, J.D. Wickham, D.H. Yankee, S.P. Timmins, K.B. Jones, and B.L. Jackson. 1995. A factor analysis of landscape pattern and structure metrics. *Landscape Ecology* 10: 23-40.
- Riitters, K.H. J.D. Wickham, R.V. O'Neill, K.B. Jones, E.R. Smith, J.W. Coulston, T.G. Wade, and J.H. Smith. 2002. Fragmentation of continental United States forests. *Ecosystems* 5:815-822.
- Tinker, D.B., C.A.C. Resor, G.P. Beauvais, K.F. Kipfmueller, C.I. Fernandes, and W.L. Baker. 1998. Watershed analysis of forest fragmentation by clearcuts and roads in a Wyoming forest. *Landscape Ecology* 13:149-165.
- Tinker, D.B., W.H. Romme, and D. Despain. 2003. Historic range of variability in landscape structure in subalpine forests of the Greater Yellowstone Area, U.S.A. *Landscape Ecology* 18:427-439.
- Wu, J., W. Shen, W. Sun. P.T. Tueller. 2002. Empirical patterns of the effects of changing scale on landscape metrics. *Landscape Ecology* 17:761-782.

WEEK 6: Spatial statistics

- Bolstad, P.V., W. Swank, and J. Vose. 1998. Predicting Southern Appalachian overstory vegetation with digital terrain data. *Landscape Ecology* 13:271-283.
- Burrows, S. N., S. T. Gower, M. K. Clayton, D. S. Mackay, D. E. Ahl, J. M. Norman, and G. Diak. 2002. Application of geostatistics to characterize leaf area index (LAI) from flux tower to landscape scales using a cyclic sampling design. *Ecosystems* 5:667-679.
- Cullinan, V.I., and J.M. Thomas. 1992. A comparison of quantitative methods for examining landscape pattern and scale. *Landscape Ecology* 7:211-227.

- Dungan, J. L., J. N. Perry, M. R. T. Dale, P. Legendre, S. Citron-Pousty, M.-J. Fortin, A. Jakomulska, M. Miriti, and M.S. Rosenberg. 2002. A balanced view of scale in spatial statistical analysis. *Ecography* 25:626-640.
- Gardner, R.H. 1998. Pattern, process, and the analysis of spatial scales. Pp. 17-34 in: D.L. Petersen and V.T. Parkers (eds.). *Ecological Scale: Theory and Applications*. Columbia University Press, New York.
- Legendre, P., and M.-J. Fortin. 1989. Spatial pattern and ecological analysis. *Vegetatio* 80: 107-138.
- Plotnick, R.E., R.H. Gardner, and R.V. O'Neill. 1993. Lacunarity indices as measures of landscape texture. *Landscape Ecology* 8: 201-211.
- Turner, S.J., R.V. O'Neill, W. Conley, M.R. Conley, and H.C. Humphries. 1991. Pattern and scale: statistics for landscape ecology. Pp. 17-49 in: M.G. Turner and R.H. Gardner (eds), *Quantitative Methods in Landscape Ecology*. Springer-Verlag, New York.

WEEK 7: Neutral landscape models

- Gardner, R.H., and R.V. O'Neill. 1991. pattern, process, and predictability: the use of neutral models for landscape analysis. Pp. 289-308 in: M.G. Turner and R.H. Gardner (eds.). *Quantitative methods in landscape ecology*. Springer-Verlag, New York.
- O'Neill, R.V., R.H. Gardner, and M.G. Turner. 1992. A hierarchical neutral model for landscape analysis. *Landscape Ecology* 7:55-61.
- Pearson, S.M., and R.H. Gardner. 1997. Neutral models: useful tool for understanding landscape pattern. Pp. 215-230 in: J.A. Bissonette (ed). *Wildlife and landscape ecology*. Springer-Verlag, New York.
- With, K. A., D. M. Pavuk, J. L. Worchuck, R. K. Oates, and J. L. Fisher. 2002. Threshold effects of landscape structure on biological control in agroecosystems. *Ecological Applications* 12:52-65.

WEEK 8: Landscape modeling

- Baker, W.L. 1989. A review of models of landscape change. *Landscape Ecology* 2: 111-133.
- Baker, W. L. and D. J. Mladenoff. 1999. Progress and future directions in spatial modeling of forest landscapes. Pages 333-350 in: D. J. Mladenoff and W. L. Baker, (eds.). *Spatial modeling of forest landscape change*. Cambridge University Press, Cambridge.
- Dunning, J.B., D.J. Stewart, B.J. Danielson, B.R. Noon, T.L. Root, R.H. Lamberson, and dE.E. Stevens. 1995. Spatially explicit population models: current forms and future uses. *Ecological Applications* 5: 3-11.
- Kareiva, P., D. Skelly, and M. Ruckelshaus. 1997. Reevaluating the use of models to predict the consequences of habitat loss and fragmentation. Pp. 156-166 in: S.T.A. Pickett, R.S. Ostfeld, M. Shachak, and G.E. Likens (eds.). *The ecological basis of conservation*. Chapman-Hall, New York.
- Liu, J., and P.S. Ashton. 1999. Simulating effects of landscape context and timber harvest on tree species diversity. *Ecological Applications* 9: 186-201.
- Merriam, G., K. Henein, and K. Stuart-Smith. 1991. landscape dynamic models. Pp. 399-416 in: M.G. Turner and R.H. Gardner (eds.). *Quantitative methods in landscape ecology*. Springer-Verlag, New York.
- Mladenoff, D.J., and W.L. Baker. 1999. Development of forest and landscape modeling approaches. Pp. 1-13 in: D.J. Mladenoff and W.L. Baker (eds.). *Spatial modeling of forest landscape change: approaches and applications*. Cambridge University Press, Cambridge.

- Turner, M.G., G.J. Athaud, R.T. Engstrom, S.J. Hejl, J. Liu, S. Loeb, and K. McKelvey. 1995. Usefulness of spatially explicit population models inland management. *Ecological Applications* 5: 12-16.
- Urban, D.L., M.F. Acevedo, and S.L. Garman. 1999. Scaling fine-scale processes to large-scale patterns using models derived from models: meta-models. Pages 70-98 in D. J. Mladenoff and W. L. Baker, editors. *Spatial modeling of forest landscape change*. Cambridge University Press, Cambridge.
- Zollner, P.A., and S.L. Lima. 1999. Search strategies for landscape-level interpatch movements. *Ecology* 80:1019-1030.

WEEK 9: Landscape disturbance, diversity, and equilibrium

- Bebi, P., D. Kulakowski and T. T. Veblen. 2003. Interactions between fire and spruce beetles in a subalpine Rocky Mountain forest landscape. *Ecology* 84:362-371.
- Foster, D.R., D.H. Knight, and J.F. Franklin. 1998. Landscape patterns and legacies resulting from large infrequent forest disturbances. *Ecosystems* 1:497-510.
- Hall, F.G. 1991. Large-scale patterns of forest succession as determined by remote sensing. *Ecology* 72: 628-640.
- Jules, E. S., M. J. Kauffman, W. D. Ritts and A. L. Carroll. 2002. Spread of an invasive pathogen over a variable landscape: a nonnative root rot on Port Orford Cedar. *Ecology* 83:3167-3181.
- Kramer, M.G., A.J. Hansen, M.L. Taper, and E.J. Kissinger. 2001. Abiotic controls on long-term windthrow disturbance and temperate rain forest dynamics in southeast Alaska. *Ecology* 82:2749-2768.
- Krummel, J.R., R.H. Gardner, G. Sugihara, R.V. O'Neill, and P.R. Coleman. 1987. Landscape patterns in a disturbed environment. *Oikos* 48: 321-324.
- Landres, P.B., P. Morgan, and F.J. Swanson. 1999. Overview of the use of natural variability concepts in managing ecological systems. *Ecological Applications* 9:1179-1188.
- Paine, R. T., M. J. Tegner, and E. A. Johnson. 1998. Compounded perturbations yield ecological surprises. *Ecosystems* 1:535-545
- Perry, G. L.W. 2002. Landscapes, space and equilibrium: shifting viewpoints. *Progress in Physical Geography* 26:339-359.
- Perry, D.A., and M.P. Amaranthus. 1997. Disturbance, recovery, and stability. Pp. 31-56 in: K.A. Kohm and J.F. Franklin (eds.). *Creating a forestry for the 21st century: the science of ecosystem management*. Island Press, Washington, D.C.
- Romme, W.H. 1982. Fire and landscape diversity in subalpine forests of Yellowstone National Park. *Ecological Monographs* 52: 199-221.
- Romme, W.H., and D.H. Knight. 1982. Landscape diversity: the concept applied to Yellowstone Park. *Bioscience* 32:664-670.
- Sprugel, D.G. 1991. Disturbance, equilibrium, and environmental variability: what is 'natural' vegetation in a changing environment? *Biological Conservation* 58:1-18.
- Wallin, D.O., F.J. Swanson, B. Marks, J.H. Cissel, and J. Kertis. 1996. Comparison of managed and pre-settlement landscape dynamics in forests of the Pacific Northwest, USA. *Forest Ecology and Management* 85: 291-309.
- White, P.S., and J. Harrod. 1997. Disturbance and diversity in a landscape context. Pp. 128-159 in: J.A. Bissonnette (ed.). *Wildlife and landscape ecology*. Springer-Verlag, New York.
- White, P.S., and S.T.A. Pickett. 1985. Natural disturbance and patch dynamics: an introduction. Chapter 1 in Pickett, S.T.A., and P.S. White. *The ecology of natural disturbance and patch dynamics*. Academic Press, Orlando.

WEEK 10: US-IALE Annual meeting. No Class.

WEEK 11: Organisms and landscapes

- Crist, T.O., D.S. Guertin, J.A. Wiens, and B.T. Milne. 1992. Animal movement in heterogeneous landscapes: an experiment with *Eleodes* beetles in shortgrass prairie. *Functional Ecology* 6: 536-544.
- Dunning, J.B., B.J. Danielson, and H.R. Pulliam. 1992. Ecological processes that affect populations in complex landscapes. *Oikos* 65:169-175.
- Johnson, A.R., J.A. Wiens, B.T. Milne, and T.O. Crist. 1992. Animal movements and population dynamics in heterogeneous landscapes. *Landscape Ecology* 7: 63-75.
- Kareiva, P. 1990. Population dynamics in spatially complex environments: theory and data. *Philosophical Transactions of the Royal Society of London B* 330:175-190.
- Kie, J. G., R. T. Bowyer, M. C. Nicholson, B. B. Boroski, and E. R. Loft. 2002. Landscape heterogeneity at differing scales: effects on spatial distribution of mule deer. *Ecology* 83:530-544.
- Metzger, J.P. 2000. Tree functional group richness and landscape structure in a Brazilian tropical fragmented landscape. *Ecological Applications* 10:1147-1161.
- Ritchie, M.E. 1997. Populations in a landscape context: sources, sinks, and metapopulations. Pages 160-184 in: Bissonette, J.A. (ed.). *Wildlife and landscape ecology: effects of pattern and scale*. Springer-Verlag, New York.
- Saab, V. 1999. Importance of spatial scale to habitat use by breeding birds in riparian forests: a hierarchical analysis. *Ecological Applications* 9: 135-151.
- Szacki, J., and A. Liro. 1991. Movements of small mammals in the heterogeneous landscape. *Landscape Ecology* 5: 219-224.
- Tallmon, D. A., E. S. Jules, N. J. Radke, and L. S. Mills. 2003. Of mice and men and Trillium: cascading effects of forest fragmentation. *Ecological Applications* 13:1193-1203
- Wiens, J.A. 1997. Metapopulation dynamics and landscape ecology. Pp. 43-62 in: I.A. Hanski and M.E. Gilpin (eds.). *Metapopulation biology*. Academic Press, San Diego.

WEEK 12: Communities, ecosystems, and landscapes

- Burke, I.C., T.B.F. Kittel, W.K. Lauenroth, P. Snook, C.M. Yonker, and W.J. Parton. 1991. Regional analysis of the central Great Plains. *Bioscience* 41: 685-692.
- Burke, I.C., W.K. Lauenroth, R. Riggall, P. Brannen, B. Madigan, and S. Beard. 1999. Spatial variability of soil properties in the shortgrass steppe: the relative importance of topography, grazing, microsite, and plant species in controlling spatial patterns. *Ecosystems* 2:422-438.
- Fan, W., J.C. Randolph, and J.L. Ehman. 1998. Regional estimation of nitrogen mineralization in forest ecosystems using Geographic Information Systems. *Ecological Applications* 8: 734-747.
- Hansen, A.J., S.L. Garmann, B. Marks, and D.L. Urban. 1993. An approach for managing vertebrate diversity across multiple-use landscapes. *Ecological Applications* 3: 481-496.
- Hansen, A.J., J.J. Rotella, M.P.V. Kraska and D. Brown. 2000. Spatial patterns of primary productivity in the Greater Yellowstone Ecosystem. *Landscape Ecology* 15:505-522.
- Kratz, T.K., K.E. Webster, C.J. Bowser, J.J. Magnuson, and B.J. Benson. 1997. The influence of landscape position on lakes in northern Wisconsin. *Freshwater Biology* 37: 209-217.
- Pastor, J., Y. Cohen, and R. Moen. 1999. Generation of spatial patterns in boreal forest landscapes. *Ecosystems* 2: 439-450.
- Seagle, S.W. 2003. Can deer foraging in multiple-use landscapes alter forest nitrogen budgets? *Oikos* 103:230-234.

Weller, D.E., T.E. Jordan, and D.L. Correll. 1998. Heuristic models for material discharge from landscapes with riparian buffers. *Ecological Applications* 8:1156-1169.

WEEK 13: Applied landscape ecology: land use change and landscape planning

- O'Neill, R.V., C.T. Hunsaker, K.B. Jones, K.H. Ritters, J.D. Wickham, P.M. Schwartz, I.A. Goodman, B.L. Jackson, and W.S. Baillargeon. 1997. Monitoring environmental quality at the landscape scale. *Bioscience* 47: 513-519.
- Palik, B.J., P.C. Goebel, L.K. Kirkman and L. West. 2000. Using landscape hierarchies to guide restoration of disturbed ecosystems. *Ecological Applications* 10:189-202.
- Theobald, D.M., T. Hobbs, T. Bearly, J.A. Zack, T. Shenk, and W.E. Riebsame. 2000. Incorporating biological information in local land-use decision-making: designing a system for conservation planning. *Landscape Ecology* 15: 35-45.
- Urban, D.L. 2000. Using model analysis to design monitoring programs for landscape management and impact assessment. *Ecological Applications* 10:1820-1832.

WEEK 14: Applied landscape ecology: conservation

- Boutin, S., and D. Herbert. 2002. Landscape ecology and forest management: developing an effective partnership. *Ecological Applications* 12:390-397.
- Franklin, J.F. 1993. Preserving biodiversity: species, ecosystems, or landscapes? *Ecological Applications* 3: 202-205.
- Freemark, K.E., J.B. Dunning, S.J. Hejl, and J.R. Probst. 1995. A landscape ecology perspective for research, conservation, and management. Pp. 381-427 in: T.E. Martin and D.M. Finch (eds.). *Ecology and management of neotropical migratory birds*. Oxford University press, New York.
- Haila, Y. 2002. A conceptual genealogy of fragmentation research: from island biogeography to landscape ecology. *Ecological Applications* 12:321-334.
- Hansson, L., and P. Angelstam. 1991. landscape ecology as a theoretical basis for nature conservation. *Landscape Ecology* 5: 191-201.
- Margules, C. 1999. Conservation planning at the landscape scale. Pp. 83-87 in: J.A. Wiens and M.R. Moss (eds.). *Issues in landscape ecology*. International Association for Landscape Ecology, Guelph, Ontario.
- Noss, R.F. 1996. Conservation of biodiversity at the landscape scale. Pp. 574-589 in: R.C. Szaro and D.W. Johnston (eds.). *Biodiversity in managed landscapes: theory and practice*. Oxford University Press, New York.
- Ritters, K.H., R.V. O'Neill, and K.B. Jones. 1997. Assessing habitat suitability at multiple scales: a landscape-level approach. *Biological Conservation* 81: 191-202.
- With, K.A. 1999. Landscape conservation: a new paradigm for the conservation of biodiversity. Pp. 78-82 in: J.A. Wiens and M.R. Moss (eds.). *Issues in landscape ecology*. International Association for Landscape Ecology, Guelph, Ontario.

WEEK 15: Oral presentations; no readings.

FINALS WEEK: The future of landscape ecology

- Hobbs, R.J. 1999. Clark Kent or Superman: where is the phone booth for landscape ecology? Pp. 11-23 in J.M. Klopatek and R.H. Gardner (eds.). *Landscape ecological analysis: issues and applications*. Springer-Verlag, New York.
- Risser, P.G. 1999. Landscape ecology: does the science only need to change at the margin? Pages 3-10 in: J.M. Klopatek and R.H. Gardner, (eds.). *Landscape Ecological Analysis*. Springer-Verlag, New York.

Hobbs, R.J. 1997. Future landscapes and the future of landscape ecology. *Landscape and Urban Planning* 37:1-9.