

NARRATIVE

BACKGROUND

History and Mission

Alfred University, located in southwestern New York State, is a private institution with an enrollment of approximately 2,000 undergraduate students. Founded in 1836, it was the first private institution in New York to admit both male and female students. Today, approximately fifty percent of the student body is female. The cornerstone of the university is a commitment to academic excellence. *U.S. News and World Report* repeatedly recognizes this commitment and in several recent annual surveys has ranked Alfred University at or near the top among institutions of a similar nature located in the northeastern United States. Students attending the university in 1997 come from thirty-three states and seven foreign countries and from very diverse social and economic backgrounds. A complete description of the university is included in Attachment B.

Current Program and Accomplishments

The Environmental Studies Program (ENS) at AU has been in existence since 1971, offering a B.A. degree with an emphasis in either natural or social sciences. Common core courses, diverse electives, and an independent research project are required of all Environmental Studies majors. Enrollment in the ENS Program has been increasing over the past several years. Twenty-three seniors with ENS majors graduated in 1996, our biggest class to date. We suspect this increase reflects overall environmental awareness of incoming freshmen, our emphasis on project-oriented hands-on learning, and greater administrative support for the program in terms of faculty assignments, course development, and minor equipment needs. At the same time that we have had an increase in *quantity*, we have also maintained a rigorous program and see the *quality* of our students rising. One-fifth of the 1996 Alfred University Scholars (the university-wide honors program) were ENS majors, and nearly one third of the 1996 ENS graduates were National Merit Scholars. Our students are strongly encouraged to get a second major in a “traditional” discipline such as biology, chemistry, or geology to add specialty to their education; currently one-third of them do this. About one third of our seniors go immediately to graduate school, more within a few years; this proportion is also increasing.

In recent years, we have been successful in acquiring federal funds to improve specific aspects of our program. Grants from the National Science Foundation have allowed us to purchase both sophisticated analytical instruments and computers, with which we have set up a student computer laboratory. Funds from another federal grant from have been used to install four groundwater wells on the university campus which are used for teaching and research purposes. A previous grant a private foundation was used to establish an interactive multimedia classroom for the Environmental Studies Program, where we teach students how to use computers, software, and Internet resources. This classroom, the first of its kind on campus, has been an enormous success. We frequently have requests from other programs on campus to “borrow” the classroom (whenever Environmental Studies classes aren’t using it!) and it has been used by biology, geology, chemistry, psychology, and physics classes. This multimedia classroom is also used for final presentations by students who have received our

prestigious ARGUS grants (Alfred Research Grants for Undergraduate Students) and is increasingly used by students presenting routine work in a wide variety of our classes.

Staff and Relationships to Other Organizations

Three full-time faculty teach in the Environmental Studies Program (a biologist, geologist, and geographer), and we employ a half-time secretary. We are a member of NEES, a group of northeastern colleges and universities with Environmental Studies programs, whose purpose is to share resources and discuss curricula and pedagogy. We have also been invited to join an informal group of New York State colleges with environmental programs (Colgate University, Vassar College, Barnard College, St. Lawrence University) with whom we will embark on joint field trips and research projects with undergraduate students.

The Environmental Studies Program at Alfred University differs from other academic environmental programs in several ways. Many colleges and universities have recently added a major in Environmental Science or Environmental Studies, largely in response to student interest and opportunities in the job market. Our program has been in existence for twenty-six years. Originally an outgrowth of the biology and geology programs and Alfred, our Environmental Studies program is a distinct, interdisciplinary unit today. Most Environmental Studies programs at other institutions are still intimately associated with a “home” department (usually biology or geology) and have yet to reach the degree of interdisciplinarity that we have been able to achieve after more than twenty years of program refinement.

FUNDING REQUEST

Purpose and Need for the Project

We want our students to significantly contribute to the solution of environmental problems. Graduates from our program should be strong in field, analytical, and computational aspects of environmental sciences. We have made a good start at providing opportunities for students to hone their skills in these areas, but feel that we need to do more. As mentioned previously, recent grants from the National Science Foundation have provided the funds to purchase computers for data analysis and equipment used to determine the chemical composition of water samples. We need to do more, however, in the way of hands-on field experiences. The value of practical field experience cannot be overstated. Furthermore, field work is fun for students, so they devote more energy – and learn more – when provided with field opportunities.

Project Implementation

We propose to set up a permanent field station/laboratory that we can use as part of classes and research. A parcel of land (over 100 acres) located 15 miles from campus has been donated to the university. This location is ideally situated for an Environmental Field Facility: there are streams, ponds, fields that were used for agricultural purposes in the past, wooded areas, a small quarry, and wetlands – a wide diversity of environments for our students to investigate! Two barns in good (though rustic) condition are available for indoor activities and storage. We do need, however, the equipment necessary to study these ecosystems. Since the three faculty members in the Environmental Studies Program have different specialties, our students use an interdisciplinary approach to learning about the environment, incorporating aspects of the biological, geological, and geographical sciences to gain a broadly-based, yet detailed picture of the systems that they are studying. For example, we will map a small drainage basin to determine its runoff characteristics and gauge discharge in the stream, especially during single storm events to test our hypotheses about infiltration, peak discharge, time of flow, etc. Stream water will be analyzed over time to estimate export of materials from the drainage basin. The equipment requested in this proposal includes instruments used by environmental scientists from various disciplines. It will support a very broad array of activities for students at all levels, from introductory classes through their senior project. The equipment will be available for student use at the field site as it will not be regularly needed on campus which lacks comparable field sites. Having permanent study sites facilitates long-term projects, which are more realistic, practical, and educational. Moreover, long term efforts can be beneficial for future classes to continue on-going research.

One of the field skills that our students will develop is the ability to make an accurate map. We have recently added the capability for GIS (Geographic Information Systems) to our program, which allows our students to analyze spatial data collected in the field, but we need a way to accurately collect the field data. To this end, the largest single item on our list of equipment is a “Global Positioning System” (GPS). This instrument, which is used routinely by map-makers and surveyors, can be used to map any locale with precision and subsequently to identify sampling sites on these maps, for example. The power of a GPS is its ability to place the map and the data collection points in “real world” coordinates, such as latitude and longitude, so that the final products are accurately georeferenced.

It is essential to be able to locate sampling sites precisely on a map in order to determine spatial relationships in the data using GIS. Recent technological advances have made GIS and GPS readily compatible, so that the data collected in the field with the GPS can be downloaded directly to our existing GIS in the lab. Here is a simple example of how GPS/GIS may be used: at several sampling sites on the property, a student will use GPS to determine the exact location of the sites (in latitude/longitude, for example), measure soil moisture, record vegetation type, and collect samples of water and soil for chemical analyses. The site coordinates will then be entered into the GIS along with other field and laboratory data. The GIS allows the student to generate an accurate map of the sample sites, superimpose the field and laboratory data, and query for correlations and spatial relationships among the data; for example, is the vegetation type related to groundwater or soil chemistry? This type of spatial analysis of environmental data would not be possible without the accurate locational data obtained with the GPS.

Various pieces of equipment will be used to study both the quality and quantity of water at the field station. A current meter (already in hand) will be used to measure stream flow and a turbidity meter will be used to measure the amount of suspended sediment in streams and ponds. A pH meter

(purchased with funds from another grant) will be used to measure acidity of the water. We also plan to install a weather station at the site to collect precipitation and measure temperature, wind speed, humidity, barometric pressure, etc.; these data can be very important in ecosystem studies. A data logger, an electronic device for recording digital data over long periods of time, will be connected to the weather station and to stream discharge gauges. Other field items to be purchased include calipers for measuring tree diameters (data to be used for total biomass calculations and growth studies) and soil and water samplers.

We will also set up a rudimentary field laboratory/classroom at the site in one of the barns currently on the property. In that facility, we will need to have essential laboratory equipment, including drying ovens, balances or scales, and basic glassware. More sophisticated analyses will be done in the analytical labs on the university campus, but initial work and sample preparation is best accomplished at the field site.

Staffing and Time-table

Faculty members in the Division of Environmental Studies will be responsible for the implementation and success of the project. Dr. Michele Hluchy, a geologist, currently serves as chair of the Division of Environmental Studies and, as such, will direct the project. Dr. Gordon Godshalk is a biologist who specializes in aquatic systems, and Dr. Diana Sinton is a geographer whose recent work has involved evaluating the effects of environmental perturbations on forests. We anticipate that it will take no more than one year to purchase the equipment and set up the field station.

Contribution to our Overall Mission

This field station will benefit virtually every Environmental Studies student at Alfred University, along with many geology, biology, and chemistry students. Every Environmental Science course will have a field component (most do now) – some courses will be almost entirely field-based. This field experience will be of inestimable value to our students especially as we take advantage of the ability to conduct long-term research on dedicated plots. Those that become employed as environmental scientists will have learned skills that they can bring to their job and all students will have gained an appreciation for how field data are collected. We believe that our mission is to provide the most relevant education possible to our students and this field facility will be an integral part of their hands-on experience.

EVALUATION

We anticipate that we will be able to assess the impact of this project on our students and programs by maintaining a dialogue with the students, alumni, and their employers with regard to their opinions of our students' preparation for future study or employment in their chosen fields. We make a

concerted effort to solicit and respond to the concerns of our students and alumni. There are student representatives on the Environmental Studies Program Committee (the college committee that advises on curricular matters for the program), and we periodically survey alumni to adjust our major programs so that our students are best prepared for graduate school and the work force. We will continue to gather this information from current and past students to fully assess the impact of this project on the academic programs involved and the students associated with those programs.

LIST OF ATTACHMENTS:

A. Financial Information

Operating Expense Budgets – University and Env. Studies Program
List of Foundation and other Supporters
Other Sources of Funding Solicited
Current Expense Budget for the Project
Sources of Income for the Project

B. Other Supporting Materials

List of Board of Trustees
Tax Exempt Status
Resumes of Key Staff
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Information about the Organization and Program

Environmental Studies Program Operating Budget – 1996-1997

Faculty Salaries.....	\$88,198
Administration.....	1000
Office Staff.....	6870
Personnel Benefits.....	23,487
Supplies and Expenses.....	3500
Travel–General.....	324
Employee Support.....	324
Telephone–Toll charges.....	86
Student Travel.....	681
TOTAL.....	\$124,470

Active Externally - Funded Grants in the Environmental Studies Program – 1996-1997

National Science Foundation: 4 grants active in 1996-1997:

National Science Foundation - Instrumentation and Laboratory Improvement Program
“A Field Site for Studying Surface and Subsurface Water”, 1997-1999, \$18,293

National Science Foundation - Undergrad. Course and Curriculum Development Program
“Investigative Science at Alfred: How the World Works”, 1997-1999, \$114, 930

National Science Foundation - Instrumentation and Laboratory Improvement,
“Integration of Analytical Chemistry into Environmental Programs at Alfred University”, 1995-1997, \$83, 757

National Science Foundation - Undergrad. Course and Curriculum Development, 1993-1997
“Introductory Course to Teach Methods in Environmental Science”, \$73,638

Current Expense Budget for the Project

GPS system (including laptop computer)	\$
Weatherport Weather Station	\$3445
Fisher Scientific Isotemp Drying Oven	\$ 695
Campbell Scientific CR 10X Datalogger	\$1046
OHAUS triple beam balance	\$ 178
Tree Calipers	\$ 106
Water samplers	\$ 283
Soil Auger	\$ 118
Miscellaneous Glassware	\$ 500
<i>TOTAL</i>	

Sources of Income for the Project

There are currently no other sources of income for the project, although long-term use of the site at which the field station will be located has been assured by Mrs. Carol Ellenson, owner of the property. She has guaranteed use of the site by our program during her lifetime and she plans to deed the property to the university in her will.

Resumes of Key Staff

Dr. Michele Hluchy is a geologist with an undergraduate degree in geology from Colgate University and an M.S. and Ph.D. from Dartmouth College. Her areas of scientific expertise include hydrogeology and the study of minerals in soils. Currently serving as Chair of the Environmental Studies Division, she has been a faculty member in the Geology and Environmental Studies Departments at Alfred University since 1988 and teaches courses in hydrogeology, environmental and surficial geology and environmental science. Dr. Hluchy has been a principle investigator on nine externally funded grants for teaching and research – five from the National Science Foundation, and one each from the American Chemical Society and the Open Space Institute, and two from the Donaldson Charitable Trust. She has presented papers at scientific meetings about teaching research techniques (field and laboratory) to undergraduates, has served as a proposal reviewer for the National Science Foundation, and is currently an elected geology councilor for the Council on Undergraduate Research (a national organization whose sole propose is to foster undergraduate research at colleges and universities.)

Dr. Gordon Godshalk is a biologist concerned primarily with effective science teaching. He received his degrees from the University of California at Davis and Michigan State University. Dr. Godshalk directed the Environmental Studies Program from 1987 through 1996 and teaches general ecology, aquatic ecology, introductory environmental science (with Hluchy), environmental data analysis, environmental problem solving, environmental issues, environmental studies seminar, preparation for environmental research, and supervises independent studies projects each year. He has served on ad hoc committees proposing curricular changes in the College of Liberal Arts and Sciences and creating an Institute for Math and Science Education. He has participated in several workshops on teaching critical thinking and national conferences exploring ways to improve undergraduate curricula. He participated in an NSF-sponsored Undergraduate Faculty Enhancement Program on Water Resources during the summer of 1992 at the U.S. Geological Survey Training Center in Denver. He has presented papers on specific techniques used in his classes and has been the chair of the Education Section of the Ecological Society of America. His research interests center on aquatic decomposition and the fate of organic matter in lakes, streams, and wetlands. His published articles come from both basic and applied research, and he is writing a textbook.

Dr. Diana Sinton is a geographer who is just joining Environmental Studies at AU. She holds degrees from Middlebury College and Oregon State University. She is adding geography to the AU curriculum and is setting up a computer GIS laboratory (geographic information systems) for teaching and research. She has completed her doctoral degree by studying landform features and forest disturbance in Oregon. Her experience includes a GIS study of marine zooplankton for a federal fisheries agency.

