



# The Goodwin-Niering Center for Conservation Biology and Environmental Studies



## Senior Integrative Project Abstracts for the Class of 2002

**Leys Bostrom**

### **Hidden From View: A Closer Look at Banana Production in Costa Rica**

During the summer of 2001, I traveled to Costa Rica and worked with a small organic banana producing organization, initiated by a group of local women in 1994. I learned about the process of organic banana production in contrast to that of the conventional bananas, which consume the majority of the U.S. and European markets. Additionally, I worked with the men and women who are now part of this small group, which is called the Association of Family Producers "El Yüe." I worked with them to initiate a tourism project to educate more people about the benefits of organic banana production, as well as to show tourists the beauty and extent of the native tropical fruits and medicinal plants. I created and distributed a brochure, worked with the group members to build a path throughout the plantation, and created signs with bi-lingual descriptions for each plant. Finally, I have chosen to use classic black and white images, as well as some color photographs, to create a photographic journal in which I illustrate my experience in the southeastern corner of this country. My text includes both informational material and stories told me by the local people.

**Marjorie Lundgren**

### **Environmental and Site Characteristics Influencing Invasion of Ten Exotic Plant Species in Southern New England**

Invasive exotic plants have been identified as one of the major threats to ecosystem function and biodiversity through competition with, suppression, and displacement of native plant species. Spreading and invading North American habitats at more than 283,000 hectares per year, invasive plant and animal species are considered second only to habitat destruction as the most serious threat to natural systems worldwide. This study examined extent to which common invasive plant species threaten natural and managed habitats in relatively rural areas of central and southern New England. Further, the distribution of invasive plant species was examined relative to varying land use intensity to better understand how these factors may promote or inhibit the spread of invasive plant species. Ultimately, this study sought to locate areas free of invasive plant species in the 13,760 hectare Quinebaug Highlands project area, located in Connecticut and adjacent Massachusetts, to provide recommendations to The Nature Conservancy for location priority to defend against encroaching invasive exotic plant populations. Using multiple regression analysis and Geographic Information Systems technology, this study was able to identify current areas of high infestation, and further, to determine areas that have the greatest potential for invasion in the future. Multiple regression analysis showed the factors most strongly influencing site invasion by our target species were

past land use, level of human development, and soil texture. These results add to our current understanding of site and environmental characteristics correlated with invasive exotic plant species invasion. Because the control of exotic species in natural areas is a time- and resource-intensive task, this information may be used to direct conservation efforts by increasing efficiency in predicting and managing problems of biological invasions.

**Laura Rowe**

**Intellectual Property Rights in the K-Economy: Use and Protection of Traditional Knowledge**

*“To preserve the rain forest without preservation of shamanic knowledge of the plants in the forest would be to cut ourselves off from cures for present and future diseases. In order to preserve that knowledge and ensure that it is passed on from generations, we must also preserve cultural diversity.” (Brush and Stabinsky 1996:168)*

The purpose of this honors thesis is to explore the problems anthropologists and ethnobotanists/biologists face while researching indigenous, traditional knowledge. These problems are becoming prominent due to the uprise of the commercialization of genetic resources and enterprises based upon biodiversity prospecting. This, in turn, causes an increased interest in traditional knowledge. Inevitable problems begin to arise concerning, for example, intellectual property rights and appropriate compensation to cultures for such knowledge. This paper will focus on and explore contemporary solutions that can be established for the successful collaboration of indigenous knowledge with the global drug industry. It will attempt to determine what must be done in order to preserve knowledge and cultures while contributing to overall health worldwide.

**Jessica Schwartz**

**Long term Change (1952-1992) in the Vegetation of the Bolleswood Natural Area, Connecticut College, New London Connecticut**

The purpose of this study is to investigate characteristic changes in forest, abandoned agricultural field and wetland stands over a 40 year period. The Bolleswood Natural Area (BNA), established in 1952 within the Connecticut College Arboretum, is a 60.5 ha permanently protected landscape with a well-documented land-use and disturbance history. Vegetation surveys on four permanent transects in the BNA began when the natural area was established and have been resurveyed every 10 years. A total of eighty-nine sections were classified into one of eight stand types in the initial survey: oak, oak-hemlock, hemlock-hardwood, red maple swamp, transition forest, thicket, bog and lake. These initial stand types were analyzed for changes in composition (basal area and density) using Non-metric Multidimensional Scaling (NMS) ordination analysis. NMS places plots in a given number of dimensions (axes) such that the distances between each plot in the ordination graph represent their overall similarity in species composition. Overall, post-agricultural stands (transitional forests and thickets) have diverged as distinct stand types. Transitional forests and mature oak stands were very similar in species composition, with increasing abundance of American beech (*Fagus grandifolia*) and decreasing abundance of white

oak (*Quercus alba*) over time. Thickets show an opposite trajectory in basal area ordinations due to an increase in the abundance of white oak (*Q. alba*) and hickory (*Carya* spp.) over time. In general, there is a convergence of species composition across all 1992 density plots, correlated with increasing red maple (*Acer rubrum*) in all vegetation types over time.

**Hannah Shayler**

**Biodiversity of the diatom genus *Brachysira* Kutsing (Bacillariophyceae) in the Ocala National Forest, FL**

The biodiversity of species in the diatom genus *Brachysira* was examined in 31 oligotrophic and acidic lakes situated in the Ocala National Forest in north-central Florida. *Brachysira* was found to be especially abundant and morphologically diverse in this region as compared to previous studies of diatoms in the United States. I used scanning electron microscopy to critically examine the morphological structure of this diverse array of taxa and various multivariate statistical analyses to aid in species determinations. A representative sample of cleaned frustules from each lake was identified and characterized using measurements of length, width, form, striae density, pore arrangement, and other distinguishing structural features. Principle component analysis (PCA) identified significant morphological characteristics, while discriminant analysis (DA) produced models to aid in the delineation of species. Additionally, I quantified the morphological features of over 200 *Brachysira* specimens representing 13 taxa from recent relevant publications. This data created a complimentary DA model used to classify over 300 specimens from the Ocala lakes and to aid in final species determinations. Both statistical and qualitative results confirm that there are 8 distinct taxa in these lakes. This taxonomic information will be correlated with the chemical and physical properties of the lakes and eventually compared with *Brachysira* specimens in other lake regions along the east coast of the United States to better understand the interaction of morphological and ecological variation.

**Maria Sinnamon**

**The Response in Water Quality and the Propagation of Pollution-Sensitive Taxa of the Naugatuck River Due to the Upgraded Waterbury Treatment Plant**

This study analyzes changes in water quality of the Naugatuck River as a result of an upgrade to the Waterbury Wastewater Treatment Plant (WWTP). Data gathered by Connecticut's Department of Environmental Protection (DEP), as well as by the author during summer 2000 and 2001, were used and statistical analyses were conducted on this data. The Biological Oxygen Demand (BOD) levels, ammonia-nitrogen levels, and survival rates of test organisms for the effluent from the WWTP before, during, and after construction were analyzed. Ammonia, BOD, and dissolved oxygen (DO) levels in the river, downstream from the outfall, were analyzed for differences before, during, and after construction, with distance from the outfall, and with drainage area. The macroinvertebrate community that was sampled downstream from the WWTP was analyzed for the levels of sensitive taxa before, during and after construction. Ammonia and BOD levels did not make any significant improvements in the river after compared to before construction but DO was improved. However, all of these water quality indicators met Connecticut water-quality standards in the river, but before construction they did

not meet all standards. The macroinvertebrate community after construction in terms of sensitive taxa remains consistent with levels before construction. The DEP should continue monitoring of the river to determine if further improvements to biotic communities in the river are made as a result of the upgrade

**Emily Templin**

**Mobilizing Support for School Environmental Health Issues: A Study of Connecticut Movements in New London, Lyme-Old Lyme and Litchfield**

Mobilization efforts to improve the environmental quality of Connecticut schools in New London, Lyme-Old Lyme and Litchfield are the focus of this paper. The objective of this project is to determine what factors precipitate successful environmental health movements in Connecticut schools as well as how movements have been successful in achieving concrete results. The public has played a major role in mobilizing to improve school environments, as there are few regulations protecting school building occupants from environmental hazards. A synthetic theoretical model based on the resource mobilization theory and identity oriented paradigm is the framework used for analysis and comparison of the school environment movements. New London has mobilized successfully and improved environmental quality, despite the community's low socioeconomic class, and inactive parent base. The success of the New London movement is attributed to the leadership of a professional entrepreneur. The Lyme-Old Lyme community has successfully evolved from an informal grassroots movement, to involve existing networks, and now the administration and professionals. The public's resources and values have allowed the movement to successfully establish programs leading to concrete improvements in the school's environmental quality. Finally, Litchfield's movement is lead by two angry mothers using disruptive tactics to protect their children's health. The Litchfield community carefully maintains a high image and is not receptive to the women's disruptive tactics. The movement has mobilized few constituencies and achieved few concrete improvements in the school environment. This study has indicated that opportunity structures, resources and values influence the characteristics, tactics and outcomes of a movement. Different routes to successful mobilization are possible and accounted for in the synthetic theory. In conclusion, the synthetic theoretical model serves as a sound and comprehensive framework for the analysis and comparison of movements surrounding school environmental health hazards.

**Rachael Towers**

**Spiritual Aspects of Native New England Ethnobotany: Beliefs and Practices of New England Tribes and Lessons for Western Society**

In this study I examine the religious aspects of Native New England ethnobotany. The study focuses on the role of plants in calendrical cycles, mythology, magic, and rituals and ceremonies. I also focus on the numerous uses of tobacco in Native spirituality, looking at several tribes. In addition to this ethnobotanical data, this study also includes a discussion and analysis of the interpretations of Native American spirituality. I include a discussion of both the negative and positive views, including the concept of 'religious evolution' and the idea that Native traditions are primitive and superstitious, the favorable views of Native religious traditions that praise its holistic worldview, and the 'religious imperialism' that has been an unfortunate consequence of

these favorable views. Finally, I discuss ecopsychology as a useful tool for interpreting and learning from Native American traditions that benefits both Natives and non-Natives.