Developing a Service Learning Restoration Project along the Sparkill Creek
Madeline Micceri Mignone Ph.D., Science Department
Dominican College, 470 Western Highway, Orangeburg, New York 10962
madeline.mignone@dc.edu; 845-848-6007

Abstract:
Students in BI 113 S Introductory Ecology, inventoried plants that were located at the undeveloped park site located adjacent to a section of the Sparkill Creek at 540 Rte 340, Sparkill, New York in Rockland County. The plants were identified and separated into two groups: native plants to the region and those that are invasive. Each student, in addition to the study, worked with a certified landscape architect in planning a design for possible restorations that were included in the community presentations. Recommendations for removal of invasive plants and the incorporation of native plant restoration to the area were made to the Town of Orangetown based on the microclimate of each of the sites. This provided students with an insightful learning experience on how scientific methodology may identify ecological problems and provide methods of resolution through accrued data. This restoration project was done in conjunction with the Sparkill Creek Watershed Alliance (SCWA). The students also presented their design proposals to the local government and citizen groups. These activities provided a service learning component by which the pedagogy combined community service with academic instruction and provided a venue for developing critical and reflective thinking and a sense of civic responsibility.
Three Summary Points of Interest:

- Students participated in the independent project by which they inventoried plants at the Sparkill Park of the Town of Orangetown that is located by a section of Sparkill Creek, and quantified native vs. invasive species within the undeveloped park site.

- Students in each group worked for five weeks with a New York Certified Landscape Architect, Mr. Gregory Mercurio in developing landscape restoration proposals for the park site in which they proposed methods of removing invasives and replacing it with native plants. They also presented a restoration plan for the park site that reflected their view of how the park can be sustainable and promote community interactions.

- The students presented their proposals to citizens of the Town of Orangetown Community in Rockland County, members of the Sparkill Creek Watershed Alliance (SCWA), and members of the Dominican College Community.

Keywords: Invasive species; native plants; landscape architecture; sustainability, service learning, active learning
Introduction:

Service learning is incorporated into classroom pedagogy by which instruction is combined with community service that promotes both critical, and reflective thinking with civic responsibility. In service learning, the students are involved in projects that reflect the curriculum and address the needs of the local community. (Service Learning, Mission for the Center for Service Learning at Dominican University.) There are four basic principles used in guidance of organizing and constructing a course that incorporates service learning:

1) **Engagement:**
- Does the service component meet the needs of the community?
- How will the community be involved and what role will the community play? How will the campus-community boundaries be negotiated?

2) **Reflection**—
- What component in the syllabus will permit the students to link their service experience to course content?
- Will the student have an understanding of why the service is important? How will this be done?

3) **Reciprocity**—
- Will the relationship between students and the community enable a teaching and learning exchange with each other?

4) **Public Dissemination**—
- How will the service work be presented or returned to the public? Where will the service component come in? (http://www.csulb.edu/divisions/aa/personnel/cce/faculty/documents/ResourceGuideforFaculty0706_000.pdf)

Some studies have shown that service learning in the sciences can be a successful learning tool. It provides a venue by which students can relate biology concepts learned in the classroom and may lead to an interest into future scientific professions (Haines, 2003). Active learning is defined as any form of instructional method that permits the engagement of students directly in the learning process (https://www.everettcc.edu/files/administration/institutional-effectiveness/institutional-research/outcomeassess-active-learning.pdf). In addition, active learning promotes problem solving, discussions, and brainstorming to name a few instructional benefits, as students interact with each other (Revell and Wainwright, 2009). Active learning in introductory STEM courses has been shown to improve student achievement especially for under-represented minority students (Snyder et al., 2016). The goal of this project was to integrate these two forms of learning, and to provide a hands on experience of students in the BI 113 S Introductory Ecology course. Presently, there is little pedagogical literature available on applying these types of learning to higher education science classes.

There is a great interest in studying the damage invasive species inflict on the environment. There is also a growing movement to plant native species of trees, shrubs
and herbaceous specimens in order to provide a more sound ecological balance to the environment. Native species are defined as indigenous organisms that have evolved within the local region. These species are well adapted to the local environments and have coevolved with other species in the region. Studies have shown that invasive species have contributed to 42% of the decline and endangerment of species in the United States, at a cost of over 120 billion dollars per year as over 100 million acres of land are lost to invasive infiltration (http://www.nature.org/ourinitiatives/habitats/forests/explore/invasives-101.xml). Invasive plants have thus become a major ecological problem, as it continues to be a threat to the economy. The Nature Conservancy began actively working on the invasive problems in the late 1980s, but others venues such as farms, parks, and homeowners have recognized the problem and have been actively combating invasives for at least a century (Kaufman and Kaufman, 2007). The Ecology class focused their design on the native plants with the idea that other native species types would naturally flourish in such a natural community.

The Research Project

BI 113 S Introductory Ecology is an introductory course opened to all students at Dominican College. In this course students studied the ecological problems of a park site on Rte. 340 in Sparkill. The students then produced a restoration design by which the park could be restored back into an ecologically friendly location. The independent project performed by the students was an innovation of this course. It provided an active learning experience for students that incorporated theoretical ecology, laboratory protocols and application of real time experience into their course work that included a mandatory service learning component. The application of their lab work through hands on experience provided a venue by which the students were able to identify ecological problems and an opportunity to design an ecologically viable restoration landscape that will solve both the ecological problems of the studied site, but also provide a community friendly meeting place for residents of the Town of Orange-town.

This pedagogical opportunity provided a means by which to engage students not only in the theoretical instruction in my Ecology class, but to have them apply what they learned in the classroom, by providing a sustainable design by which they both utilized their scientific knowledge, and afforded them the ability to envision the product. By doing so, each student was able to be creative in their approach on the type of design formulated. It also afforded an excellent opportunity for the students to work with an expert, Mr. Gregory Mercurio, a New York Licensed Landscape Architect, who shared foundations of landscape design with the class. The only parameter that was put into place for this project was that the design had to promote sustainability.

Results and Discussion:

As can be seen from Figures 1a and b, the park site was a disturbed area that is overgrown with invasives and is unmanaged. There is a crude parking lot made of gravel
Developing a Service Learning Restoration Project Along the Sparkill Creek

and broken asphalt and the Sparkill Creek flows behind this site. On one right facing side of the park, there is the Sparkill Fire Department and to the left, is a residential home.

As the project developed, sustainability was promoted in the design by the incorporation of native plants, sustainable material, and natural products. Each group had a different vision of what theme the park should reflect, but all participants strongly encouraged community interaction within their designs.

The project culminated with a PowerPoint presentation that invited the College, local citizens, SCWA members, and Rockland County officials. It included posters with each group’s design to promote further discussion. In the appendix, the PowerPoint pdfs can be observed that includes each group’s designs.

The active learning component of this project, promoted critical thinking. It integrated a strong science foundation with landscape design, and each student succeeded in producing a unique but very sustainable park space. Some students perceived parts of the park being a tranquil area that provided a meditative feel, while other visualized a family-oriented space where it promoted active community interaction. In addition, the students also integrated accents and construction that also reflected sustainability. For example in one design, the concept of rolling hills was implemented. Rain gardens were also introduced to complement the proximity of the creek and its close ecological relationship to the site. Stream bank stabilization was another problem addressed by some groups, where native plants, for example grasses, were chosen for their ability to aid in suppressing run-off of water and their ability to survive in a wetland type of environment. Plants were also chosen as a food source for local animals, with many groups planting flowering plants that bloomed at various times from late March through the Fall.

Soil remediation was also addressed in the design in view of the poor soil that exists at the site. Recommendations included the addition of organic material and biochar, a form of charcoal, that aids in the sandy soil retaining nutrients.

As a science educator, the goal of any course is to have students engaged and learning. Besides students demonstrating a greater understanding of the science behind their design, they took ownership of their individual assignments, and most importantly became stewards of the watershed. Their new found respect for the need for sustainable practices is reflected in their PowerPoint presentations. The application of their classroom and laboratory experiences, manifested itself into a most creative and original design that promoted an ecological balance between plants, animals, and humans. Their design invited native animals by the introduction of native plants.
Developing a Service Learning Restoration Project Along the Sparkill Creek

Figure 1. Sparkill Park, located on Route 340, Sparkill, New York

Figure 1a. Another view of Sparkill Park.

Figure 2. Lectures on designs that were implemented by various architects were incorporated into the course.

This report was prepared for the New York State Water Resources Institute (WRI) and the Hudson River Estuary program of the New York State Department of Environmental Conservation, with support from the NYS Environmental Protection Fund
Developing a Service Learning Restoration Project Along the Sparkill Creek

Figure 3. Students, Shaheim and Raymond work with Mr. Mercurio as they discuss design.

Figure 4. An example of a design that promoted tranquility and also implemented some sustainable design.
Policy Implications:

The student presented design proposals that may have a future impact in promoting a sustainable restoration project at the site. The presentations provided awareness of the Sparkill Park’s deteriorating condition to the local community.

Methods:

As a part of the class, students participated in labs by which they studied water quality, soil quality, and surveying the abundance of species within the plant community structure by quantifying density, frequency, relative density and relative frequency of the species. These concepts were then applied to the park site. Once the students determined the layout of the park, they were assigned sections by which they produced an inventory of the plants using dichotomous keys and determined their relative frequency. They met with Gregory Mercurio at the site, and further explored the topography of the area.

They received a scaled blueprint of the area based on the measurements of their study sites. The laboratory work was then integrated for the next five weeks into design lectures given by Mr. Mercurio, and group discussions that included brainstorming sessions on modes of invasive removal, herbicide use, the consideration needed for the health of the creek, rain water conservation, and why sustainability was needed for each of their designs.

This report was prepared for the New York State Water Resources Institute (WRI) and the Hudson River Estuary program of the New York State Department of Environmental Conservation, with support from the NYS Environmental Protection Fund.
Outreach Comments:

- November 6, 2015: Develop a Service Learning Restoration Project Along the Sparkill Creek, Environmental Consortium Annual Meeting, Presentation

- December 16, 2015 Officials from Rockland were invited including Andy Stewart, Supervisor of the Town of Orangetown; Nicole Laible, Environmental Management Assistant, Rockland County Division of Environmental Resources (in attendance)
  
  College community members included Sr. Mary Eileen O’Brien (President), Sr. Kathleen Sullivan (Chancellor), Dr. Ann Vavolizza (Associate Academic Dean), faculty members and other students
  SCWA members – some of who were in attendance

- SCWA followed up at December 2015 meeting, at which all the powerpoints were shared with the membership

- Powerpoints of the students presentations were sent to Mr. Andy Stewart by Mr. Gregory Mercurio.

- Powerpoint were sent to Andy Stewart by Mr. Gregory Mercurio

Students involved:

There were 12 students in this class that were Biology Majors, and ranged from sophomores to seniors as a requirement for their Bachelor of Science requisites.

References:


Impacts of Invasive Species: Invading Our Lands and Waters. No habitat or region is immune from the threat of invasive species. Retrieved 1 April 2016, from http://www.nature.org/ourinitiatives/habitats/forests/explore/invasives-101.xml


Developing a Service Learning Restoration Project Along the Sparkill Creek


Snyder, Julia J., Sloane, Jeremy D., Dunk, Ryan, Wiles, Jason, 2016, Peer-Led Team Learning Helps Minority Students Succeed, PLOS Biology | DOI:10.1371/journal.pbio.1002398 March 9, 2016 vol. 7 No. 7.

This report was prepared for the New York State Water Resources Institute (WRI) and the Hudson River Estuary program of the New York State Department of Environmental Conservation, with support from the NYS Environmental Protection Fund