

Forest Resource Management Program

Master of Forestry Degree



NICHOLAS SCHOOL OF THE
ENVIRONMENT AND EARTH SCIENCES
DUKE UNIVERSITY

December 2007

Forests are some of the most complex and undervalued of natural ecosystems. They cover more than 30% of the earth's terrestrial surface. Forests provide a wealth of tangible goods and environmental services including fiber, high quality water, and many non-wood products. Forests provide habitat for wildlife, and aesthetic and recreational values. Forests also affect critical ecological functions, regulating the biosphere's circulation of chemical elements such as carbon, oxygen, and nitrogen, and the local to global-scale circulation of water and energy.

The future of forests is, however, a matter of great concern, given the rate and geographical extent of modern human development. The **Forest Resource Management (FRM)** program integrates forest ecology and management within an educational program that also emphasizes related environmental fields. The program builds knowledge in basic forest ecology and ecological management of forests for a variety of uses, including nontraditional forest products and conservation. This distinctive approach is brought about by coordinating a core set of forestry courses, in sampling, measurement, dendrology, silviculture, and ecology, with electives in resource-oriented courses such as soils, hydrology, air and water quality, biological conservation, and physiology; statistical analysis and modeling; and resource economics and policy. The Duke Forest serves as an outdoor laboratory in many of these courses.

The Forest Resource Management Program seeks to provide:

1. A knowledge base with breadth in the ecology and management of forest resources and depth in biology and physical sciences, silviculture, forest measurement, and resource policy, economics and administration.
2. Quantitative and analytical skills of statistics and forest measurement, and a choice among geospatial tools, applied mathematics and quantitative modeling, and decision analysis.
3. Management skills for effective stewardship and planning of forest resources, as well as the ability to work effectively in cross-disciplinary settings with a high degree of professional ethics in the government, non-profit and business sectors.
4. Oral and written skills to communicate management prescriptions and plans to a wide audience and the ability to critically evaluate opposing viewpoints.

The focus of the Forest Resource Management program is problem solving in complex ecological and management systems. Within the program, students may acquire skills that qualify them for positions in industry, conservation organizations, government agencies, nonprofit organizations, and other groups involved with the use and conservation of forests. Students can develop additional credentials for employment by jointly completing this program and also a Master of Environmental Management degree in the Nicholas School of the

Environment, a Master of Business Administration degree in the Fuqua School of Business, a Master of Public Policy degree in the Terry Sanford Institute of Public Policy or a Juris Doctor degree in the Law School. The program also provides an excellent foundation for the Ph.D. and a career in research.

Duke's MF degree is accredited by the Society of American Foresters (SAF), the largest professional forestry organization in the United States. The MF is important as a credential for application to a wide range of employment, with organizations ranging from those interested primarily in conservation to those who manage forests for fiber products, from public-sector agencies to non-profits and private-sector companies. For over 60 years, Duke's program in forestry has educated leaders in forestry fields, and the current program at Duke continues this tradition.

Prerequisites

Prerequisites for admission to the Nicholas School of the Environment are: (1) at least one course in calculus; (2) at least one statistics course that includes parametric statistics, probability distributions, hypothesis testing, confidence intervals, correlation, linear regression, and simple ANOVAs; (3) a working knowledge of word processing and spreadsheet analysis; and (4) previous education in the natural sciences, social sciences, and humanities that is related to the student's area of interest in natural resources.

In addition, the Forest Resource Management program requires at least one introductory course in principles of ecology, and an introductory economics course that includes microeconomics. Deficiencies must be made up in the student's first year in residence; prerequisites do not count toward degree requirements.

Course of Study

Students must complete 48 units of credit to fulfill the Duke master of forestry degree. These units are distributed among forest ecology and biology, measurement of forest resources, management of forest resources, forest resource policy and administration, professional ethics, quantitative analysis, electives, and the master's project. In the first semester, students develop a course of study (the advising worksheet), which summarizes the student's plan for specific coursework that will meet degree requirements. This planning is facilitated by periodic forestry program meetings with faculty and students, individual consultation with advisors, and in discussions with fellow students. The course of study is expected to be refined as a student moves through the program.

The electives provide students with a major opportunity to develop a field of specialty. Students are encouraged to coordinate electives to develop specialized skills or a specialized understanding of a forest ecosystem. Such specialization is used to allow students to acquire a proficiency of some aspect of the broad, multi-disciplinary field of forest resource management and should not confine students' perspective, educational development, or career path. Examples include wetland ecology and management, hydrology and soil science, conservation ecology,

computer applications, quantitative analyses, GIS modeling, economics, finance, policy, and business applications. The specialization is further developed with the Master's Project (MP), an independent project whose direction is largely controlled by the student.

Seminars

Second-year students are required to take the Forest Resource Management program area seminar (ENV398.01, 1 unit earned on completion of program) every semester, and present the results of their master's project in a school symposium. First-year students are required to attend these presentations as well as the required skills modules and other program meetings.

Master's Project

A master's project (MP) is completed for 4 to 6 units of credit, which may be taken in any semester. The MP is an opportunity for students to investigate a forest issue in a manner that is independent of traditional coursework projects. Both the topic and the approach are determined by the student in consultation with the advisor. The range of opportunity is wide and is considerably wider than a traditional graduate school thesis. The master's project must include a quantitative analysis component of some aspect of the problem examined. Master's projects have included model simulations, forest sampling and analysis, development of educational materials, management plans or environmental impact statements, results of library research or traditional scientific study, and even videos on land management issues. Perhaps the most distinguishing feature of the MP is that it places the educational opportunity and responsibility very much in the hands of the student. Many students gather data and work on their MP during the summer between their two years in residence, completing the work during their final two semesters. Internships and proposal competitions are available to financially support the work of the MP. MP proposals (approved and signed by the MP advisor) are due the second week in October of the second year of enrollment. Complete drafts are targeted for March 1 of the second year, final drafts April 1, with final submission due by the end of exams during the spring semester. Specific guidelines for MP proposals and final papers are available on the Nicholas School's website.

Participating Faculty

Faculty members serving as advisors in the Forest Resource Management program are listed below. Please consult the faculty pages on Nicholas School's website or the *Bulletin of the Nicholas School of the Environment* for a description of their research.

Faculty:

Jennifer Swenson (Program Chair)
Dean Urban
Norm Christensen
Pat Halpin
Lynn Maguire
Ram Oren

Office (email):

A207A LSRC (jswenson@duke.edu)
A320 LSRC (deanu@duke.edu)
A237 LSRC (normc@duke.edu)
A324 LSRC (phalpin@duke.edu)
A222 LSRC (lmaguire@duke.edu)
A319 LSRC (ramoren@duke.edu)

Dan Richter
John Terborgh

A207B LSRC (drichter@duke.edu)
Center for Tropical Studies (manu@duke.edu)

In addition, the program is supported by other faculty within NS (Bob Healy, Randy Kramer), a number of affiliate and adjunct faculty (Coleman Doggett, Subrendu Pattanayak), forest scientists at the USDA/FS Research Station in Research Triangle Park (Tom Holmes, Evan Mercer, David Wear), and the Forest History Society (Steve Anderson). Students who work with advisors outside of the Nicholas School should consult with regular program faculty on matters of academic advising and other administrative details that might be unfamiliar to our affiliates in other institutions.

MF/FRM Curriculum

Asterisk (*) indicates courses that are usually taught every other year. (R) and **bold type** indicate required courses or areas. Courses taken to fulfill required areas other than those suggested here need advisor approval. (F) and (S) course are offered in fall and spring semesters, respectively.

(1) Forest Ecology and Biology (10+ units)

ENV205L **Silviculture/Ecological Management of Forest Ecosystems**, 4 units (R)
offered F '03, then S '05 (thereafter, regular S semesters)

ENV213 **Forest Ecosystems**, 3 units (R) (S)

One additional forest science course from the three options below (R):

ENV221 Soil Resources, 3 units
ENV234 Watershed Hydrology, 3 units
ENV207* Forest Pest Management, 3 units

(2) Measurement of Forest Resources (5+ units)

ENV201 **Forest Resources Field Skills**, 2 units (R) (F)
ENV206 **Forest Vegetation Sampling**, 3 units (R) (S)

(3) Management of Forest Resources (5+ units)

ENV320 **Forest Ecosystem Management**, 3 units (R) (S)
ENV262 **Forest Management Traveling Seminar**, 2 units (R)
(1 unit per semester with rotating topics: forest regeneration, harvest effects on water and soil, and fiber utilization, may be repeated for credit)

(4) Forest Policy and Administration (6+ units)

One course in forest/resource economics from the two options below (R):

ENV298.27 Forest Economics, 3 units (or NCSU/FOR519)
ENV270 Resource and Environmental Economics, 3 units

One course in forest/resource policy from the options below (R):

ENV274	Resource and Environmental Policy, 3 units
ENV285	Land Use Principles and Policy, 3 units

(5) Professional Ethics (1+ units)

ENV277	Professional Ethics for Environmental Practitioners, 1 unit (R) (F)
---------------	--

(6) Quantitative Analysis (6+ units)

Two courses from the eight options below (R):

ENV255	Applied Regression Analysis
ENV210	Applied Data Analysis for Environmental Science
ENV259	Fundamentals of Geospatial Analysis
ENV261	Geospatial Analysis for Conservation Applications
ENV352	Spatial Analysis
ENV357	Satellite Remote Sensing for Environmental Analysis
ENV358	Multivariate Analysis in Community and Landscape Ecology
ENV359	Advanced Geospatial Analysis
ENV385	Environmental Decision Analysis

Intermediate-level methods-oriented statistics courses are strongly recommended for many students. Quantitative courses are also taught by Duke's ISDS, Fuqua School, and departments of Biology, Economics, Political Science, Public Policy, Sociology, and BAA. In addition, various departments at NCSU and UNC offer graduate-level quantitative coursework that is of very fine quality.

(7) Masters Project (5-7 units)

ENV399	Masters Project, 4-6 units (R)
ENV398.01	Forest Resource Management Seminar, 1 unit (R)

Specializing Electives

Electives should be chosen to help develop a special perspective or area of specialization. This is done in consultation with the advisor and program chair, with some thought as to the topic of the MP. The identification of a specialization and is usually done over the course of a student's first two semesters.

Forestry Field Trips

All MF's are ensured a place in ENV266, Ecology of Southern Appalachian Forests, a 1-unit readings and field trip course held each fall. A 1-credit western forestry field trip, ENV260, is given each spring and may be repeated for credit.

Rev. 12/18/07