



The Goodwin-Niering Center for the Environment

Senior Integrative Project Abstracts for the Class of 2010

Melanie Bender

Lobstermen of Long Island Sound and the Struggle with Shell Disease

The lobster industry in Long Island Sound is suffering. The lobster population is a fraction of what it once was, and many of the individuals are ill. For my senior integrated project I studied the illness afflicting the local lobster population, shell disease. Shell disease is a chitinoclastic bacteria infection that penetrates the lobster through the pores in the cuticle. It compromises the integrity of the lobster shell and makes it vulnerable to predation. It also affects the livelihood of lobstermen. Lobstermen rely on lobsters as their main source of income. Shell diseased lobsters are not appetizing looking and this lessens the value of the catch. While lobstermen are suffering economic losses they are also the target of a vast array of public perceptions. I spent the second half of my senior integrated project studying the public perception on the men and women in this field. The majority of the public is not well versed in the issues of lobstermen and their livelihoods. This disparity in knowledge showed clearly through the surveys concerning the perceptions of the public I posed, and were in relative contrast to the reality of the profession.

Erin Brady

Closing the Gap with Ecological Literacy: An Examination of Environmentally Focused Charter Schools as Tools for Reform

Currently our nation faces two challenges: impending environmental disaster from global climate change and a public education system that is failing the needs of many children. Education is where the focus needs to turn in order to ensure leaders for the future able to tackle complex environmental problems. In the standards based, accountability nightmare we are in under the No Child Left Behind Act of 2001 (NCLB) there needs to be a solution found that could balance both these standards with environmental education. A school that successfully can perform this balance is said by this study to be working under "NCLB Green". This study examines charter schools because of their unique ability to work outside traditional school bureaucracy but still work to meet NCLB standards. Three environmentally themed charters are studied through testing 5 hypotheses to determine if environmentally themed charter schools working to increase ecological literacy are also able to effectively implement "NCLB Green". Accountability, responsiveness and equity are all elements of charter schools that are examined. The study ends with recommendations for the future of environmental education and education reform policy.

Ariella Cohen

The Intersection of Affordable Housing and the Environment Through the Lens of Chapter 40B

This paper used Chapter 40B of the Massachusetts General Law, Massachusetts' unique affordable housing law, as the medium by which to look at the intersection of affordable housing and the environment. The affordable housing movement and the environmental movement developed around the same time and often attract similar members. Controversy and intrigue arises when these two movements collide forcing people to choose one movement over the other. In Massachusetts residents often choose environmental concerns over affordable housing ones. Chapter 40B states that developers building under the law can be excluded from what some consider to be exclusive local zoning laws if 25% of the housing units in a development are sold below market value and some of the developer's profits are returned to the town. When deciding whether to approve a 40B development each town must weigh the need for low and moderate-income housing over local health, safety, design, environmental and open space concerns. I examined two 40B case studies, one in Holliston and one in Scituate, that each represented two different sides of the conflict between 40B and the environment. In each case the state decided that the need for affordable housing outweighed the town's environmental concerns because the concerns could be prevented or the town could not supply enough evidence of a threat. The Holliston case portrays a scenario in which residents are genuinely concerned that a 40B development will harm the environment but are open to affordable housing in other areas of the town. The Scituate case portrays a scenario in which residents merely use the environment to prevent the construction of dense housing in the town. I found that 40B is not perfect but it contains avenues for concerned town residents to address potential environmental problems and even prevent them through creating an affordable housing plan. One recommendation to improve how environmental concerns with 40B are addressed is to allow concerned residents more access to an explanation from the DEP and local environmental officials. Overall, 40B finds a healthy balance between affordable housing construction and environmental protection.

Maria Figliola

The Visual Communication of Climate Change

Climate change is a very difficult issue to communicate. It is abstract, surrounded by uncertainty in the media, temporal and thus not immediately visible; it has global boundaries, and is generally just a complex issue. To help bridge the 'behavior gap,' and make those aware of the causes and effects of climate change to take action, climate change advocacy campaigns have utilized the visual extensively in their print material or advertisements. For my Student Integrative Project I examined a variety of visuals used in these campaigns, and critiqued them using a framework of visual communication theory. Specifically I focused on the aesthetics, rhetoric, cognition, semiotics (mainly iconography), and representation found within the images. Overall I discovered that the combined cognitive and affective responses to visuals can strongly influence the viewer to react with a behavioral response.

However, images must be used with careful intention so as not to simplify the issue, distance the viewer emotionally, or contribute to “green fatigue.”

Erica Hildebrand

Differences in community composition of ammonia oxidizing archaea in control and high nitrogen fertilizer plots of the Great Sippewissett Marsh, Cape Cod, MA.

Non point source pollution from anthropogenic sources is the cause of excess nitrogen and other nutrients in coastal ecosystems. By adding artificially fixed nitrogen to the global nitrogen biogeochemical cycle, perturbation of the cycle and the organisms involved is a possibility. Nitrification is a step of the nitrogen cycle involving the oxidation of ammonia to nitrite and nitrate, which is catalyzed biologically by the enzyme complex ammonia monooxygenase in ammonia oxidizing bacteria (AOB) and archaea (AOA). AOA are newly discovered, and important for the functioning of the nitrogen cycle. This study compares community composition of AOA the Great Sippewissett salt marsh, Cape Cod, MA, in areas of nitrogen fertilization and no nitrogen fertilization. AOA communities exposed to long term nitrogen fertilization have lower diversity and evenness and different community composition than control AOA communities in the same marsh.

James Irwin

Challenges and Opportunities for Climate Change Resilience in Small Cities

Over the last decade, concern with the sustainability of urban places has increased dramatically. Converging with the many other urban placemaking, revitalization, planning and social justice movements is the need to create sustainable cities that maintain and enhance quality of life. Recently, the sustainable cities movement began to focus on resilience. This has often left out the different contexts and issues facing the resilience of small cities. The many differences between small and large cities make it imperative that vulnerabilities and pathways to resilience of small cities be considered separate from large cities. Unique cultural and ecological assets, as well as an emphasis on local food, economies and renewable energy systems can be used to leverage specific characteristics of small cities. Economic, Political and Spatial issues create vulnerabilities to climate change that must be addressed through resilience. In addition, these issues manifest in social and micro-level vulnerabilities. Ecological vulnerabilities are also a major concern for small cities. I consider two case studies of Keene, NH and New London, CT to highlight the attempts to build resilience in small cities. The former has been very successful in using a systems approach, while a multitude of barriers limit New London’s movement towards resilience. Ultimately, political capacity, long-range planning and leveraging of unique qualities will help move small cities towards climate change resilience.

Kevin Izzo

A Study of Environmentally Sustainable Large Scale Sporting Events

The goal of this independent study was to research and analyze the progressing trend of environmentally sustainable large sporting events. As environmental challenges, such as human induced global warming, have increasingly become mainstream issues, I decided to investigate the little known and obscure connection between large sporting events and their environmental footprints. Through examining recent sources in this nascent field and extrapolating information from less focused publications, this paper provides an insight to the trends, motivations, and methods for holding environmentally sustainable large sporting events. The paper is organized into five sections. The first section provides an account of the relatively short history of green sporting events. The second section offers the two main reasons for large events to reduce their environmental footprint, and is followed in the third segment, which discusses methods for doing so. The final two parts discuss case studies of environmental failures and economic incentives for implementing green initiatives, respectively. While this paper provides a wide spectrum of information on the topic of environmentally sustainable large sporting events, the main theme throughout the piece is that environmental initiatives and large sporting events should not be considered mutually exclusive.

Lily Kunin

Renewable Energy: Discovering and Overcoming the Barriers in Rural Areas of Developing Countries

This paper discusses renewable energy as a catalyst to alleviate poverty and specifically achieve the Millennium Development Goals. It discusses the benefits of the use of renewable energy over conventional energy, particularly in rural areas of developing countries. Rural areas of developing countries were chosen for this paper due to the high levels of poverty and millions of people that lack access to energy in these regions. The barriers preventing more widespread implementation of renewable energy are presented, as well as specific measures to overcome these barriers. Case studies on Senegal and China, two countries with high levels of poverty in the rural regions and abundant natural resources for production of renewable energy, are presented at the end of the paper. Although the barriers are significant, if the appropriate measures are taken to overcome them, renewable energy can have a profound effect in terms of poverty alleviation.

Sturgis Sobin

U.S. Green Building Policy and the American Recovery and Reinvestment Act of 2009: Promoting Green Building in Absence of National Regulation

In the absence of binding national or international climate change policy, many states and local governments are taking the initiative to mitigate climate change through the use of energy efficiency and environmental protection policies. The impact of both the built environment and climate change on our national welfare makes a strong case for the need for increasingly energy efficient and environmentally friendly building practices. In the U.S. and around the world, buildings are a significant source of human, environmental, and economic health. Therefore, promoting sustainable building practices will translate into a huge source of benefits to society, including mitigating climate

change. The economics and environmental metrics of green buildings, although relatively young, have demonstrated their ability to capitalize on these perceived benefits to society. And through the policies the U.S. is instituting, efforts for further development are certainly being promoted. However, with all the recent distressing financial news—the declining economy, continuing credit market turmoil, and especially the rapid deterioration in property markets—some might assume that the green building trend is over, or at least stymied. This study investigates the economic and environmental issues surrounding U.S. green building policies in the context of our current economic climate with special emphasis on the American Recovery and Reinvestment Act. Although the situation is quite young, current policies could foreshadow what may come for green building promulgation in the 21st century.

Charles van Rees

Of Ethics and Ecosystems: A Bifocal Perspective on Biodiversity Conservation

In the latter part of the 20th century, the field of conservation biology emerged to confront the growing human awareness of the anthropogenic mass-extinction of biological phenomena on earth. Unfortunately, the urgent necessity of biodiversity conservation warranted such swift action that for more than 40 years the field has advanced with no great degree of principle or coherence in ideals. Though there is certainly a general consensus among conservationists, differences in opinion abound with respect to three core issues: the nature of biodiversity, the justification for its preservation, and how best to go about preserving it. “Of Ethics and Ecosystems” employs a comprehensive literature review in the fields of philosophy of biology, conservation, and environmental ethics to create practical responses to these difficult questions. In characterizing biodiversity, this project forms an inclusive biodiversity definition by employing not only species abundance but also additional sources of biological variation described by other authors and makes the additional suggestion of considering behavioral diversity. The project also portrays ecosystem diversity as a variable component of biodiversity with importance and value on a scale of community coherence and interaction. In addressing biodiversity justification, the project outlines one author’s adequacy conditions for conservation ethics and adds an additional condition which necessitates that an ethic be conceptually accessible even to uneducated members of the public. Using these conditions, the project examines the strengths and weaknesses of popular ethical systems, and concludes that current philosophical and scientific knowledge of biological systems is insufficient to create a “master-ethic” for conservation. In lieu of such a system, it defends a pluralist ethical framework for practical application. The project uses Costa Rica as a case study to address the question of how to conserve biodiversity. Combining the suggestions from this study with the practical implications of the conclusions established in the first parts of the work, it concludes by forming a summarized list of suggestions for future conservation management. The project also proposes an evolutionary framework for biodiversity conservation to allow an accurate evaluation of disparate sources of biological variation with respect to their role in the evolutionary process.