



**GOODWIN-NIERING CENTER  
FOR THE ENVIRONMENT**

## **Reflection Papers for the Class of 2011**

**Sarah Berkley  
IslandWood, Bainbridge Island, WA**

This past summer, I interned at IslandWood, an outdoor school located on former logging land on Bainbridge Island near Seattle. During the school year, IslandWood has a graduate program in environmental education that is affiliated with the University of Washington. Graduate students teach groups of fourth through sixth grade students from Seattle area schools for a week at time with the largest proportion being students who qualify for free and reduced lunch. Environmental justice is central to the mission of IslandWood, and the desire to provide disadvantaged children with a unique opportunity was the catalyst for the creation of this outdoor school. IslandWood was developed to bring students of all races and economic status out of the city and across the Sound to a beautiful school in the woods and instill in them an environmental ethic they will carry with them for the rest of their lives. IslandWood follows an experiential education philosophy of teaching kids about the natural environment through actively exploring and participating in that natural environment. The IslandWood campus has a large variety of ecosystems: forest, bog, marsh, pond, ravine, and harbor. Throughout the summer, former IslandWood graduate students work together with interns to provide extensive summer camp programming that embodies the philosophy and curriculum of the School Overnight Programs. IslandWood provides summer camps for students from age four all the way to high school students with a wide range of environmental themes.

My official title as an intern was Summer Camp Assistant Instructor. I was assigned a mentor, Derek Jones, who had completed the IslandWood graduate program the previous year. I taught with Derek my first and last week, and he was the person who answered all of my questions about environmental education. He also was the primary person charting my progress and providing me with useful feedback. I spent 90 percent of my time outdoors actually teaching, and ten percent of my time planning and developing curriculum. The mentorship program allowed me to ease into teaching while learning from a more experienced teacher, but also challenged me to take on increasing amounts of responsibility until I was acting as a Lead Instructor by my last week. I was simultaneously given a crash course in the ecology, botany, animals, history, culture, and green architecture of IslandWood from the graduate students, so that I could in turn teach it to the campers.

I spent the first three weeks of my internship teaching day-length camps to first and second graders. These camps were intended to introduce the concepts of ecosystems and sustainability and other basic science and environmental ideas to young children. The camps that I taught these weeks were "Nature Detectives," an introduction to tracking that gave children the tools that they need to explore nature intelligently; "Water Wonders," an exploration of the importance of water, different aquatic

ecosystems, and the water cycle; and “Garden Explorers,” a camp where students learned how plants grow. By the third week, I was able to develop, plan, and teach my own curriculum, and I created a binder that will help future instructors teach the Garden Explorers camps. During my fourth week, I taught “Just for Girls II,” a camp aimed at getting seventh through ninth grade girls excited about science. The last two weeks of my internship were the most important to me. During these weeks, I taught “Sleep-Away Camp,” and by this time I was acting as Lead Instructor, planning and teaching curriculum with a graduate student assisting me. The curriculum of the Sleep-Away Camps was entirely up to us, and these were the weeks when the majority of our campers were there on scholarships. We had a lot of students for whom English was their second language, or who were labeled “at risk.” These were the most rewarding students for me to work with because it was amazing to teach kids who had never been in the woods before, for whom being in the woods was a magical foreign experience.

My three learning objectives for my internship were to develop an understanding of the value of experiential education as a tool for environmental education, to learn how to actually develop and teach experiential environmental education programs, and to understand how environmental education can be used as a tool for environmental justice. My internship helped me to achieve these learning objectives to a greater extent than I believed possible. I really understood the value of experiential education when I developed a lesson to teach photosynthesis to first and second graders. By teaching this lesson in the garden, and using inquiry based learning and a variety of different teaching styles, I was able to help every student be able to explain this difficult concept by the end of the day. I think that students will remember photosynthesis much better by learning it experientially than if they learned it in a classroom from a book. By my third week, I was actually developing and teaching my own lessons. By seeing first hand the impact that one-week of environmental education at a place like IslandWood can have on at-risk youth, I learned how environmental education can be a very powerful tool for environmental justice.

My IslandWood internship may be the most valuable learning experience I have ever had. I learned more than I could ever have hoped to in that period of time about environmental education, environmental justice, experiential education, inquiry based learning, child development, and child management. My naturalist skills have improved and I feel confident in the role of environmental educator. I discovered that working with disadvantaged groups of students in nature is what I want to do for graduate school and for my career.

My internship allowed me to complete all of the research needed for the final section of my thesis. I now have a clear understanding of how environmental education can help achieve environmental justice and will be able to articulate it in my thesis. I developed close relationships with the staff at IslandWood, and I will be able to contact them to conduct further interviews if needed. My supervisor, Christen Foehring, is very interested in my thesis, gave me a lot of valuable contacts, and is willing to assist me while I am writing my thesis. In my thesis, “Environmental Justice: A Historical Perspective”, I will strive to broaden the definition of “environmental justice” to include a wider historical period, and to show that there has been activism among marginalized peoples that have dealt with environmental injustices during this period. I plan to focus on specific civil rights battles and show how they were also environmental justice struggles. At the end of my thesis, I will examine present day environmental justice issues and identify environmental education as one tool to combat these issues. I

will particularly look at the solution of placing outdoor schools that cater to inner city kids, such as IslandWood, near large urban populations.

**Catharine Brookes**

**TerraCycle, Trenton, NJ**

I spent the summer as an intern for TerraCycle, Inc., of Trenton, New Jersey. TerraCycle is a company that aspires to “outsmart waste,” by finding innovative uses for non-recyclable waste materials otherwise deemed as garbage. The company forms corporate partnerships with major brands like Kraft®, Mars®, and Frito-Lay® to fund national collection programs of a single category of waste like drink pouches, candy wrappers, or chip bags. These waste stream collection programs, known as brigades, run free of cost as well as donate two-cents to non-profits and schools for each unit of waste collected. TerraCycle finds a solution to each waste stream by converting the materials into environmentally friendly consumer products like tote bags and backpacks, which are sold by major retailers such as Home Depot, Target, and Wal-Mart. The program boasts a collection base of over 11.5 million people who have collected more than 1.8 billion units of waste. Additionally, TerraCycle operates internationally in Brazil, Canada, Mexico, Sweden and the United Kingdom.

I served in the brigades department, which interfaces between the public and the corporate partners, and the visibility and success of which is integral to the success of the company. Active collection on behalf of consumers justifies the corporate partnership with TerraCycle because it exemplifies that its consumer cares about the environmental and economic benefits that the program offers. Participation in the program is also crucial because the waste materials received amount to the supply of raw materials for the company’s products.

My responsibilities as an intern were somewhat variable, but in all cases my work was either visible publicly, or integral to internal matters. My supervisor, Michael Waas, Vice President of Sponsored Waste, assigned me to large research or analytical projects that would take one to two weeks to complete. For each project, I would intermittently schedule meetings to chart progress, ask questions, and follow up with a final meeting where I would present my work.

My most extensive project was an evaluation of the performance of the brigades in the U.S. A single brigade can consist of between a thousand and 45,000 teams, who sign up to collect waste. I described the key demographic of collectors for each brigade from data about each team and I used shipment data and waste inventories to evaluate the performance of the brigade. The evaluation gave the company insight into how each team participated in waste collection based on the percent of teams actively collecting and the total units of waste those teams shipped. This project taught me valuable skills on Microsoft Excel that helped me to generate and interpret this data. Other projects that I was in charge of were: writing reports summarizing life cycle assessments for our products (evaluated by a third party), researching recycling programs in the tri-state area to improve methods for collection of packaging, writing product descriptions for the website, and researching marketing and activation strategies for our partner brands.

I believe that through my various projects and the orientation program, I met many of my initial learning objectives. I learned about the company's business model through presentations given by the departments and through observation of daily activities and operations. I also learned TerraCycle's role in the scheme of waste management, which is as a service provider who collects packaging, provides public relations, material development, and manufacturers to create TerraCycle products for companies seeking a solution for their waste stream. TerraCycle does not wish to compete with existing forms of recycling, but rather to forge new opportunities for packaging materials that are ending up in the trash. I learned that TerraCycle is striving to make its mark by creating products with prices that meet or beat its competitors that have products made from virgin materials. The company's goal is to make environmentally friendly products available to mass markets.

Interning at TerraCycle helped prepare me for my senior integrative project by improving my research skills. My assignments often required me to extract important information and streamline it into a single document. This process helped me to improve my presentation skills, as I frequently briefed my supervisor about my work assignments. Finally, working a regular business week helped me to discipline myself and to maintain my focus and productivity.

For my senior integrative project, I seek to discuss the negative externalities of landfills and how the increased pressure that municipal solid waste poses on landfills is a growing environmental concern. I will argue that our current economic valuation of landfills is not environmentally viable and that a combination of efforts by the government, business, and the public will be necessary in adjusting its value. My experience at TerraCycle taught me first-hand the pressure that business faces to go green. I learned how companies have changed their public identity to become more environmentally friendly because of the threat and opportunities that green products hold for a company's future. The reflexive property of the marketplace helped me to understand the potential that business has in addressing the negative externalities of waste.

**Nita Contreras**

**Pan Himalayan Grassroots Development Foundation, Ranikhet, India**

This summer I worked for an organization in a small village named Ranikhet in the state of Uttarakhand, India. The NGO I worked for is called the Pan Himalayan Grassroots Development Foundation whose main mission is to aid community building. In fulfilling this mission, Grassroots employs a variety of tactics ranging from gender empowerment to ecological improvements. The main focus of the organization is to implement new technologies in villages without feasible alternatives to aggregate technological and educational improvements on their own. The improvements Grassroots offers include the installation of new infiltration wells, biogas plants, and reforestation nurseries in Ranikhet and many of the surrounding villages. In addition, a new community enterprise called Umang was created a few years back to allow local women a place to voice concerns about their communities, families, and livelihood as well as earn additional income to support their families through organic and handcrafted products. Through all of these activities, Grassroots aims to build productive capacity, quality of life, and a feeling of empowerment to increase the lucrative ability of agricultural lifestyles in Himalayan villages.

When I first applied for the internship, I expressed that my main interest lay in aiding the organization with its research in water quality and documenting changes in individual lifestyles after the implementation of infiltration wells. Because of my knowledge of forestry issues in developing areas, I was also asked to assist with the reforestation nursery sector of the organization. Yet when I arrived, my responsibilities quickly expanded to encompass almost every aspect of the organization's reach. I was responsible for gathering data on water quality across a few dozen villages in the basin area, compiling that data for future use, as well as analyzing the results to document improvements in technology introduction. I was also assigned to a project focusing on studies of native broadleaf vs. nonnative vegetation in the Himalayan climate, and its effects on temperature and soil moisture in local forest areas. The data from this project was drafted into a series of reports and Power Point presentations, to help locals to see how important forests are in maintaining a healthy environment. These documents, along with water quality and quantity reports, were also used to help educate the youth and act as an inspiration to create drive and interest in their environment. Lastly, I was charged with attending local village meetings to interview people whose lives had been changed by the introduction of self-help groups. These groups focused on introducing the possibility of technology improvements, both from Grassroots and government sponsorship, developing important skills such as banking, and acting as a mediator between the purchase and production of their produce for locally made, and regionally sold, products.

This internship was an amazing learning experience because, though I had gone into the situation with some preconceptions as to what my internship would entail, I had no way of predicting how much more I would learn about ecology, religion, and a completely different way of life. Living with a local family taught me about unexpressed or unrecorded religious practices and beliefs. Many of these practices differ from mainstream Hinduism because of the area's secluded population in the Himalayas, which was quite a distance from any large and well-known religious cities. I also noticed a unique respect for the area's limited resources, which I had not expected to find without an explicit tie to religious practices. Though Hinduism is often considered an ecologically respectful religion, much of the actual proof of this environmentalism is embedded in the texts and interpreted through prominent leaders. Since I had no way of knowing what kind of influence this had had on the people living there, I had no way of gauging what the ecology and religion relationship would entail. At the same time, I also saw how these values conflicted with the equally prevalent urge to develop and attain modern technologies and lifestyles. The need to earn money in order to preserve their lifestyle has changed the village economy from being reliant on trade and self-sufficiency to one of competition in the local and global market.

In many ways, I did not meet my original objectives because my intention had been to focus solely on water and religious practices. Yet the reality was that where I lived, religion did not have the same organizational focus as I had expected. Most people worked from early in the morning until late at night, and there was no time to attend temple, to witness long pujas, a form of ceremonial worship, or even to perform pujas on a daily basis. Therefore what I expected to see on a large and frequent scale seemed a little more hidden and private, but I also found that people were generally more concerned about the state of their environment than I had expected. I found it interesting that rather than seeing reverence for the environment as a principle taught to them through religion, most people's experience with their surroundings stemmed from the close connection to it and concern for maintaining it, as it was a part of their lives on a daily basis.

The experiences I had this summer prepared me for my senior integrative project in many ways that I had not expected. Though I understood that logically, this part of the project would be the hands on experience I needed to tie to academic research, I still found that the experience was very real and different from what I had expected to find after reading scholarly materials on the relation between religion and ecology. What I have come to find in these last few weeks though, is that rather than try to force a religious experience out of my internship, the secular motivations to clean up ecological resources will be just as valuable when creating a comparison to religious movements behind a similar clean-up program.

My project ideas have shifted, and will probably continue to evolve as I gain input from Professor Harlan. I think my main focus will be on the religious aspects that water sources carry, as an embodiment of the goddess, and how the pollution of these waters has triggered a response through both religious and secular organizations. In this way, I will be able to look at my interests in religion, view how they intersect with ecology, and tie my research together in an observation of how different approaches to solving pollution problems are being accepted by a religious body of people.

### **Flora Drury**

#### **United States Environmental Protection Agency-Region I, Boston, MA**

During the summer of 2010 I interned at the Environmental Protection Agency's Region 1 office located in Boston, Massachusetts. For this government agency, I worked in the Office of Ecosystem Protection for the Energy and Climate Change Unit. The majority of my time was spent working with the Community Energy Challenge (CEC), an EPA program encouraging municipalities across New England to increase energy efficiency and renewable energy use. To enter the CEC, local governments sign a pledge agreeing to establish an energy task force in their town, benchmark the energy performance of municipal buildings, and increase their energy efficiency by 10%. The goal of this program, to reduce greenhouse gas emissions, ties into EPA's overarching mission to protect human health and the environment because greenhouse gas emissions are polluting our air and threatening the environment in which we live.

As an intern, my primary responsibility was to provide assistance to Maine towns participating in the Community Energy Challenge. Specifically, it was my task to benchmark the buildings operated by each municipality with EPA's online benchmarking software "Portfolio Manager." To complete this task, I visited each participating Maine town to meet with their town manager and/or energy committee. On these visits I collected the town's energy use data, with which I created an energy portfolio in Portfolio Manager for each town. After entering this information, I created individual presentations which included charts and graphs displaying the municipality's energy information, along with how they could use this data to make educated choices regarding energy efficiency projects, how to continue tracking their energy consumption in Portfolio Manager, and contacts and links for funding and auditing information. I returned to each town at the end of the summer and gave the presentations I had created.

Although my largest project and most notable accomplishment this summer was the completion and delivery of seven presentations for local energy teams in Maine, I had a variety of other responsibilities as well. For the CEC, these responsibilities included assisting the municipalities who contacted EPA for technical assistance with Portfolio Manager and updating the CEC database that contained information about participating towns. I was also required to attend Energy and Climate Change Unit meetings and present the status of my work to the unit staff. Additional responsibilities I gathered during my internship included summarizing a newly published paper for the Unit staff, compiling data generated from a Water Department Roundtable sponsored by EPA, and updating EPA's financial incentive factsheet for energy efficiency and renewable energy projects in Maine. I also attended meetings for Maine's newly established Local Energy Committee, an organization currently creating a guidebook for Maine towns interested in energy efficiency.

The original objectives for this internship included gaining experience working in an office, bolstering my knowledge regarding energy efficiency, learning about different routes communities are taking to lessen their energy dependence, and improving my public speaking skills. For the most part, these objectives were met and this internship proved to be an extremely educational experience. To begin with, I learned a great deal about what it meant to work in an office, work as part of a team, and finally, work for the government. This internship provided me with the inside view of how the EPA works, ranging from what is expected of employees on a day-to-day basis, to the EPA's organizational structure, to how the EPA responds to environmental crises such as the BP oil spill which occurred weeks before my internship began. In addition, this internship allowed me to make connections with EPA employees working on a wide range of topics, which furthered my understanding of EPA's mission as a whole.

My objective to learn about energy efficiency and the routes different communities are taking to lessen their energy dependence was met through my involvement in the benchmarking of municipality buildings in Maine. I learned about the process of achieving energy efficiency as I worked with towns to plan their next steps towards decreased energy consumption. Helping towns interpret the benchmarking data, showing them where and how to access EPA materials, and pointing them in the direction of auditing and financial incentives taught me specific information about cost-effective energy efficiency projects and the order in which EPA recommends energy efficiency projects should be conducted. I also learned the importance of software, such as Portfolio Manager, which helps benchmark energy consumption, and EPA's Cash Flow Opportunity Calculator, which determines the cost of putting off energy efficiency projects.

The connections I made with EPA employees and individuals I met on trips outside of the EPA will significantly benefit me as I work on my senior project. I met with numerous employees who are interested in and knowledgeable regarding the topic of my senior integrative project: community-owned wind energy. They not only provided me with more information on the subject, but also gave me additional contacts that could aid me during my project. Notably, community-owned wind projects were underway in two of the towns I worked with. I spoke with local officials about these projects and plan to keep in contact with these communities as I conduct my senior integrative project (SIP).

With this internship experience behind me, I hope to conduct my SIP to determine how communities can benefit from wind, a local natural resource that may have previously been undervalued. I plan to

focus my SIP on wind power infrastructure that is owned at least partially by local citizens, known as community-owned wind energy. This a less common form of wind infrastructure ownership in the United States than the absentee-owned model which is defined by a private company or investor establishing wind power infrastructure in an area or community in which they have no connection. Through my SIP, I hope to explore the concept of community-owned wind energy by focusing on issues such as how proposals for these projects are framed to gain community support, how projects are financed, how state and federal policy encourages the construction of community-owned wind turbines, and how public opinion of wind power differs between communities with community-owned and absentee-owned wind energy.

**Janan Evans-Wilent**

**Dolphin Communication Project, Mystic CT / Bimini, The Bahamas**

My internship this past summer was with the Dolphin Communication Project (DCP) in Stonington, CT and Bimini, the Bahamas. DCP is a non-profit scientific organization which studies dolphin to dolphin communication in several wild and captive populations. DCP emphasizes the importance of scientific research and publications, but also the importance of bringing this research and information to the general public through adopt-a-dolphin programs, newsletters, and classroom activities. My internship began in Connecticut at the DCP office developing the skills needed for many cetacean research projects. This included learning to use photographs, sketches, and video to identify individual dolphins, assisting with video analysis and event-sampling analysis, and digitizing audio data for future bioacoustic analysis. I also spent a lot of time reviewing and reading scientific articles, journals, and various publications in DCP's extensive science library.

The second half of my internship was an exciting change of scene to Bimini, a small, 7-miles long island in the Bahamas. In Bimini my role was to enter data from daily dolphin trips, identify dolphin dorsal fins using the DCP photo-ID catalog, write daily field reports for the website, help with video analysis, create and update Squidoo webpages, and most importantly, go on dolphin trips to collect data. DCP researchers have the opportunity to work with local eco-tour operators who run daily or week-long dolphin and snorkel trips. We were able to join the tourists on the boat in order to conduct this important research and help monitor the local dolphin populations.

On each dolphin trip I filled out a data sheet which included GPS data, weather, cloud, tidal, and celestial information. When dolphins were spotted, I marked the location with GPS, noted the depth, and included information about the species of dolphin, number of individuals, and tried to identify individual dolphins. Identifying the individuals from the boat is difficult because there are over 100 individuals in the Bimini spotted dolphin population. Dolphins in the adopt-a-dolphin program are given names and are typically easier to identify because they have distinct spot patterns or scars. Several dolphins have parts of their dorsal or pectoral fins missing from shark attacks, which make them easy to spot! When dolphins were spotted and remained near the boat, we were permitted to enter the water to swim with them. Wearing a mask, snorkel, and fins, we could swim and dive down with the dolphins, taking underwater photographs in order to identify individuals later.



Looking back on the experience, I think many of my objectives were met by this internship. During the lab work portion, most of my expectations were realized. I feel very comfortable identifying different species of dolphin by sex and age class. Additionally, I am able to recognize the DCP site dolphins individually using sketches and photographs. I also know how to analyze video and create both a general video log, and how to use event-sampling to create a specific behavioral ethogram. I became very proficient at data-entry, and I learned how to use the program End Notes to list new publications in a library. It was also great to have scientific discussions with both Kathleen Dudzinski, director of DCP, and other interns/volunteers. Kathleen was a wealth of information about cetacean research, bioacoustics, and many other areas of science.

I gained great experience in the field, learning how to use a handheld GPS, how to keep a field sheet, and how to write field reports. I also learned to be flexible with field work, because so much is out of your control, including the weather, the tourists onboard, and the actual animals. The experience of swimming a foot away from live dolphins was awe-inspiring. The trust and curiosity of these dolphins can only be understood entirely through a first-hand experience. It was really exciting to get the chance to leave the classroom and lab and get outdoor, underwater experiences!

One of the less obvious skills I feel I gained from this experience is the ability to communicate effectively with scientific professionals, tourists, and my peers. It can be difficult to convey a scientific topic with those who may not share a scientific background. The fact that all my fieldwork was done with an eco-tour operator emphasized the need for scientific education and outreach. I really enjoyed talking to passengers about my education, my experience with DCP, and the importance of our research. Additionally, the fieldwork and interaction with the actual dolphins energized and inspired me to begin my own research with DCP this year.

The internship has definitely prepared me for my proposed senior project because I will be writing a thesis with Professor Askins and Kathleen Dudzinski, the director of DCP. My thesis will characterize the acoustics of a captive Atlantic bottlenose dolphin population associated with pectoral fin contact. I will be using DCP pectoral fin data (gathered from video analysis and event-sampling) and examine the acoustics dolphins associated with contact. I hope to be able to do pair-wise comparisons of the bioacoustics associated with contact between different types of pairs, such as juvenile to juvenile, male to female, mother to calf, adult male to adult male, etc., in order to see if there are significant differences in the sounds these animals make. From the internship, I know how to analyze video, how to recognize pec-fin contact, how to identify the individual dolphins who are in contact (as well as their age class and sex), and will be working on digitizing the acoustic data for me to analyze.

I am very excited about this project because there has been very little research on dolphin acoustics associated with specific underwater events. No researchers have examined the acoustics of this specific population yet, and it will be a unique opportunity for both me and the Dolphin Communication Project. My experience with DCP this summer has been a wonderful opportunity and left me with many memories, photos, and most importantly, future research questions! I look forward to the new challenges, questions, and thought-provoking experiences I will have with the Dolphin Communication Project this year while I work on my senior honors thesis.

**Christopher Haight**

## **TIDE Project, Marine Biological Lab, Plum Island Sound Estuary, Byfield, MA**

This summer I was a field science research intern on the TIDE Project in the Plum Island Sound Estuary in Massachusetts. TIDE stands for Trophic cascades and Interacting control processes in a Detritus-based aquatic Ecosystem. The TIDE Project is a large scale, long term salt marsh nutrient enrichment experiment where a large amount of nitrogen fertilizer is added to treated marsh creeks with the incoming tides throughout the summer (May through September). Many different salt marsh ecosystem structures and functions in both treated and non-treated creeks have been observed and compared over time to understand the effects of nutrient enrichment on the ecosystem. These include the monitoring of vegetation and algae growth, invertebrate and fish abundances and activity, biogeochemistry of the water and sediments, and others. The goal of the experiment is to understand the effects of increased nutrients in salt marshes due to anthropogenic sewage and runoff.

The responsibilities that I had at TIDE were to help out where I was needed and work on my own project. Since I worked on the TIDE Project last summer, focusing on plants, I was able to share my knowledge and experiences with this year's plant interns. For my own project, I developed a field experiment to examine the degradation of plastics in the salt marsh environment over the course of the summer. The experiment involved placing five different types of plastic objects out on the marsh for an extended period of time. The items were placed near the creek edges close to the water and also higher up on the marsh platform away from the water. Weight loss and qualitative observations and photographs were used to determine the extent of degradation. The items were collected after 54 days and then redeployed for an additional 54 days to be recollected in early October. I also conducted garbage surveys on the higher marsh platform where dead vegetation, called rack, collects. Over the course of the summer I collected, recorded, and categorized over one thousand pieces of garbage. Additional duties included helping fill the fertilizer tanks, flume netting for fish at night, filtering water samples, collecting and sieving peat cores, using surveying equipment and many other tasks both in the field and the lab.

The original learning objectives that I had for this internship were to develop skills for designing my own research and field experiments, to gain a personal understanding of plastic waste in marine environments, and to gain experience in conducting field research. During the internship I was able to design an experiment that helped me understand what happens to plastics and how they degrade when they are placed in a marine environment. I also got first hand perspective on the abundance and variety of garbage found in marsh habitats by doing garbage surveys. In addition to working on my own project, helping others with their research provided me with extensive amounts of field research experience. One objective that I was not able to achieve to the extent that I had hoped was to understand the local community's waste management system. However, having spent the summer living in a house with 12 other people, I was able to observe and understand the amounts of waste generated by a large household and how that waste was disposed of and recycled.

This internship was an invaluable learning experience, and having worked for the TIDE Project two summers in a row, I learned even more than I ever thought I would. Having the freedom to conduct my own research allowed me to discover my own capabilities for developing and implementing my own ideas. I learned the steps behind designing an experiment and how to resolve any issues that may arise during that process. I learned what happens to plastics waste when it ends up in salt marsh habitats,

where it accumulates, and the many different types of waste that are present. Through my experiment and surveys I learned that plastics take a long time to degrade and even when they do, they are only breaking apart into smaller pieces. The biodegradable plastics also take a long time to degrade, however they are degrading at a faster rate than conventional plastics and they are made from natural products meaning that they will completely return back to their natural components. Also, through helping with other projects at TIDE, I learned many new things about the salt marsh ecosystem, field research, and lab techniques.

Working on the TIDE Project this summer has prepared me in many ways for my senior integrative project. I now have a better understanding of plastic pollution in marine environments. I am more aware of how the environment is exposed to these plastics and how organisms or ecosystem functions may come into contact with them. I also have a better understanding of the different physical mechanisms that degrade plastics and how the degradation of conventional plastics differs from biodegradable or compostable plastics. I have also developed better problem solving skills that will help me with designing and conducting my senior integrative project.

My proposed senior integrative project is to examine the current effects of plastic waste in marine environments focusing on the release of the toxin Bisphenol A and its effects. The project will also evaluate the effectiveness of current legislation that is designed to examine and reduce the amount of marine plastic waste, and legislation that reduces the use of Bisphenol A in the making of plastics. My goal is to understand the extent of marine plastic waste and determine if we are doing enough to remedy the problem.

### **Kristiane Huber**

#### **Tribal Link Foundation, New York, NY**

Tribal Link Foundation is a non-profit organization located in New York City which works to build business and cultural connections between indigenous groups and organizations or companies with common objectives. Tribal Link's two-person staff, Pamela Kraft, the executive director and her assistant, Erin Hinkle, direct three programs. "Project Access" funds the transportation of twelve indigenous representatives to New York City and a week of workshops to prepare them for the UN Permanent Forum on Indigenous Issues. The "Indigenous Entrepreneurship Program" advises indigenous groups and businesses, especially the fragrance companies which make up the Natural Resources Stewardship Circle (NRSC), on entering fair business partnerships for indigenous entrepreneurs called access benefit sharing agreements. "Education, Leadership and Rights-Training" was formed with three Maasai non-governmental organizations (NGOs) to fund the education of indigenous girls in Kenya and Tanzania. Tribal Link's advocacy for indigenous rights drew in environmental, human rights and development issues, and complements my interest in environmental justice.

My primary responsibility at Tribal Link was writing three to five page papers about the territory, history, cultures and modern issues of indigenous groups in Africa, Asia, South America and North America including the Taino, Maasai, Okiek, Naga, Cordeilera, Yawanawa, Huaorani, Mbuti, Nama, Himba and San. I summarized reports and protocols for the executive director and wrote about

potential impacts of proposed changes to the Convention on Biological Diversity (CBD) or the NRSC policies on indigenous groups. In the end of the internship period I assumed administrative duties like responding to the organization's e-mails.

Before the start of the internship period, I listed three learning objectives. First, I wanted to understand indigenous issues in a more personal and less academic manner. My research was mostly academic but after writing a research profile, I would read or watch interviews with Project Access participants or other indigenous representatives. I edited several project proposals and grant applications which provided a personal account from indigenous groups demonstrating their goals, concerns and priorities. Many applications requested funding for cultural centers, schools, trade cooperatives, and the preservation of traditional lands. Conservation and environmentalism are at the core of indigenous culture and projects benefiting indigenous groups often benefit the environment. Reviewing grant applications, project proposals and CBD documents illustrated the challenges indigenous groups face, the role of indigenous rights in international law and how the interests of indigenous groups are advocated in the UN. My second learning objective was to better understand indigenous issues in the context of international politics. I attended two meetings of the NGO Committee on the United Nations International Decade of the World's Indigenous Peoples. In June, the meeting focused on the success and few organizational glitches of the Permanent Forum on Indigenous Issues held in May while the July meeting planned an educational and celebratory event called Indigenous Peoples Day. I also read and summarized a proposed CBD protocol, the Nagoya Protocol. Comparing the Nagoya Protocol, which lists requirements for access benefit sharing agreements between local communities and foreign companies, and the NRSC guidelines demonstrated how indigenous people interact with companies, developed countries, and their own national governments. Many indigenous issues, especially those surrounding access benefit sharing and free prior informed consent are addressed in the CBD, demonstrating the link between indigenous rights and environmental policy.

My final learning objective was to observe NGO activism at the UN. I learned that an organization with a small staff but ambitious agenda can have a marked impact on international policy by networking and collaborating with other organizations. The organization is based in a small loft in a nontraditional looking office, but maintains a high level of professionalism in all that they do. The two meetings of the NGO Committee on the United Nations International Decade of the World's Indigenous Peoples demonstrated that collaboration was imperative to build a unified voice in the UN. The committee, consisting of religious, human rights and indigenous groups, organizes events to educate the public and delegates about indigenous issues. Ms. Kraft considers networking an essential component of Tribal Link's advocacy work. She networks with people in the fragrance industry, indigenous peoples, the Permanent Forum, photographers, reporters, architects, environmental groups, committees and anyone who can also advocate for indigenous rights. Ms. Kraft and I attended UN Economic and Social Council meetings and Department of Public Information NGO Briefings in order to learn about relevant environmental and human rights issues and to keep touch with the UN NGO community. The NRSC sought Tribal Link's advice for the formation of access benefit sharing agreements for the companies in the circle. As a result, Tribal Link hosted a workshop at the UN Headquarters called Indigenous and Local Communities, Business and Biodiversity Consultation for indigenous groups and NRSC members in May of 2009.

I am currently writing a senior integrative project studying the threat of climate change to cultural diversity and whether this can or should be framed as a human rights issue. Climate change will create a similar, but larger scale threat than the historical case studies I completed this summer. It is apparent that climate change will impede sustainable development and preservation of traditional values and practices. My time at the UN Headquarters and ECOSOC sessions taught me about the inner workings of the UN and how international policy develops. Ms. Kraft can refer me to contact people working in the UN with insight on the issues of cultural diversity and climate change.

I studied environmental issues with an anthropocentric focus and found that each indigenous group has been affected by a legacy of racism and dispossession from traditional homelands through periods of colonization, globalization and now under the guise of development. There are many improvements in indigenous rights, but new threats including biopiracy, language extinction and climate change are obstacles to indigenous groups trying to achieve a balance between tradition and modernity and establish their identities and communities. Working with Tribal Link showed me the more emotional aspects of environmental degradation and climate change. My internship also showed me that even NGOs as small as two people have a voice in international politics and can advocate for what they believe is right.

### **Fiona Jensen**

#### **Appalachian Mountain Club, Gorham, NH**

Working as the Trails Department Intern for the Appalachian Mountain Club was a multifaceted job that I found to be both demanding and rewarding. My wide range of responsibilities included leading volunteer trail crews, helping to prepare an operations manual, organizing and preparing for volunteer trail crews, making trail signs, and administrative work. Before going in to this job I hoped to learn more about the administrative side of trail work, the educational aspects of trail work and how multiple organizations (the Appalachian Mountain Club and the U.S. Forest Service) work together in one area.

The summer began with a month of leadership training and patrolling. The majority of my training I did with the volunteer portion of the trails department working with other crew leaders on “soft” skills (leadership, backcountry ethics, first aid, etc). I also led some of the hard skills training sessions for the huts and shelters departments and worked with my supervisors to teach trail work skills to new employees. The trail work instruction was both in technique and purpose. There was a large emphasis placed on trail work as a preservation method to concentrate use and prevent further impact. A focal point of this instruction was teaching how to do work that meets both Forest Service guidelines and “Leave No Trace” guidelines.<sup>1</sup>

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<sup>1</sup> Leave No Trace Outdoor Ethic was developed by the Leave No Trace Center for Outdoor Ethics. It is a code of seven guidelines to reduce the impact of recreation in the backcountry. The principles are as follows:

1. Plan ahead and prepare
2. Leave what you find
3. Dispose of waste properly
4. Respect wildlife
5. Respect other visitors
6. Camp and travel on durable surfaces
7. Minimize campfire impact

When I wasn't in training or leading training I was patrolling. Patrolling is when members of the trail crew go out in small groups to hike a section of trail to clear all the trees that fell from winter snows and spring winds. A normal day of patrolling consists of hiking about 20 miles and chopping as many blow-downs (fallen trees) that one comes across. Patrolling was unique for me because I needed to note trail sign conditions and standards during the patrol. Functional and standardized trail signs are important for both practical and ethical reasons. Good maintenance of trail signs is an important part of "Leave No Trace," especially as part of the plan ahead and prepare principle.

The most challenging aspect of my internship was leading volunteer teen trail crews. I would prepare for the teen trail crews during the week; cleaning, repairing, and testing tools and gear, planning work and reviewing the project, planning menus, and reviewing medical information. A group of teenagers, usually about ten, would arrive on Sunday night, when we would brief them on the week, check their gear, and pack. On Monday morning we would head in to the woods where we would stay until Friday. Monday morning was often the most challenging time for the teenagers who were not used to hiking long distances and carrying heavy weights.

While the actual work day was only eight hours, working with teenagers in the woods is a twenty-four hour job. Trail work is often dangerous and teenagers need to be constantly monitored so that they do not injure themselves. Outside of the work day we had to prepare and cook meals that fit all dietary needs and teach the teenagers how to live in the woods while respecting "Leave No Trace" outdoor ethics and Forest Service rules. While this was certainly the most challenging aspect of my job, it was also the most rewarding. As a teenager I was a participant in the programs that I was leading now and they had a profound impact on my life. It was incredible to have the opportunity to share my love of wilderness and trails with others and hopefully inspire some to continue the work. One of the most rewarding parts was working with obstinate teenagers and seeing them change; it was extremely rewarding to work with a teen that went from angry to never wanting to leave in one week.

The most important aspect of my internship was organizing and working on a new AMC volunteer program in Maine. I got to lead and plan some aspects of the first ever AMC volunteer trail crew in the Maine Wilderness. All of the preparation and planning for the Maine crews needed to be carefully done since we were so far from our home base and from help if we needed it. This aspect of my job was also particularly rewarding; I enjoyed having the opportunity to bring a program to life.

Overall my internship was a great experience. I got to fulfill many of my goals for the summer including learning about the administrative and organizational aspects of trail maintenance and construction. I also had the chance to work with the Forest Service and under Forest Service guidelines giving me the chance to further understand the Forest Service systems. My job was often both physically and mentally demanding but I had a lot of fun and got to spend my time outdoors.

My internship was also helpful in preparing me for my senior integrative project. I am studying modern wilderness protection through a comparison of U.S. Forest Service and Chilean Forest Service practices. In this comparison I will be examining preservation and conservation strategies. My experiences this past summer gave me personal insight on how humans affect wilderness areas. I worked with many people who had strong feelings about how wilderness areas should be maintained and got to hear a wide variety of opinions. Through my work, which was mostly on Forest Service land, I got to learn more about how the Forest Service operates. These experiences will help me bring both a personal touch and passion to my senior project.

**Christopher Krupenye**  
**Budongo Conservation Field Station, Uganda**

In the west of Uganda, a country often referred to as “the pearl of Africa,” lies the impoverished, rural Masindi district where I spent the summer of 2010. Working under Professor Klaus Zuberbuhler and his PhD student, Thibaud Gruber, of the University of St. Andrews School of Psychology, I explored chimpanzee tool use and feeding ecology in the context of the evolution of material culture in apes. The School of Psychology is a world renowned psychology program which educates students in several disciplines within the field. The research group within which I worked focuses on the ‘Origins of the Mind’ and applies evolutionary theory to the study of psychology. In direct collaboration with the University of St. Andrews is the Budongo Conservation Field Station (BCFS), a biodiversity research station which has become recognized, especially in recent years, for its unique approach to the study of chimpanzees, focusing often on cognitive questions and utilizing field experiments to explore them. BCFS has a mission to promote research, training and conservation within the Budongo Forest Reserve.

With Thibaud conducting research at BCFS, I completed a complementary project in the Busingiro region of the Budongo Forest. My summer was spent living in a relatively isolated rural village where I was the only foreign inhabitant. My days were passed with my field assistant tracking chimpanzees within the dense, tropical forest. I recorded general behaviors, especially related to feeding, and collected samples of foods that the chimps were observed eating. It was also my responsibility to perform a field experiment in which, after determining an appropriate location that the chimps visited often, I installed a honey acquisition task apparatus. The apparatus consisted of a log in which a hole had been drilled and which was filled daily (at 5 am) with honey. The honey reached a level that allowed the chimps a small taste, but not efficient extraction, requiring that they utilize a tool in order to competently exploit the desirable food within. Through a motion sensitive camera I recorded and analyzed the tool use behaviors employed to solve the honey acquisition task, which, in my community, were nearly non-existent. This data is to be compared with complementary studies being completed at three other sites within the Budongo forest, including at BCFS.

The objectives of the internship were relatively straight-forward. First, it was necessary that I familiarize myself with the general procedures and daily grind of fieldwork. Next I had to accomplish my daily research tasks – first locating the semi-unhabituated chimps, then attempting to follow them as they moved through the dense forest, collecting observational data and field samples and completing the previously described experiment. Although it was difficult to implement the experiment given the elusive nature of the chimpanzee study community, I was fortunate to be successful in my task. In addition to the previously foreseen objectives just described were several unforeseen ones. In order to complete my internship it was necessary to adjust to life as the only foreigner in an extremely impoverished, rural village and overcome the obstacles presented by such a lifestyle – namely the lack of transportation infrastructure, lack of common languages, acquisition of food and necessary resources and life as an extreme minority.

I embraced the opportunity to immerse myself in village life and had an exceptional experience! Without other foreigners I had no choice but to fully engage in local life and had no outsiders with whom I could discuss my experiences. Instead I was able to more fully understand and appreciate the

habits and perspectives of the friends whom I came to know. At my study site there was only one mode of transportation available: *matatu*. *Matatus* are share-taxi vans intended for 14 passengers, but which, in reality, tend to hold at least 25. Daily between 8 and 9 am four *matatus* passed by my village, heading to the district capital. The journey was about three hours (although it should require less than one hour in a private vehicle) to the district capital, Masindi. From my village I could walk 7 km to the nearest 'center' where people congregated in the evenings and where I could purchase airtime for my cell phone, beverages and very few other resources, but in Masindi I had access to the internet, a large fruit and vegetable market and small shops for food and other goods. After completing my shopping and internet I would be sure to board the *matatus* between 1 and 3 pm so as to not be stranded in Masindi for the evening.

In Masindi most people speak English and I was fortunate to know several individuals within the village who did as well, but in Uganda people often speak at least five languages, if not ten. Next to English Ki-Swahili is the most universal language so I did my best to pick up some important phrases and very basic language capabilities. This proved to be integral in gaining respect from local people and integrating myself more wholly into village life.

Such integration was constantly challenged by the social stigmas associated with extreme ethnic and economic minorities. Whether or not a foreigner would be considered wealthy within his home country (which is certainly not true in my own case), travelers have far more opportunities than anyone living in a village and it can be difficult to traverse the visible and perceived economic gap and develop completely honest and caring friendships that lack any economic prejudice on the part of locals. I did my best to dissuade such sentiments and was touched when villagers expressed their recognition of and appreciation for my attempts to both live and love local culture.

As anyone can imagine my internship was an incredible learning experience on so many levels, from scientific exploration to cultural understanding. The internship provided unparalleled experience working with chimpanzees in the wild and exploring questions of ecology, culture and social and physical cognition. Although I am still working out the details of my honors thesis, it will certainly have dual foci on primate social cognition and the unique obstacles facing the conservation of cognitively sophisticated species. This will include issues related to the conservation of not only genetic, but also cultural (behavioral) diversity as well as the complex social and ecological requirements necessary for the preservation of such species. The research to be highlighted within the thesis will detail an experiment examining the interface of theory of mind and communication in primates as well as ingroup-outgroup perceptions. This will involve analysis of existing data on rhesus monkeys from Cayo Santiago, in Puerto Rico, and hopefully a several week trip to the island to collect additional data.

**Eric LeFlore**

**Global White Lion Protection Trust, Hoedspruit, South Africa**

Last summer I interned with the Global White Lion Protection Trust (WLT) in Hoedspruit, South Africa. The WLT is a nonprofit conservation and community development organization. They are committed to protecting white lions which are very rare and endemic to the Greater Timbavati Region of the Limpopo Province. The Trust is working to maintain a diversified gene pool in the area as white



lions represent recessive pigmentation genes. The WLT also has a presence in the local communities. They partner with different organizations, both local and international, to work on projects that aid development for various schools in the area.

While completing my internship, my responsibilities varied greatly. However, we did have a typical structure to our days. Every day we would go out into the game reserve, perform fence checks to ensure security for us as well as the wildlife and then locate the nine lions using radio telemetry. Once we located the lions, we would collect data on their location, the lions present in the area, their behavior, whether or not they had made a kill, their individual belly full ratings (a standard of health for lions based on the shape of the lion's stomach), along with other pieces of metadata. While I was there, a lion roar recording project was initiated. The interns would record roars of the different lions on the reserve. Because the roar project was new, we drafted protocols for the recording process. All of the data that was collected was put into a computer database to be looked at by the head lion ecologist. I also developed a mammal booklet for the reserve; any mammals seen on WLT property were described thoroughly in the booklet. The interns monitored lions during the supplemental feedings that occurred when the lions were not able to hunt for themselves. We also occasionally accompanied the reserve manager and other staff members on corridor security patrols. As interns, we were also responsible for making trips into town and running errands for the organization.

Some of my original objectives were to 1) learn how to successfully locate collared animals with radio telemetry equipment, 2) learn more about the savanna ecosystems, 3) learn how to use GIS software, and 4) learn about the conservation methods that are utilized by organizations, game reserves, and scientists in South Africa. I was also interested in learning about how local people were affected by game reserves and wildlife conservation. From this experience, I was able to accomplish some of these goals. I am now proficient in locating animals with radio telemetry and I learned a substantial amount about many different aspects of savanna ecosystems. I had many conversations with Jason Turner, the head lion ecologist, about various conservation models and the ecology of the region. I was only able to work with the GIS mapping a little bit. I also did not get to learn as much about the local community as I would have liked. Most of what I learned about the communities surrounding conservation areas was from those involved with the reserves themselves. While I only accomplished some of my learning objects, this internship was an invaluable learning experience for me.

This internship helped me figure out that I am definitely interested in pursuing an academic research career. I would like to conduct wildlife research after I graduate from Connecticut College and eventually enter a graduate program. I am interested in returning to Africa to conduct more research on wildlife in the region. It would be nice to go back to Tanzania and continue working on my Kiswahili as well as dive deeper into the conservation issues that I learned about while studying abroad there. I am hoping to return as a part of graduate school research. This internship also helped me learn a little about running a conservation organization, what works and what does not. Overall this internship was a fantastic learning experience for me and was influential in helping me figure out a potential piece of my future.

By interning in South Africa, I was able to gain some more knowledge of conservation methods as well as compare and contrast the methods there with those that I witnessed in Tanzania. I was able to see a living conservation project and observe how it fit into the larger ecological picture in the region. I was

also able to gain some insights into conservation from Jason Turner as well as the volunteer coordinator, Mark Spicer. The information that I gathered while I was interning will help with my senior integrative project.

I am writing an Honors Thesis that is being advised by Robert Askins. My project is a literature review that aims to answer the question: “how do we conserve the biodiversity in the savanna ecosystems of eastern and southern Africa in an ecologically and socially responsible fashion?” I am looking at different conservation techniques and aiming to figure out which ones are the most sensitive to the conservation of natural resources as well as helping to further social development. These issues are vital to the countries in these areas because wildlife is an important part of their economies, but the protection of the wildlife may and can be harmful to the people that live in or near a conservation area. Working with the White Lion Protection Trust has given me some more experience with and insight into conservation efforts in the region.

**Scott Siedor**

**Environment and Natural Resources Division,  
United States Justice Department Washington, DC**

This past summer I interned in Washington D.C. with the United States Department of Justice in the Environment and Natural Resources Division, Environmental Enforcement Section. The division is “responsible for civil judicial enforcement of most of the nation’s environmental laws.” While they litigate environmental crimes across a wide array of circumstances they primarily prosecute Clean Air Act, Clean Water Act, Resource Conservation and Recovery Act, Safe Drinking Water Act, and CERCLA (Superfund) violations. The section works primarily with the Environmental Protection Agency as well as other federal agencies that serve as trustees for federal natural resources, such as the Department of Interior, the Department of Defense, and Fish and Wildlife Service to bring suit against third parties when U.S. resources and lands have been contaminated. Overall, the section is comprised of six Assistant Chiefs who supervise a litigation group of about 20-25 attorneys. Each group has the litigating responsibility for 2 of the 10 Environmental Protection Agency’s regions.

My responsibilities varied throughout the course of the summer. The first day in the office I was assigned to the Regions 1 and 2 litigation group which is comprised of the New England States, New York, New Jersey, Puerto Rico, and the Virgin Islands. I was then introduced to two attorneys who would act as my “mentors” for the duration of my internship and soon after found myself in meetings with the Section Chief and Senior Counsel where the goals and responsibilities of the section were outlined. I attended training sessions for the majority of this first week which included presentations on the history of the Division, environmental statutes, legal researching software, and what to see in D.C. The week concluded with an intern welcome by the First Lady, Michelle Obama and United States Attorney General, Eric Holder.

Overall, my main responsibility was to provide assistance to the team of attorneys in Regions 1 and 2 with their case load. The section strives for negotiation and eventual settlement on every case, meaning a significant amount of work goes into discovery and the subsequent legal research on the law presented in the case. The attorneys typically have such a vast amount of evidence prepared against the liable party

that the cases rarely go all the way to trial, usually ending in large, seven figure civil penalties. With that being said, I used a variety of legal researching software such as Lexis Nexus and Westlaw to research Appellate and Circuit Court decisions in which the judge has ruled in favor or against specific, relevant issues raised in our cases. It was my responsibility to provide summaries and outlines to the lead attorneys on the existing case law, that they used as an aid in formulating their legal argument against the Defendant. For example, research I prepared for attorneys litigating *United States v. Duncan Petroleum* helped lead to a \$3 million civil penalty following a week-long trial in Wilmington, DE.

Following a settlement agreement, the violator can agree to undertake a supplemental environmental project related to the violation in exchange for mitigation of the penalty to be paid. I compiled a 55-page Supplemental Environmental Project (SEP) spreadsheet for the section chief which included all applicable cases dating back to 2004. The document contained a summary of the violations, penalty calculations, descriptions of the SEPs, and their nexus to the violations. I also drafted Consent Decrees, performed quality assurance checks, and other basic clerical duties such as scanning, printing, and filing.

Going into this summer experience, I hoped to learn what it was like to work in the field of environmental law. The people that I worked with were an unbelievable resource in helping to meet my objectives. All the attorneys employed in my section graduated from an array of different law schools from around the country and all offered different perspectives not only on environmental law but also on their own life experiences. Some explained their reasoning in taking time off prior to law school, some outlined the major differences between working for a private law firm and the government, and others discussed the differences between litigating environmental issues and other fields such as criminal and tax law. Overall, I tried to take in as much information as I could and left with a real understanding of what it was like to work with environmental law on a day to day basis.

The substance of my senior integrative project will be a case study of the decade-long battle in Old Saybrook, CT over a tract of inland wetlands, named "The Preserve". Lehman Brothers bought the land around 15 years ago with a plan to develop Connecticut's largest coastal forest into an 18-hole golf course, private country club, and over 220 residential units. After being denied a wetlands permit from the Old Saybrook Wetlands and Watercourses Commission, Lehman Brothers' subsidiary, River Sound LLC challenged the ruling in CT Superior Court where it was upheld. The case was then taken to the CT Appellate Court where the Superior Court's decision was affirmed on many grounds ranging from the loss of habitat for various endangered species to contaminated well water in surrounding neighborhoods. A decision is still pending as to whether the Supreme Court will hear additional arguments from River Sound.

I will specifically look at the economics and law at issue with this case. To what extent do environmental values outweigh the need for development? How should this land be valued, how is economic value assigned to a natural resource? If the state, through the court system, restricts all development (and economic value) of the Preserve should that be considered a taking under the 5th amendment of the Constitution which says no private property should be taken for a public purpose without just compensation? Should the state simply buy the land from River Sound LLC?