



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



## Senior Integrative Project Abstracts for the Class of 2008

**Christina Comfort**

### **Drugs from the Sea: Discovery, Development and Sustainability**

Marine invertebrates are a source of many medically useful secondary metabolites, which are either produced endogenously or through symbiotic bacteria. To use these resources sustainably, collections from the native habitat must be carried out in an environmentally responsible manner, preferably with the help of international regulations for sustainable bioprospecting. Once a medically useful compound is discovered from a marine organism, the chemical could potentially be supplied through full chemical synthesis, aquaculture or cell culture of the source organism, or through heterologous expression systems using recombinant DNA. While chemical synthesis is usually impractical, aquaculture has the potential to supply some bioactive organisms. However, aquaculture projects are susceptible to environmental fluctuations. Bypassing the difficult process of culturing a new type of organism would allow many more compounds to be supplied, and for this reason, recombinant DNA technology and heterologous expression may ultimately hold the key to the sustainable supply of marine-derived pharmaceuticals. The second part of my SIP also focused on protecting marine ecosystems and resources. I choreographed a dance piece entitled  $\frac{1}{2}$ (Specific Heat) in which I used two movement images to show the effects of ecosystem degradation. The first image is a healthy ecosystem, portrayed by internally driven, intentional movement and complex staging. The intent was to create a feeling of not knowing where to look, since many phrases are happening at once. After a short trio, the second movement image is that of a degraded ecosystem. This section contrasts with the first because of the softer movement quality and less complex staging. The dancers simply repeat a circular phrase, winding in and out of each other, and the internal vivacity of the healthy ecosystem is absent.

**Cara Donovan**

### **Ethnobotanical Guide to the Casa Matsigenka**

For my senior independent project, I created a brochure in English and another in Spanish for the Casa Matsigenka. This educational brochure contains a map as well as information on the ethnobotanical uses of some plants surrounding the lodge. I collaborated with several Matsigenka men to collect the data for this brochure during the fall semester of 2007 as part of the SATA Peru program under the direction of Professor Manuel Lizarralde. The cartogram was digitized from a drawn map using ArcGIS 9.3 software and the brochure was designed using Adobe InDesign software. The Casa Matsigenka is a community-based eco-tourism lodge owned by an indigenous Matsigenka population in the rainforest of Manu National Park, Peru. The

challenge facing many indigenous groups is to find a source of income without compromising biodiversity and natural resources. This tourist lodge has been operating since 2003 with the goal to not only provide a source of income but also to generate cultural pride and organization within the Matsigenka community. This educational brochure was made to distinguish this lodge from other tourist lodges in Manu National Park by illustrating the depth of knowledge that this indigenous community holds regarding the natural environment. The hope is that this guide will encourage and facilitate dialog between visitors and Matsigenkas working at the lodge.

**Eliza Greenman**

### **Nature as a Theme in Selected Readings in American Literature**

For my Senior Integrative Project I examined works of American fiction and nonfiction from the 19<sup>th</sup> to 21<sup>st</sup> centuries that explore the relationship between man and his environment. The selected readings include works by American writers of prose and poetry from the 19th to 21st centuries. The readings also include works by naturalists and other non-fiction writers who focus on nature and the environment. The books trace the history of American nature writing; a complex, constantly changing and vast genre of literature. The texts were shaped by and helped to shape American ideas about nature and the land. As different as the works I studied of prose, poetry, and non-fiction are from each other, they all explore similar, powerful themes which have the might to endure. The most interesting and lasting of these include: the American frontier, American expansion, and loss of the wilderness, sustainability, the natural hero, the connection between the observer of nature and the author, and preservation and conservation initiatives. In conclusion, America's nature writing has foreshadowed the environmental crisis that is gripping our world today. I believe it can be used as a powerful tool for change; by closely examining these past works of literature, perhaps we can educate ourselves in hopes to solve the problems of the present.

**Kathryn Gutleber**

### **People, Planet, Profits: The Development of a Triple Bottom Line for Connecticut College**

For my Senior Integrative Project I examined works of American fiction and nonfiction from the 19<sup>th</sup> to 21<sup>st</sup> centuries that explore the relationship between man and his environment. The selected readings include works by American writers of prose and poetry from the 19th to 21st centuries. The readings also include works by naturalists and other non-fiction writers who focus on nature and the environment. The books trace the history of American nature writing; a complex, constantly changing and vast genre of literature. The texts were shaped by and helped to shape American ideas about nature and the land. As different as the works I studied of prose, poetry, and non-fiction are from each other, they all explore similar, powerful themes which have the might to endure. The most interesting and lasting of these include: the American frontier, American expansion, and loss of the wilderness, sustainability, the natural hero, the connection between the observer of nature and the author, and preservation and conservation initiatives. In conclusion, America's nature writing has foreshadowed the environmental crisis that is gripping our world today. I believe it can be used as a powerful tool for change; by closely examining these past works of literature, perhaps we can educate ourselves in hopes to solve the problems of the present.

**Kelsey Jacobsen**

## **Modeling Planktonic Larval Dispersal Patterns to Improve the Design of Marine Protected Areas**

Humans have depended on the goods and services of marine ecosystems for millennia, and the effects of our influences on them are evident. In particular, fishing has profound effects on marine ecosystems. Targeting of top predators, fishing down the food web and indiscriminate and destructive fishing practices are among the human actions which threaten the very ecosystems on which we depend. One solution can be found in marine protected areas (MPAs), regions where fishing or other human activity are restricted or prohibited. MPAs are commonly planned according to socioeconomic concerns; however, ecological considerations like larval dispersal should be taken into account in order to create efficient MPAs. Many marine organisms spend part of their life cycle in a larval stage, in which their movement is controlled largely by the currents. Short-range dispersers can be effectively protected by small MPAs, but MPAs of sufficient size to encompass the dispersal zones of long-range dispersers may be logistically and economically infeasible. Networks of small MPAs linked by current-controlled larval dispersal can serve as a viable alternative. The life histories and habitat preferences of giant clams, octopi and tuna are discussed in terms of suitable MPAs and MPA networks for these three groups of organisms of differing life histories. The dispersal distances calculated for each group are applied with Geographic Information Systems (GIS) to a case study of the Banda and surrounding seas of Indonesia, to evaluate the efficiency of Indonesia's MPAs at protecting these organisms. According to this study's model, there is little networking by giant clam larvae between Indonesia's MPAs, although sites for potential MPAs to create networks with existing MPAs exist. Octopi and tuna larval dispersal distances are too long to make accurate predictions of dispersal zones possible, but Indonesia's MPAs contain a large amount of suitable octopi habitat. Tuna are likely effectively protected in the MPAs which surround small island groups. More detailed scientific data would allow more precision in this model, but it should form the basis for ecological evaluation of potential MPA sites using GIS. Spatial analysis of ecological characteristics should accompany the evaluation of socioeconomic concerns in order to formulate effective MPAs which meet both socioeconomic and ecological goals.

**Bianca Kissel**

## **The Botanical Importance of Coca and the Environmental Impact of the Cocaine Industry in Peru**

My Senior Integrative Project is inspired by my funded internship in Ayacucho, Peru. Several of my experiences and observations during my visit opened my eyes to the traditional uses of coca and its value culturally, religiously and medicinally to the Andean people. But I also saw the harsh reality of the cocaine industry and how it is impacting the Andean people and causing the destruction of the Peruvian jungle. The goal of my SIP is to use my experiences to further understand the role of coca and cocaine in Latin America and specifically in Peru. My research explores the botanical, cultural and medicinal uses of coca leaves, the history of traditional coca use and the development of the current cocaine industry, the environmental impact of the cocaine industry and discusses potential solutions. Another component of my SIP is a Common Hour panel discussion I organized to educate the college community about the complexity of the

cocaine trade and about the impact that the United States' demand for cocaine is having on the environment and people in Latin America.

**Jessica LeClair**

### **Voices from the Far North: The Environmental Justice of Circumpolar Climate Change**

The effects of climate change are predicted to raise average Arctic temperatures twice that of the rest of the world, as stated by the Intergovernmental Panel on Climate Change. The current and anticipated warming of the Arctic is and will have significant impacts on those living in the Polar region, especially those who practice a subsistence-based lifestyle. The four million who live in the Arctic contribute insignificant amounts of greenhouse gases to the atmosphere compared to amounts produced by countries such as the United States and China. The unequal burden received by the Arctic residents stemming from the development of these countries is an example of an environmental injustice. The reaction from the Arctic populations in response to the injustice of climate change has yet to generate popular support or recognition; the voice from the Arctic has not yet unified enough to generate the international attention that is warranted.

**Lindsay Michel**

### **Stonewalls: A Stacked History of Land Use and Ownership in the Connecticut College Arboretum**

My SIP used a multidisciplinary approach to the study of land use history in the Connecticut College Arboretum. The goal of this project was to create a land records archive and take a very detailed look at the stonewalls in a 26.5 acre area north of Gallows Lane. I did land records research at the Mashantucket Pequot Museum and the Waterford Town Hall to determine the history of land ownership in this area. I also used techniques from Robert Thorson's "Exploring Stonewalls: A Field Guide to New England's Stone Walls" (2005) to record the attributes of the 1.5 miles of stonewalls in this particular area. I found that this area was extensively used over the 200 years before it was bought by Connecticut College. It contained an array of features including a house foundation, well, barn, and outbuildings and its intricate display of stonewalls indicate that it had an interesting farming past. This project has opened the door for future anthropological, archeological, ecological, historical, and biological work to be completed within the arboretum to gain a better understanding of how this landscape tells a story of land use history.

**Katherine Serafin**

### **Seasons, storms and Seawalls: a Comparison of Constrained and Unconstrained Beaches in Groton, Connecticut**

A study was done in order to evaluate the impact of a seawall on a beach in Groton, Connecticut. Literature predicts beaches containing seawalls will inhibit functioning as a normal beach and lead to increased erosion. Groton Long Point is developed and backed by a seawall while Bluff Point is located on a state park and receives much less human usage. Profiles were measured to study the affect of storms, seasonality and time on these two barrier beaches. Two transects at each beach were used to determine changes in profiles throughout the year. Profiles were then compared to previous research (Campbell, 2004) to analyze long-term change. The beach at

Bluff Point reacted normally to the seasons and the storm and showed a trend of accretion over the four year period. On the other hand, Groton Long Point beach showed no change in beach features in regard to the seasons and storms and exhibited extreme variability in the long-term. While it cannot be proven the seawall at Groton Long Point is increasing erosion, there is strong evidence of erosion on the beach. The irregular system created makes it hard to predict how the beach will behave in the future.

**Gabe Sidman**

**History Trumps the Turtle: A Comparative Analysis of the Simultaneous Management of Cultural and Natural Resources in the National Park Service**

The National Park Service (NPS) has both historically and ecologically important sites within its system, and many that are important in both ways. Park staff faces the constant challenge of balancing the preservation of its historical and ecological resources, with only a certain amount of time and effort to devote to each. This paper analyzes the history of park management of historical and ecological resources in the NPS, and case studies of Gettysburg National Military Park and Acadia National Park to provide insight into how parks balance these two distinct types of preservation. Further specific examples are then discussed in Great Smokey Mountains National Park and Mesa Verde National Park. It is concluded that overall park policy is highly individualized from park to park, depending on the park's mission, its comparative amount and importance of cultural and ecological resources, and the leanings of the park staff.