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# The University of Georgia

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**Daniel B. Warnell School of Forest Resources**  
Forestry, Wildlife, Fisheries and Aquaculture  
Forest Environmental Resources  
*Office of the Dean*

October 21, 2004

Dr. Arnett C. Mace, Jr.  
Senior Vice President for Academic Affairs and Provost  
Administration Building  
CAMPUS

Dear Arnett:


Enclosed are materials relative to a merger of two majors: Environmental Soil Sciences, in the College of Agriculture and Environmental Sciences, and Forest Environmental Resources in the Daniel B. Warnell School of Forest Resources. The new single major would be called "Water and Soil Resources." Whether the student graduating in this program receives a BSFR or BSES degree is the student's choice.

We believe this proposal to merge these two majors is in the best interest of students and The University of Georgia and seek your support for its acceptance.

Sincerely,



Gale Buchanan, Dean  
Agricultural and Environmental Sciences

  
Richard L. Porterfield, Dean  
Daniel B. Warnell School of  
Forest Resources

**NAME CHANGE JUSTIFICATION FORM**

School/College

Name: \_\_\_\_\_

Proposed

Name: \_\_\_\_\_

**Department Name Changes:**

Current Department Name:

Proposed Department Name:

\_\_\_\_\_

**Major Name Changes:**

Current Major Name:	Degree	Proposed Major Name:	Degree
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<u>Environmental Soil Science</u>	<u>BSES</u>	<u>Water and Soil Resources</u>	<u>BSES</u>
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<u>Forest Environmental Resources</u>	<u>BSFR</u>	<u>Water and Soil Resources</u>	<u>BSFR</u>
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**Minor Name Change:**

Current Minor Name:	Degree	Proposed Minor Name:	Degree
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**Prefix Changes:**

A prefix change package should be submitted after the name change has been approved.

Current Prefix	Department	Proposed Prefix	Department
_____	_____	_____	_____
_____	_____	_____	_____

**JUSTIFICATION:**

See attached justification

**SIGNATURES:**

*for DM* School/College: DP Krause  
CAES

WSFR RL [Signature]

Department: [Signature]

## **Justification**

Proposed here is the merger of two majors, Forest Environmental Resources in the Warnell School of Forest Resources and Environmental Soil Science in the College of Agriculture and Environmental Sciences, into a single major to be called Water and Soil Resources. The combined major will be offered under two degree programs -- Bachelor of Science in Forest Resources (BSFR) and Bachelor of Science in Environmental Science (BSES). Choice of degree under which a student graduates will be the student's choice.

The present Forest Environmental Resources major has three Areas of Emphasis -- Water Resources, Soil Management, and Environmental Assessment. In the merger, the Environmental Assessment AOE would be eliminated and be reconstituted as an Interdisciplinary Degree Certificate Program. Given the actual interdisciplinary nature of this program, this is a more sensible curriculum structure.

The Environmental Soil Science major has had 15-20 students over most of its history with three to five graduates of the major annually. Thus, it is considered to be an undersubscribed major. Enrollment is larger in the Forest Environmental Resources major, but enrollment is relatively small, less than 10 students, in both the Water Resources and Soil Management Areas of Emphasis. Thus, the goal of the name and curriculum changes is to combine three small programs into a larger and more comprehensive Water and Soil Resources major.

Most of the concepts and principles that students should master during their undergraduate education are similar for soil science and water science, and there is considerable overlap in curricula for the three existing programs. This overlap goes beyond the classroom. Soil and water are intimately linked, and a single major addressing the basic concepts of the two fields will better prepare graduates to help solve environmental and water resource issues facing our society. Expectations are that the synergy across departments and colleges created by the combined major will enhance the student's educational experience, and that enrollment in the major will grow to numbers greater than the sum of the three existing programs. Other interested departments including Geology, Geography, and Biological and Agricultural Engineering will be invited to become involved in the restructured major through course offerings and curriculum design.


The name for the major, Water and Soil Resources, was determined through surveys of students in the existing programs and faculty discussions. It is felt that the name adequately reflects the intent and curriculum of the major and will be attractive to students looking for a career in water and soil resource investigation and management.

**APPROVAL PAGE  
WARNELL SCHOOL OF FOREST RESOURCES  
CURRICULUM PROPOSALS**


Proposal for: **Rename the BSFR in FOREST ENVIRONMENTAL RESOURCES  
to a BSFR in WATER AND SOIL RESOURCES,**

**AND**


**Rename the BSES in ENVIRONMENTAL SOIL SCIENCE to a  
BSES in WATER AND SOIL RESOURCES.**

  
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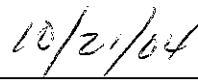
Associate Dean for Academic Affairs

  
\_\_\_\_\_

Date

  
\_\_\_\_\_

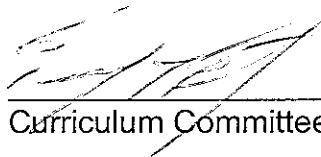
Dean

  
\_\_\_\_\_

Date

APPROVAL PAGE  
COLLEGE OF AGRICULTURAL AND ENVIRONMENTAL SCIENCES  
CURRICULUM PROPOSALS

Proposal for: PROPOSAL TO RENAME THE BSES IN ENVIRONMENTAL SOIL SCIENCE TO A BSES IN WATER AND SOIL RESOURCES AND THE BSFR IN FOREST ENVIRONMENTAL RESOURCES TO A BSFR IN WATER AND SOIL RESOURCES

  
\_\_\_\_\_  
Curriculum Committee Chair

10-15-04  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Faculty Council Executive Committee Chair

10-19-04  
\_\_\_\_\_  
Date

  
\_\_\_\_\_  
Associate Dean for Academic Affairs

10-15-04  
\_\_\_\_\_  
Date

# Water and Soil Resources Major

## Background

Rapid advances in science and technology over the past century have dramatically improved the standard of living and quality of life for most people. These advances have not come without cost, however. Georgia is faced with enormous challenges related to soil and water quality that threaten our future growth and development, and may limit potential benefits afforded by these advances.

Although Georgia has bountiful water resources, we have learned in recent years that they are not limitless. Recent droughts have underscored the need to better manage our finite water resources. Providing sufficient quantities of clean water for cities, farms, and factories has become an urgent priority for Georgia, as evidenced by ongoing efforts to develop a comprehensive state water management plan.

Our water - and soil - resources are threatened by urban and industrial development, and by agricultural and silvicultural production. The use of soils and water bodies for agricultural, industrial, and municipal waste disposal has become an important national and regional issue. Many potential non-point source contaminants of water result from soil erosion, or from material applied to soil, including fertilizers and pesticides, solid and liquid animal wastes, and municipal and industrial wastewater, biosolids, and byproducts.

Soil is a complex biogeochemical reactor that mediates and controls the fate of organic and inorganic anthropogenic substances applied to soils and serves as an effective buffer between the point of application and ground and surface water. Through natural soil processes including microbial degradation, adsorption, precipitation, filtration, and biocycling, the soil degrades and/or immobilizes most organic and inorganic substances that may threaten human health and ecosystem integrity.

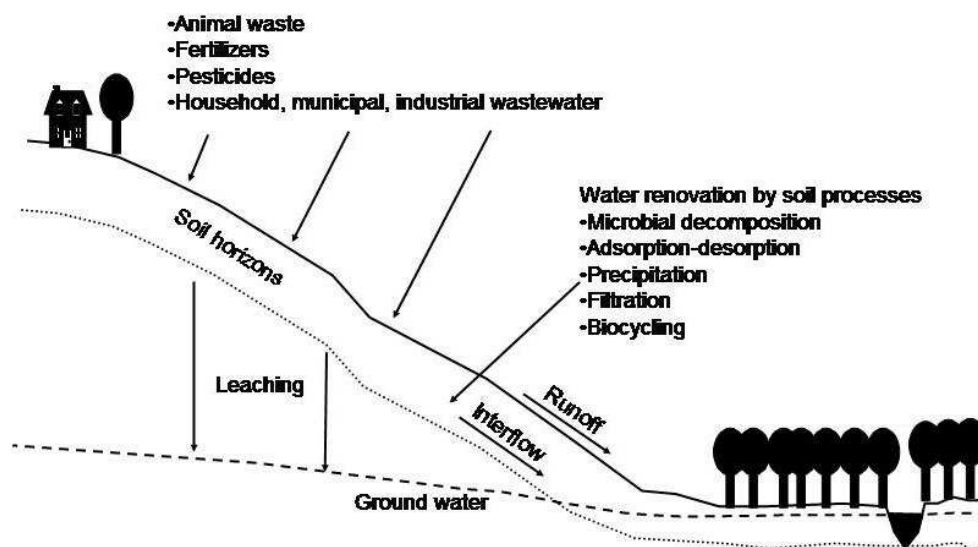


Figure 1: Schematic representation of soil renovation of waste and wastewater.

The capacity of soil and waterbodies to act as sinks for contaminants is great, yet not without limit. Failure to consider the assimilative capacity of soils and waterbodies - over application of anthropogenic materials and poor management practices - can lead to unexpected movement of possible contaminants. These contaminants can move from their source into ground and surface water, through rivers and streams, and into lakes and estuaries, where they can degrade water quality. Poor management leading to excessive erosion can even turn the renovation medium into a source of contamination.

## **Objectives of the Major**

- Educate students in chemical, physical, and biological processes that impact the fate and transport of natural and anthropogenic substances applied to or occurring in soil and water.
- To provide students with knowledge of soil and landscape properties and their interactions that will enable graduates to effectively evaluate site conditions.
- Develop student's critical thinking skills to enable them to apply principles learned to develop management strategies to enhance quality and minimize degradation of soil and water resources.

## **Knowledge Required to Accomplish the Objectives of the Major**

- Essential knowledge:
  - Basics of landscape development and characteristics
  - Principles of water movement through soil
  - Principles of surface hydrology
  - Principles of ground water hydrology
  - Chemical interactions of water transported substances with soil
  - Biological and microbiological actions and interactions in soil and water
  - Computer manipulation and analysis of spatial information (GIS)
  - Human, economic, and policy impacts on soil and water resource management
- Important - but not essential - knowledge:
  - Field sampling, instrumentation, and monitoring of soil and water
  - Laboratory analysis and analytical protocols of soil and water
  - Plant and animal identification, management, and population dynamics
  - Soil development processes, landscape interactions, and taxonomy

**Core Requirements:** 62 hours

**Area A - Essential Skills:** 9 hours

- English Composition I, ENGL 1101, 3 hours
- English Composition II, ENGL 1102, 3 hours
- Precalculus, MATH 1113, 3 hours

**Area B - Institutional Options:** 4 hours

Satisfied by electives selected by the student

**Area C - Humanities/Fine Arts:** 6 hours

Satisfied by electives selected by the student

**Area D - Science, Mathematics, and Technology:** 12 hours

Course must be taken using general electives if not taken here

- Freshman Chemistry I, CHEM 1211/1211L, 4 hours
- Analytic Geometry and Calculus, MATH 2200/2200L, 4 hours
- Choice of
  - Principles of Biology I, BIOL 1107/1107L, 4 hours
  - Principles of Plant Biology, PBIO 1210/1210L, 4 hours

**Area E - Social Sciences:** 12 hours

Course must be taken using general electives if not taken here

- Principles of Microeconomics, ECON 2106, 3 hours

**Area F - Courses Related to Major:** 19 hours

- Introduction to Public Speaking, SPCM 1100, 3 hours
- Freshman Chemistry II, CHEM 1212/1212L, 4 hours
- Elementary Statistics, STAT 2000, 4 hours
- Introductory Physics, PHYS 1111/1111L, 4 hours
- Choice of
  - Principles of Biology II, BIOL 1108/1108L, 4 hours
  - Elementary Organic Chemistry, CHEM 2100/2100L, 4 hours



**Major Requirements:** 34 hours

1. Choice of

- General Geomorphology, GEOG 3010, 3 hours
- Pedology, CRSS (GEOL) 4540/4540L, 3 hours

2. Soils and Hydrology, CRSS (FORS) 3060/3060L, 4 hours

3. Watershed Hydrology, FORS 4110/4110L, 4 hours

4. Hydrogeology, GEOL 4220, 3 hours

5. Soil Physics, CRSS 4600/4600L, 4 hours

6. Soil Chemistry, CRSS 4670, 3 hours

7. Choice of

- Soil Microbiology, CRSS (MIBO) 4610/4610L, 3 hours
- Limnology, ECOL (FORS) 4310/4310L, 4 hours
- Environmental Microbiology, EHSC 4310/4310L, 3 hours

8. Choice of

- Environmental Soil Science Internship, CRSS 3920, 3 hours
- Senior Project in Forest Resources Management, FORS 4730, 4 hours
- Senior Thesis in Forest Management, FORS 4750, 4 hours

9. Choice of

- GIS for Decision Support in Agricultural Applications, (CRSS)APTC 4050, 4 hours
- Spatial Data Analysis, ENGR 3120, 3 hours
- Spatial Information in Forest Resources, FORS 3910/3910L, 3 hours
- Introduction to Geographic Information Systems, GEOG 4370/4370L, 3 hours
- GIS Applications in Agriculture, GEOG (CRSS) 4375, 4 hours

10. Choice of

- Principles of Resource Economics, AAEC 3060, 3 hours
- Environmental and Public Health Law, AAEC 4250, 3 hours
- Environmental Economics, AAEC 4650, 3 hours
- Water Resources Economics, AAEC 4800/4800L, 3 hours
- Environmental Law and Governmental Regulation, AAEC 4930, 3 hours
- Environmental Values and Policy, EETH 3230, 3 hours
- Forest Resource Economics and Management, FORS 3710/3710D, 3 hours
- Forest Resources Policy, FORS 4800/4800D, 3 hours
- Water Issues in Georgia, GEOL 3220, 3 hours

**Total Electives:** 24 hours

**Major Electives:** 9 hours

Choose from this list, the major courses listed above, or with approval of the advisor.

- Crop Science, CRSS 2010, 3 hours
- Crop Science Laboratory, CRSS 2010L, 1 hour
- Soil Morphology and Interpretation, CRSS 3540, 1 hour (can be repeated)
- Contaminants in Soil and Water, CRSS 4510, 3 hours
- Soil Erosion and Conservation, CRSS 4580/4580L, 3 hours
- Soil Fertility and Plant Nutrition, CRSS 4590, 3 hours
- Soil Fertility and Plant Nutrition Laboratory, CRSS 4590L, 1 hour
- Chemical Analysis of Environmental Samples, CRSS 4660/4660L, 3 hours
- Environmental Soil Chemistry Laboratory, CRSS 4670L, 1 hour
- Ecology, ECOL 3500/3500L, 4 hours
- Environmental Chemistry, EHSC 4350/4350L, 3 hours
- Environmental Toxicology, EHSC 4490, 3 hours
- Water and Wastewater, EHSC 4590/4590L, 3 hours
- Water Pollution and Human Health, EHSC 4610, 3 hours
- Soil and Water Resource Conservation, ENGR 3050, 3 hours
- Field Orientation and Measurements, FORS 3000/3000L, 4 hours
- Dendrology, FORS 3010/3010L, 3 hours
- Forest Ecology, FORS 3020/3020L, 4 hours
- Forest Biometrics, FORS 3610/3610L, 3 hours
- Forest Soil Management, FORS 4000/4000L, 3 hours
- Quantitative Methods in Hydrology, FORS 4120/4120L, 3 hours
- Field Methods in Hydrology, FORS 4130/4130L, 2 hours
- Introduction to Wetlands, FORS 4140/4140L, 3 hours
- Environmental Monitoring, FORS 4160/4160L, 3 hours
- Hydrology, Geology, and Soils of Georgia, FORS(ENGR)(CRSS)(GEOL) 4170L, 3 hours
- Fluvial Geomorphology, GEOG 4020, 3 hours
- Field and Laboratory Methods in Physical Geography, GEOG 4060, 3 hours

- Introductory Spatial Analysis, GEOG 4300, 3 hours
- The Use and Interpretation of Aerial Photographs, GEOG 4330/4330L, 3 hours
- Remote Sensing of the Environment, GEOG 4350/4350L, 3 hours
- Earth Materials, GEOL 3010/3010L, 4 hours
- Surficial and Near-Surficial Processes, GEOL 3020/3020L, 4 hours
- Principles of Geochemistry, GEOL 4110, 3 hours

**Free Electives:** 15 hours

Choose with approval of the advisor.

**Total:** 120 hours