

DEPARTMENT OF CITY AND REGIONAL PLANNING
University of North Carolina at Chapel Hill

PLAN 641: ECOLOGY AND LAND USE PLANNING

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Office Hours: 3:15 – 4:15 MW, and by
appointment

Office: New East 307

Fall 2010

9:30 – 10:45 MW (New East 102)

<http://blackboard.unc.edu>

Course Description

Land use planning and ecology focuses on understanding the functions of ecosystems, how land development activities impact such functions, and how land use management tools can be used to create impact mitigation and restoration strategies. The functions, threats, and protection strategies of watersheds and wetlands will be examined.

A key theme throughout the course will be to explore how the scientific knowledge of ecological relationships can be integrated into a land use planning framework. The fundamental goal is to assure natural ecosystem integrity is sustained over the long-term, while accommodating human use and occupancy within natural ecological limits.

Course Objectives:

- 1) To identify important functions of different types of urban ecosystems;
- 2) To evaluate how urban development impacts urban ecosystem functions; and
- 3) To create environmental plans for mitigating the impact of land development while protecting and restoring urban ecosystems..

Class Format

This course will meet for two sessions per week. Class sessions will involve lectures with extensive class discussion and oral presentations by students. Field trips will also be taken to observe the functions of ecosystems and how such functions are influenced by urban development.

Course Requirements

Requirements include five cumulative plan documents:

- state of watershed report (20% of grade);
- watershed management plan policy framework (20% of grade);
- sub-watershed management plans (20% of grade);
- wetland management plan (20% of grade);
- complete watershed management plan (20% of grade).

Policy on Late or Incomplete Work: According to Department policy, and in order to be fair to your fellow students, late assignments will not ordinarily be accepted. Grades of incomplete may be given in the event of a medical or other emergency. A written application for an incomplete on any assignment, including the term project, must state the reasons for the request and propose a new deadline. A grade of F will be assigned for presentations and written assignments not completed on time.

The University's Honor Code is in effect. Please consult with the instructor if you are uncertain about your responsibilities under that code with respect to this course. Assignments are expected to be completed individually. Discussions with classmates about assignments are encouraged, but all final work must be entirely your own.

- **Late homework assignments will not be accepted.**
- All assignments must be completed **individually**.
- Any student who feels s/he may need an accommodation based on the impact of a disability should contact me privately early in the semester to discuss your specific needs. Students with documented disabilities should contact the Department of Disability Services at 919-962-8300 (SASB North, Suite 2126) to coordinate reasonable accommodations.
- **This syllabus could be subject to change!**

Readings

Course readings (required) are on Blackboard.unc.edu; reserved readings are available in Davis Library.

*Indicates required reading. Please complete readings before scheduled class period. **Readings and course content may change over the course of the semester.**

Aug. 25: Session 1: Introduction and Overview of Course

Part I: Environmental Plans and Implementation Tools

Objectives: 1) To identify and evaluate land use management tools that can be used for impact mitigation and restoration; and
2) To evaluate how land use management tools are used to formulate comprehensive ecosystem protection strategies.

Aug. 30: Session 2: The Environmental Plan

*Baer, William, 1997, "General Plan Evaluation Criteria: An Approach to Making Better Plans," Journal of the American Planning Association 63(3): 329-344.

*Berke, Philip, David Godschalk, and Edward Kaiser with Daniel Rodriguez. 2006. "Plan Quality Protocol in Ch. 3: Making a Good Plan," in Urban Land Use Planning, 5th Edition, Chicago: University of Illinois Press.

*Daniels, Tom and Katherine Daniels. 2003. "Ch. 1: Taking Stock of the Local Environment and Creating an Environmental Action Plan," in The Environmental Planning Handbook for Sustainable Communities and Regions, Chicago: APA Planners Press, pp. 11-36.

Sept. 1: Session 3: Plan Implementation Tools

*Randolph, John. 2003. "Ch. 5: Land Conservation for Working Landscapes, Open Space, and Ecological Protection," "Ch. 6: Design with Nature for People: Sustainable, Livable, and Smart Land Use Development," "Ch. 7: Local Government Smart Growth Management," in Environmental Land Use Planning and Management, Washington, D.C.: Island Press, pp. 83-87, 106-140, 141-168.

Sept. 6: **CLASS CANCELED – LABOR DAY**

Part II: State of Watershed Report

Objectives: 1) To map a watershed, identify drainage networks, and compute watershed slopes and area.
2) To evaluate land development impacts on upland and riparian zones of watersheds.
3) To create a state of the watershed report and vision for the future.

Sept. 8: Session 4: Physical Attributes of Watersheds: Boundary, Slope, Stream Order

ASSIGNMENT 1 HANDED OUT: State of Watershed Report for Booker Creek Watershed Due: Sept. 29

*Riley, Ann L., 1998, "Ch. 1: The Basics," in Restoring Streams in Cities: A Guide for Planners, Policymakers, and Citizens, Washington, D.C.: Island Press, pp. 1-13, 27-33.

*Cassells, David and others, 1983, "Ch. 2: Understanding the Role of Forests in Watershed Protection," in Carpenter, Richard, ed., in Natural Systems for Development: What Planners Need to Know, New York: MacMillan Publishing Co., pp. 53-69.

*Marsh, William, 1991, "Ch. 4: Topography, Slopes and Land Use Planning," "Ch. 9: Watersheds, Drainage Nets, and Land Use," in Landscape Planning: Environmental Applications, New York: John Wiley and Sons, pp. 54-59, 132-135.

*Anderson, Larz, 2000, "Ch.2: Maps, Ch 3: The Constraints of Slope on Land Development," in Planning for the Built Environment, Chicago: APA Press, pp. 9-32, 239-240, 245-246.

* Letunic, Niko. 2007. Beyond Plain English: Ten Best Practices for Creating Citizen friendly Planning Documents. Planning Magazine, October, pp. 40-43.

*Creating Effective Poster Presentations: <http://www.ncsu.edu/project/posters>

Sept. 13: Session 5: Watershed and Sub-watershed Planning

*Center for Watershed Protection, 1998, "Ch. 3: Crafting a Watershed Plan," Ch. 4: Customizing Subwatershed Plans," Rapid Watershed Planning Handbook: A Comprehensive Guide for Managing Urbanizing Watersheds, Ellicott City, MD: same as author, pp. 3.1-3.36, 4.1-4. 18.

*Schueler, T. and K. Kitchell. 2005. Desktop Analysis: Comparative Sub-watershed Analysis. Ellicott City, MD: Center for Watershed Protection.

Sept. 15: Session 6: Impervious Cover

*Arnold, Chester and C. James Gibbons, 1996 (Spring), "Impervious Surface Coverage: The Emergence of a Key Indicator," Journal of the American Planning Association, pp. 243-258.

*Ryznar, Rhonda and Philip R. Berke, 2001, "Testing the Applicability of Impervious Surface Estimates Based on Zoning Categories in Watersheds," Chapel Hill: Department of City and Regional Planning, UNC, pp. 17.

*Case Study: Powhatan Creek Watershed Management Report, 2001, 5 pp.

Note: In class assignment on developing and development policies based on imperviousness of Powhatan Creek Watershed.

Sept. 20: Session 7: Land Suitability Analysis

*Ormsby, Tim and Jonell Alvi. 1999. Extending ArcView GIS, ESRI Press, chapter” How Model Builder Works.

*Berke, Philip, David Godschalk, and Edward Kaiser, 2006, “Analyzing Environmental Information,” in Urban Land Use Planning, 5th edition, Chicago: University of Illinois Press, pp. 33-41.

Sept. 22: Session 8: Computer lab assistance for suitability analysis

Sept. 27: Session 9: Best Management Practices

*Schuler, Thomas, 1987, “Ch. 2: Choosing the Best BMP Option for a Site,” in Controlling Urban Runoff, Washington, D.C.: Washington Metro Regional Council, pp. 2.1-2.17.

*Department of Environmental Resources, 1999, “Ch. 2: Low-Impact Development Site Planning,” Ch. 4: Low-Impact Development Integrated Management,” pp. 2-1 – 2-20, 4-1 – 4-25, Low Impact Design Strategies: An Integrated Approach, Prince George’s County, MD: same as author.

*Zielinski, Jennifer. 2001. The Benefits of Better Site Design in Residential Subdivisions, Watershed Protection Techniques, 3 (2), pp. 633-646.

Note: In class assignment on selecting BMPs for development sites.

Sept. 29: Session 10: Presentation of State of the Watershed Report for Booker Creek Watershed

ASSIGNMENT 1 DUE: Student presentations of assignment 1. Posters and reports are due in class.

PART III. Creating a Vision and Policy Framework

Objectives:

- 1) *To elicit and formulate watershed issues and opportunities.*
- 2) *To formulate a watershed visioning.*
- 3) *To set goals and policies linked to the goals, and then integrate them into a “vision statement” and policy framework*

Oct. 4: Session 11: Visioning and scenario building; formulating a policy framework

ASSIGNMENT 2 HANDED OUT: Vision Statement and Policy Framework for Protection of Booker Creek Watershed Due: Oct. 18

*Berke, Philip, David Godschalk, Ed Kaiser and Daniel Rodriguez. 2006, Ch. 9: State of Community Report: Scenarios and Visions, pp. 1-26; Ch. 10: Direction Setting, pp. 1-10," Urban Land Use Planning, Chicago: University of Illinois Press.

Assignment of teams and watershed management plans to be reviewed for next class.

Oct. 6: Session 12: Student reviews and discussion of illustrative vision statements, goals and objectives, policies, and other components of policy frameworks in a sample of environmental plans.

Oct. 11: Session 13: Simulated visioning exercise on "What Do We Want for the Future of Our Watershed?" Instructions will be given ahead of time.

Oct. 13: Session 14: Open session for teams; be prepared to discuss draft vision statement/policy frameworks with instructor.

*Environmental Protection Agency. 2004. Protecting Water Resources with Smart Growth. EPA 231-R-04-002. Washington, D.C. (skim)

*Environmental Protection Agency. 2005. Using Smart Growth Techniques as Stormwater Best Management Practices. EPA 231-B-05-002. Washington, D.C. (skim)

Part IV: Watershed Field Evaluation and Modeling

Oct. 18: Session 15: Land Development Impacts on Watersheds

ASSIGNMENT 2 DUE: Vision and policy framework.

*ASSIGNMENT 3 HANDED OUT: Watershed Field Evaluation and Modeling.
Due: Nov. 3*

*Cassells, David and others, 1983, "Ch. 2: Understanding the Role of Forests in Watershed Protection," in Carpenter, Richard, ed., Natural Systems for Development: What Planners Need to Know, New York: MacMillan Publishing Co., pp. 69-93 (see Cassells reading, Session 4).

*Riley, Ann L., 1998, "Ch. 4: River Scientists," in Restoring Streams in Cities: A Guide for Planners, Policymakers, and Citizens, Washington, D.C.: Island Press, pp. 129-141.

*Tsihrintzis, V. and R. Hamid. 1997. Modeling and Management of Urban Stormwater Runoff Quality: A Review, Water Resources Management, 11: 137-164.

Oct. 20: Session 16: Application of Water Quality Models to Land Use Planning

*Donigan, A. 1991. Modeling on Nonpoint Source Water Quality in Urban and Non-Urban Areas. Washington, D.C.: EPA: read pp. 1-30

*Girling, C. and R. Kellert. 2002. Comparing Stormwater Impacts and Costs on Three Neighborhood Plan Types. Landscape Journal, 21: 100-109.

Oct. 25: Session 17: Field Trip to Booker Creek Watershed

Oct. 27: Session 18: Land Development Impacts on Riparian Zones of Watersheds

*TJCOG, 1999. An Introduction to Riparian Buffers, Technical Memo: Riparian Buffer Series, No. 1, pp. 1-8.

*TJCOG, 1999, Local Ordinances for Protecting Riparian Buffers, Technical Memo: Riparian Buffer Series, No. 4, pp. 1-13.

*Town of Chapel Hill. 2004. "Resource Conservation District (RCD)," Land Use Management Ordinance, Town of Chapel Hill, NC.

*Riley, Ann L., 1998, "Ch. 7," in Restoring Streams in Cities: A Guide for Planners, Policymakers, and Citizens, Washington, D.C.: Island Press, pp. 253-260 (*skim*).

Note: In class assignment: Be prepared to analyze Chapel Hill's RCD ordinance based on the degree to which the RCD incorporates the "model components" (see TJCOG Technical Memo 4) and "width requirements" (see TJCOG's Technical Memo No. 1).
Questions to consider:

1. Apply the following criteria for assessing the effectiveness of a buffer ordinance:
 - a. Does the RCD contain a clear definition of purpose?
 - b. Is the definition of a buffer clear?
 - c. Does the RCD include comprehensive rules/standards for protecting buffers?
 - d. Does the RCD contain a clear explanation of the administration of an approval?
 - e. Does the RCD specify how buffer protection will be enforced?
2. How does Chapel Hill's RCD compare with other buffer ordinances in the Triangle region (see matrix)?

Nov. 1: Session 19: Watershed Impact Mitigation and Restoration Measures

*Riley, Ann L., 1998, "Ch. 7, Ch. 9," in Restoring Streams in Cities: A Guide for Planners, Policymakers, and Citizens, Washington, D.C.: Island Press, pp. 273-282, 335-348.

Nov. 3: Session 21: Presentations

ASSIGNMENT 3 DUE: In class presentation of watershed field evaluations, modeling, and recommendations. Reports are due.

Nov. 8 and 10: **CLASS CANCELED – Open Sessions for Group Work**

Part V: Wetland Evaluation and Mitigation

Objectives:

- 1) *To identify the scientific and political issues involving wetland delineation;*
- 2) *To identify how land development threatens wetland functions;*
- 3) *To apply a field method to evaluate the functions of wetlands and rate their value;*
- 4) *To create a wetland protection strategy.*

Nov. 15: Session 22: Identification of Wetlands and Impacts of Urbanization

ASSIGNMENT 4 HANDED OUT: Wetland Evaluation
Due: Dec. 6

*Tiner, Ralph. 1999. “Ch. 1: Wetland Definitions” in Wetland Indicators: A Guide to Wetland Identification, Delineation, Classification and Mapping, New York: Lewis Publishers, pp. 1-16.

*Wright, Tiffany, Jennifer Tomlinson, Tom Schueler, Karen Capiella, Anne Kitchell, and Dave Hirschman. 2006. Direct and Indirect Impacts of Urbanization on Wetland Quality, Washington, D.C.: Environmental Protection Agency, pp. 13-56.

Nov. 17: Session 23: Wetland Field Trip in Chapel Hill

Nov. 22 and 24: **THANKSGIVING BREAK – CLASS CANCELED**

Nov. 29: Session 24: Wetland Classification

*North Carolina State University Wetland Website, 2001, Types of Wetlands and Their Roles in the Watershed.
<http://www.water.ncsu.edu/watershedss/info/wetlands/types3.html>)

*Tiner, Ralph. 1999. Ch. 8: Wetland Classification” in Wetland Indicators: A Guide to Wetland Identification, Delineation, Classification and Mapping, New York: Lewis Publishers, pp. 257-290 [*skim*].

*Tiner, Ralph. 1999. Ch. 10: Wetland Mapping...” in Wetland Indicators: A Guide to Wetland Identification, Delineation, Classification and Mapping, New York: Lewis Publishers, pp. 347-365.

Dec. 1: Session 25: Assessment of Wetland Functions

*Water Resources Management Program, 1993, "Guidelines for Using the Urban Wetland Evaluation Checklist," Urban Wetlands in the Yahara Monona Watershed: Functional Classification and Management Alternatives, Institute of Environmental Studies, University of Wisconsin, Madison, Wisconsin, pp. 19-41.

*Urban Wetland Evaluation Checklist, pp. 161-167.

*Wright, Tiffany, Jennifer Tomlinson, Tom Schueler, Karen Capiella, Anne Kitchell, and Dave Hirschman. 2006. Direct and Indirect Impacts of Urbanization on Wetland Quality, Washington, D.C.: Environmental Protection Agency, pp. 1-12.

*Salvesson, David, 1994, "Regional Wetlands Planning," Wetlands: Mitigating and Regulating Development Impacts, Washington, D.C.: The Urban Land Institute, pp. 15-21, 48-52.

*North Carolina State University Wetland Website, 2001, Wetland Restoration and Creation, Mitigation Banking & Successful Mitigation . Skim website: <http://www.water.ncsu.edu/watershedss/info/wetlands/mitsucc.html>

In Class Wetland Evaluation Case Study

* Case study: Starkweather Creek Wetland: Madison, Wisconsin (to be read prior to class)

Part VI: Presenting the Watershed Plan to the Community

Objectives:

- 1) *To present a plan coherently.*
- 2) *To engage elected officials, citizens, and planners in a discussion of the strengths and weaknesses of a plan.*
- 3) *To represent and respond to interests of specific stakeholders as well as general public interests.*

Dec. 6: Session 20: Open session

ASSIGNMENT 4 DUE: Reports on wetland evaluation and recommendation are due.

*ASSIGNMENT 5 HANDED OUT: Plan for Booker Creek Watershed.
Due: Oral presentation, Dec. 8, Written plan, Dec. 10.*

Dec. 8: Session 26: Student presentations of plan for Booker Creek Watershed

ASSIGNMENT 5 DUE: Student presentations of plan for Booker Creek Watershed.

ASSIGNMENT 5 DUE: Final written plan is due Dec. 10.