Wetland Restoration at RIT
Submitted to the
Provost’s Learning Innovation Grants Program
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Provost’s Learning Innovations Grant for Faculty
Request for Full Proposal
2001-2002

Please send your completed grant proposal (4 pages, plus attachments), one original and eleven copies, to
Linda Jones, 4000 Eastman
by 4:30 p.m.
Friday, February 16, 2001.
No hand written proposals will be accepted.
Notification of awards will be made by Friday, March 16, 2001.

Project Title: Wetland Restoration at RIT

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Department: 
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College: 


Project Summary

RIT is endowed with hundreds of acres of wetland habitat. Wetlands are among the most biologically productive and diverse habitats on earth. Unfortunately the majority of RIT’s wetlands are classified as shrub/scrub wetlands which have limited biological diversity or ecological value. The goal of our project is to facilitate a student planned, managed, and accomplished conversion of a portion of RIT’s shrub/scrub wetland to more diverse and productive emergent wetland. Students will be involved in every aspect of the design, construction, and planting of the new habitat, as well as monitoring the changes in ecology and species diversity as the wetland develops and matures. In addition, students will be involved in an independent study that will allow students to explore environmental policy, regulation, and implementation.

We propose to engage students from across RIT’s campus in a unique service learning activity through the restoration of wetlands. Students will be full participants in identifying sites to be restored, working with RIT Physical Plant and other departments, complying with appropriate government regulations, preparing an environmental assessment, designing the restoration project(s), requesting bids from contractors, supervising the work, monitoring the biological outcome of the project, and monitoring the hydrological impacts of the project.

The faculty members proposing this project will oversee independent study and provide supervisory contact with the students for the tasks listed above.

The project provides opportunities for innovative undergraduate research in areas including but not limited to ecology, wetland restoration, project implementation, and environmental policy, regulation, and implementation.

Targeted Learners

There are three groups of target learners. The first group is students who will be directly involved in the project. This group includes majors in Environmental Science (ES) and majors in Environmental Management & Technology (EMT), and majors in Public Policy. It is possible that students from other departments may be directly involved. The second group is students who will benefit from the field laboratory created by this project. This group potentially includes students enrolled in Field Biology, Ecology, Freshwater Ecology, Botany, Zoology, Hydrology, Hydraulics, Intro. to Environmental Studies courses in CLA and NTID. The completed project will provide an opportunity for informal learning by a third group. The third group is the remainder of RIT students, faculty and staff who will have opportunities to appreciate the value and beauty of the created wetlands.

Anticipated Impact on Learning and Teaching

For the students enrolled in the ES, EMT, and Public Policy programs the proposed project represents an experiential learning opportunity, which complements existing classroom learning. The curriculum of all three programs includes extensive classroom and laboratory learning about wetland function, value, and protection. However, the proposed practical application of the knowledge gained in the classroom will provide an opportunity for the students to expand their learning well beyond the limits of current teaching. This project will allow students to apply classroom learning in the context of planning, development, and implementation of wetlands restoration. Further, these students will have significant opportunities to work with outside experts in wetland biology and wetland management including individuals from New York Department of Environmental Conservation (NYSDEN), the United States Army Corps of Engineers (USACE), and United States Fish and Wildlife Service (USFWS). Students will also have learning opportunities through their work with RIT Physical Plant.

The second group of learners includes those students enrolled in the courses listed above (see Targeted Learners Group 2) and potentially students recruited for their special abilities, as described in the “Ancillary Benefits” section found below. While it is expected that many ES, EMT, and Public Policy students will participate in the proposed project, the participation of students from all RIT majors will be actively sought. Information about
the project will be available to students and faculty through a variety of means. Participating faculty and students from the project management team will be responsible for actively soliciting students and faculty from other programs.

c students will learn to identify stakeholders, design a project to satisfy needs of the stakeholders (working with USFWS, NYSDEC, USACE, and RIT Physical Plant), interact with regulatory agencies, obtain necessary permits, solicit bids from contractors, select a contractor, oversee the construction, select vegetation to be planted (working with USFWS), plant wetlands vegetation, identify and remove invasive species (working with field ecologists from the Nature Conservancy), monitor wetlands function, and provide access to the RIT community.

Ancillary Benefits
- Passive recreation and wildlife viewing for the RIT community.
- Increased ecological diversity.
- Opportunity to plant/view rare or unusual Native wetland plants.
- Opportunities for students enrolled in freshman experience to participate in wetland planting.
- Opportunities for student involvement by other RIT disciplines (Proposers will explore interests in student projects among faculty from the following departments):
  - IT: Wetland Creation Website
  - NTID: Env Monitoring
  - Wetland webcam
  - Mapping
  - EE: Solar Lighting/Signage/Phone
  - CET: Surveying
  - Film & Video Wetland Creation documentary Art/Design
  - Walkway Design

- The proposed wetland restoration will provide opportunities for undergraduate research for students in Biology, Environmental Management & Technology, Environmental Science, Environmental Policy. Ecological diversity before and after restoration and rate of wetland ecology establishment are examples of possible research projects.
- The proposed project will augment on-campus facilities for interactive learning through field trips.

Measures of Success
The number of students and their hours of participation will be tracked and reported, as will the number of student research/scholarly papers presented. It is expected that students will present their findings at the Summer Undergraduate Research Symposium (held at RIT) and at the Great Lakes Research Consortium Student Research Meeting, held each spring.

The successful creation of a passive recreational use facility will be tracked. This could be monitored by something as simple as a logbook

The authors of this proposal would be most pleased to present our findings and experience in a faculty forum on this type of experiential learning. It is our sincere belief that this type of project can be replicated to provide additional dimensions to the learning experience available at RIT.

In order to evaluate the ecological success of the proposed project, extensive monitoring of the biodiversity at the site before and after restoration will be undertaken. The protocols used will be those establish by one of the investigators (JMW) for use in similar biomonitoring projects at the Montezuma National Wildlife Refuge (MNWR), in Seneca Falls, New York. A system of groundwater, soil water, and surface water monitoring devices will be established using protocols developed for (by JG) use in the EMT program at RIT.

Rationale
RIT has faced difficulties with wetlands and new building construction, and will likely face additional challenges as we expand the educational/recreational/housing facilities for our students. The proposed project is
an opportunity to turn this negative into a tremendous positive by offering unique multiyear educational experiences for our students.

...the proposed project is beyond the scope of what has been offered in the ES Program, the EMT Program, or the Public Policy Program for several reasons. The first reason is that the project proposed will extend over several quarters and perhaps over several years. A second factor is that the curricula for the programs are very full and an entire course in wetland development would not fit into the regular curriculum. The learning has been spread over an extended period to accommodate scheduling. Elements of the proposed project will be incorporated into existing courses where this is appropriate. Clearly a working knowledge of wetlands issues is an important competency for the ES, EMT, and Public Policy students.

The type of experiential learning and team-based learning proposed is broadly applicable to other disciplines and could readily be adopted by other faculty. While RIT has a number of experiential learning opportunities available to students, the proposed project differs in that it is entirely student directed and will serve a wide array of students at RIT.

A wetland is defined as an area with particularly adapted vegetation, soil characteristics, and hydrologic conditions. Wetlands are subject to both Federal and State regulations. The faculty members submitting this proposal have substantial relevant experience as well as teaching experience dealing with wetland science, policy and regulations. JG is a practicing geologist and hydrologist and hence is well positioned to advise the students on soils and hydrologic issues. JM has experience in monitoring wetland flora and fauna at MNWR (see above), and has been the leader of an RIT team of students and faculty engaged by MNWR to determine baseline biodiversity information in the refuge wetlands. Following manipulation by the refuge staff (excavation, fire, raising water levels, etc) the RIT team at MNWR is to determine the affect on biodiversity. The methods developed at MNWR will be directly transferred to the proposed project. AH has a great deal of project experience and theoretical understanding of policy and law associated with wetland regulation.

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<tr>
<th>Project Timeline</th>
<th>Quarter 003</th>
<th>Project Approval</th>
<th>Present to ES, EMT, Policy students</th>
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<td>Identify Student Managers</td>
<td>Present Project to Campus Env. Comm.</td>
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<td>Initiate Job Meetings</td>
<td>Initiate Wetland Monitoring &amp; Bio Survey</td>
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<td>Quarter 004</td>
<td>Initiate Policy Review</td>
<td>Initiate Permit Applications</td>
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<td>Continue Job Meetings</td>
<td>Continue Wetland Monitoring &amp; Bio Survey</td>
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<td>Initiate Wetland Design</td>
<td>Initiate Environmental Assessment</td>
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<td>Quarter 011</td>
<td>Invasive Species Removal</td>
<td>Outreach to Learner Groups</td>
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<td>Continue Wetland Design</td>
<td>Continue Monitoring &amp; Bio Survey</td>
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<td>Continue Permit Application</td>
<td>Complete Environmental Assessment</td>
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<td>Quarter 012</td>
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<td>Identify New Student Managers</td>
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<td>Quarter 013</td>
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<td>Initiate Post Construction Monitoring and Bio Survey</td>
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<td>Presentations at Great Lakes Student Research Meeting</td>
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<td>Quarter 014</td>
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<td>Presentations at RIT Summer Undergrad. Research Symposium</td>
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<td>Quarter 021</td>
<td>Invasive Species Removal</td>
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<td>Presentations of Results to Provost, Campus Env. Committee</td>
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ATTACHMENT A

Design concepts and principles

As was stated above, students will be included in all aspects of design, implementation, monitoring, and management of the created wetlands. What follows is intended to suggest preferred design principles, but not the actual site design. Students will prepare the detailed design of these sites.

Site location(s) – Three sites have been preliminarily identified for restoration as wetlands. All three sites are believed to have the hydrologic characteristics necessary for successful restoration to wetlands. Students from RIT’s Environmental Programs, working with the faculty, will be assigned the tasks of developing a detailed feasibility study, an environmental assessment, and prioritizing these sites. What appears below is a preliminary description and assessment of each site. This preliminary information was used in developing the present proposal. (See the attached map.)

Site A is located north of the Perkins apartment complex and consists of an area of wetlands that has been used for storage of soil, gravel etc. The area proposed is approximately 1.5 acres in size and is adjacent to a large shrub/scrub wetland, which extends nearly to the corner of Jefferson Road and John Street. The remnants of a tributary to the Red Creek are also nearby. This area would most likely be restored by creating a series of interconnected shallow ponds (See design principles below). Because this site can be connected to two large existing wetland areas, the potential biological importance of the restored wetland is substantial.

Site B is located at the northwest corner of the campus. It is adjacent to the northwest entrance to campus from East River Road. This site is approximately 10 acres in size. Of this acreage, 3.5 acres are already wetland. The remainder of the sites could readily converted to a series of interconnected shallow ponds.

Site C is located along the western edge of campus. This site is approximately 5 acres in size. This is the site of the wetland enhancement project originally proposed by RIT but rejected by the US Army Corps of Engineers.

Depth of open water – The depth of a pond should vary, with a maximum depth of four feet. The depth should be irregular and at least 2/3 of each pond should be between 6” and 18” in depth.

Side slopes – The side slopes should not exceed 3’:1’. The majority of side slopes should be 6’:1’. At larger ponds the side slope could be as little as 10’:1’.

Topsoil – Topsoil should be spread on the side slopes, floor, and submerged islands.

Shape – The areas of open water should be irregular in shape.

Size – The minimum size for a pond should be 5,000 ft².

Complexes – Wherever possible, groups of ponds should be linked by level ditches to form a complex of shallow ponds. Level ditches should be 1-3 feet in depth and should meander between ponds. Side slopes for ditches should be a minimum of 2’:1’. The width of the ditches should be a minimum of 6’. Level ditches may also be used to connect the created shallow open water, with existing areas of open water.

Spoils – Some of the spoil material can be used to create visual barriers between ponds.
Islands – Small islands, approximately 1 ft above the water surface, can be constructed in the ponds. Side slopes of the islands should be a minimum of 6:1’. In larger ponds, waterfowl nesting islands can be added. These islands need to be a minimum of 100’ from land and must have a minimum surface area of 2500 ft². Nesting islands should be approximately 2 ft above the water surface. Specific cover types are needed for nesting. The USFWS can provide details. Submerged islands (6-18” below the surface) can be added to produce patches of vegetation.

Vegetation – Aquatic and Terrestrial
The USFWS will serve both as a source of expertise for selection of plants and as a source for the plants themselves. The wetland design will ensure that the wetland does not offer any open water adjacent to mowed lawns. That combination of features has the potential to attract Canada Geese.

“"A New York State Guide to Pothole Construction,” NRCS-NY, 4/19/00.