Members of the Ad Hoc Committee for the Student Spotlight on Research:
Ms. Jessica Clemons- Chairperson
Dr. Gregory Boyer
Ms. Isabel Fernandez
Dr. Elizabeth Folta
Ms. Theresa Kaier-May
Mr. Thomas Taggart
Mr. John Wasiel

This committee is a subcommittee of the Faculty Governance Committee on Research.
Dr. Philippe Vidon- Chairperson

The Committee would like to thank the campus departments and individuals that contributed funds for awards and supplies:

The ESF Alumni Association
Department of Chemistry
Department of Environmental and Forest Biology
Department of Environmental Resources Engineering
Department of Environmental Science
Department of Environmental Studies
Department of Forest and Natural Resources Management
Department of Landscape Architecture
Department of Paper & Bioprocess Engineering
Department of Sustainable Construction Management & Engineering
Office of Research Programs

We would also like to express our gratitude to the Alumni, graduate students, and faculty who volunteered to judge the posters.
Keynote Featuring ESF’s President Wheeler

Dr. Quentin Wheeler will deliver the keynote for this year’s Spotlight on Student Research on Wednesday, April 16th at 3pm in the Nifkin Alumni Lounge.

Dr. Wheeler served in distinguished academic roles for 24 years at Cornell University, where he earned the rank of tenured full professor. He was chair of entomology and director of the Liberty Hyde Bailey Hortorium while at Cornell. Wheeler also previously served as the Keeper and Head of Entomology at The Natural History Museum in London from 2004-2006, and was director of the Division of Environmental Biology at the National Science Foundation from 2001-2004.

His research career has focused on the role of species exploration and natural history collections in the exploration and conservation of biodiversity; theory and practice of phylogenetic systematics and cybertaxonomy; the evolution and classification of insects, especially beetles; and public science education. He has received a number of academic honors, including several fellowships, and has had three species named in his honor.

He is the author of approximately 150 scientific articles and six books, including What on Earth? - 100 of Our Planet’s Most Amazing New Species. He has named more than 100 new species and writes a weekly feature on new species for The Observer newspaper in London. Wheeler holds bachelor, master's and Ph.D. degrees in entomology from The Ohio State University.

After the keynote, awards will be presented in the graduate and undergraduate student poster categories with reception to follow.
GRADUATE STUDENTS

Chemistry

Name: Weber, Samantha  
Authors with Affiliations: Samantha J. Weber and Gregory L. Boyer  
Department of Chemistry, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210  
Yanping Feng, Joseph Atkinson  
Department of Civil, Structural and Environmental Engineering, State University of New York University at Buffalo, Buffalo, New York 14260  
Primary Department: Chemistry  
Type of Abstract: Research Abstract  
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry  
Level of Research: Graduate - M.S.  
Title: Monitoring Internal and External Phosphorus Loads in Sodus Bay New York  
Abstract: Located on the southern shore of Lake Ontario, Sodus Bay is an ecologically diverse watershed that is also a popular tourist destination during the summer months. Blue-green algal blooms are naturally occurring in Sodus Bay, but beginning in 2010 toxin-producing harmful algal blooms began occurring in concentrations high enough to cause closures in some parts of the Bay. These blooms are likely to be driven by phosphorus entering the Bay through the surrounding creeks and watershed (external loading) or by recycling from anoxic sediments (internal loading). To help determine the external phosphorus loads to Sodus Bay a continuous soluble reactive phosphorus monitoring system (WET Labs Cycle-P) will be deployed on Sodus Creek East (the main tributary to Sodus Bay) just before the creek enters the Bay. Internal phosphorus loads will be determined by mapping out the anoxic area of the Bay combined with historical data collected from NY DEC citizen monitoring on hypolimnetic and epilimnetic phosphorus concentrations. Determining the source of phosphorus driving these blooms will help us identify potential management options that may help reduce the intensity and occurrence of these algal blooms in the future.

Name: Perri, Katherine  
Authors with Affiliations: Perri, KA, Boyer, GL. Department of Chemistry, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210  
Primary Department: Chemistry  
Type of Abstract: Research Abstract  
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry  
Level of Research: Graduate - Ph.D.  
Title: Examination of siderophore production of three cyanobacterial strains in culture  
Abstract: Iron is required for all living organisms. Under oxic conditions, iron is not readily available for biological uptake. To meet their needs, some microorganisms produce chelators called siderophores that can facilitate the uptake of iron from the surrounding environment. The iron uptake mechanism(s) for Microcystis, a common freshwater cyanobacterium, are not well established. To test if siderophores are an important iron uptake mechanism in these genera, three cyanobacteria species were grown in iron-limited media. This includes the known
siderophore producer Anabaena sp. ATCC 27898, the type strain Microcystis aeruginosa NIES 843, and the Lake Erie isolate M. aeruginosa LE-3. Preliminary data from culture and field experiments will be presented.

Name: Schmidt, Justine
Authors with Affiliations: Schmidt, JR, Boyer, GL. Department of Chemistry, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Primary Department: Chemistry
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Graduate - Ph.D.
Title: Synthesis and Detection of Microcystin-LR Metabolites by Liquid Chromatography Tandem Mass Spectrometry
Abstract: Microcystin-LR is a peptide toxin produced by the cyanobacteria Microcystis aeruginosa. This toxin affects the enzyme protein phosphatase, forming a permanent covalent linkage within the active site. Detoxification of microcystin-LR in cells can occur through binding of microcystin-LR to the peptide glutathione, which is then enzymatically reacted to form a series of conjugated metabolites. These metabolites are readily excreted from the organism and are not as toxic as microcystin-LR. Although toxicity is reduced through conjugation, these metabolites still retain some toxicity when released into the environment. These metabolites could comprise a significant fraction of microcystin-LR in an ecosystem or in an organism in the foodweb, such as zooplankton or fish. Here we present a method for synthesis of these conjugated metabolites as standards for liquid chromatography tandem mass spectrometry (LC-MS/MS) and a novel LC-MS/MS method for detection of these conjugates in samples.
Environmental and Forest Biology

**Name:** Afelumo, Funmi

**Authors with Affiliations:** Funmi Afelumo, Shaler Garett, Lee Newman. State University of New York, College of Environmental Science and Forestry, Department of Environmental and Forest Biology.

**Primary Department:** EFB

**Type of Abstract:** Research Abstract

**Research Category:** Laboratory Sciences

**Level of Research:** Graduate - M.S.

**Title:** The potential for herbicide safener Naphthalic Anhydride to reduce the symptoms of heavy metal toxicity in Zea mays

**Abstract:** Herbicide safeners are a group of chemical compounds used with cereal crops to induce crop tolerance to otherwise phytotoxic herbicide applications. Zea mays (maize) seeds were treated with herbicide safener naphthalic anhydride (NA) then exposed to low and high toxic concentrations of nickel (50 µM and 150 µM). In seedlings exposed to nickel treatment, NA treated seedlings had an increased ending dry biomass yield of roots compared to unsafened seedlings. Total nickel concentrations in maize seedling shoot and root tissue were analyzed using ICP-MS. NA treated maize at 150 µM nickel treatment translocated significantly more nickel from root to shoot tissue compared to unsafened seedlings. NA treated seedlings were also found to have an almost 3-fold increase in leaf anthocyanin (an antioxidant) content compared to dichlormid, flurazole and unsafened seedlings. In addition, the expression levels of metal resistance and related genes such as glutathione synthase, nickel ion transporter, metallothionein, phytochelatin synthetase, and pathogenesis related proteins 1 & 2 and a glutathione s-transferase (Bz2) were seedlings will be investigated using RT-PCR in order to further elucidate the mechanism for metal resistance.

**Name:** Alger, Katrina

**Authors with Affiliations:** Authors: Katrina Alger(1), Beth Bunting, VMD(2), Krysten Schuler PhD(2), Jarra Jagne DVM DACPV(2), Christopher Whipps PhD(1)

**Affiliations:** (1) SUNY-ESF, State University of New York College of Environmental Science and Forestry, (2) Cornell University

**Primary Department:** EFB

**Type of Abstract:** Research Abstract

**Research Category:** Field Science: Biology & Ecology

**Level of Research:** Graduate - M.S.

**Title:** Diagnosis and Surveillance of Lymphoproliferative Disease Virus (LPDV) in wild turkeys (Meleagris gallopavo silvestris) in New York State

**Abstract:** Lymphoproliferative Disease Virus (LPDV) is a retrovirus that causes neoplastic lesions in turkeys (Meleagris gallopavo). In 2009, researchers in Georgia identified the presence of LPDV in wild turkeys throughout the eastern United States. Prior, the virus had only been documented in domestic turkeys in Europe and Israel where sick birds developed internal lesions and flock mortality was as high as 25 percent. Early surveillance suggests that the virus is widespread, but little is known about the course of the disease in wild birds, or the impact it may be having on turkey populations. The purpose of this study is two-fold. 1) Assess the prevalence and determine the spatial distribution of LPDV infection in wild turkeys throughout New York State.
State and 2) develop a reliable blood test for LPDV, so that animals can be tested non-lethally, and the fate of infected birds monitored. Bone marrow samples from hunter-harvested turkeys will be tested by polymerase chain reaction (PCR) for the presence of LPDV. These samples, collected from 2012-2014, will be analyzed spatially to look for hotspots or patterns of infection over time. Blood will be collected in collaboration with the New York State Department of Environmental Conservation as they band birds from January to March 2014. Whole blood and blood components will be tested by PCR to investigate the quality of this diagnostic method. Results will also be used to identify banded birds that are positive for LPDV, and track the course of the virus in those birds as bands are returned.

Name: Amos, Ben
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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Graduate - M.S.
Title: Spatial Scale and Natal Influence on Spawning Site Fidelity in Northern Pike: Investigation Using Otolith Microchemistry Techniques
Abstract: Reliance on wetlands for Northern Pike reproduction renders populations vulnerable to anthropogenic disturbance including habitat impairment and water level regulation. While spawning site fidelity has been well documented with tagging studies, few have attempted to directly address natal site fidelity. Integrated tagging and genetic studies in a Minnesota lake and the St. Lawrence River provide mixed evidence for natal site fidelity. Further, otolith microchemistry analysis did not support natal site fidelity in degraded Wisconsin waterways. Otolith microchemistry analysis of Baltic Sea Northern Pike showed evidence of natal homing in only 50% of study streams, separated by >50 km. Trace analysis of 3 St. Lawrence River tributary wetlands shows significant elemental differences among individual branches and associate bays. Otolith microchemistry analysis could provide insight into the natal origin of spawning pike. Two spatial scales will be investigated to examine the confounding influence of low dispersal on natal site distinction. Comparison of tributary spawning sites separated by 10-20 km representing coarse scales, to branches in closer proximity (<100m) provide an opportunity for a fine-resolution analysis. A more complete understanding of spawning site fidelity would enhance our mechanistic view of Northern Pike population structure and influence conservation and management of reproductive habitats.

Name: Bachman, Ceili
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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry
Level of Research: Graduate - M.S.
Title: Drowned River Mouth Wetlands and Water Level Regulation: Effects on Water Chemistry and Plankton Communities

Abstract: Water levels in the Lake Ontario-St. Lawrence River system have been lowered and stabilized by a large hydroelectric dam since 1960. This regulation may influence sediment-water nutrient exchange in marshes adjacent to the system by changing the duration of flooding, and consequently changing sediment redox properties. Altered nutrient concentrations should change productivity and nutrient stoichiometry at the base of the wetland food web, potentially affecting game fish populations whose juvenile stages feed in the marshes. Several wetlands along the upper St. Lawrence River are fitted with water control structures that create a higher, more natural water level regime and allow for comparison with the dam-regulated sites. We evaluated nutrient concentrations (e.g. nitrogen, phosphorus, and sulfate), chlorophyll-α concentrations, zooplankton communities, and seston and zooplankton stoichiometry in three dam-regulated and three managed wetlands. Results show high site-to-site variability in water quality, seasonal variation in zooplankton communities, and significant differences between regulated and managed sites in some parameters, especially nutrients in porewater. Chemistry differences were likely driven by duration of flooding, resulting in altered redox conditions. These results highlight the importance of hydrologic regulation, seasonal patterns, and site characteristics in determining the function and structure of drowned river mouth wetlands.

Name: Gavard, Emily
Authors with Affiliations: Emily Gavard, Jonathan Cohen, Chris Whipps, Sadie Ryan. Department of Environmental and Forest Biology, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Graduate - M.S.

Title: Exploring the Potential for Parasite-mediated Competition: New England and Eastern Cottontails, Invasive Vegetation and Parasites in the Hudson Valley, NY

Abstract: The New England cottontail (NEC) is found in small patches of early successional habitat in the Northeastern United States, and is currently a candidate species for listing on the Endangered Species Act. Populations have been declining due to habitat loss and resource-mediated competition with the introduced Eastern cottontail (EC). Invasive plants of unknown nutritional value dominate the majority of existing NEC habitat. In addition, parasites of NEC have not been studied, leaving us unable to assess whether parasite-mediated competition exists between NEC and EC. I will be trapping cottontails and collecting fecal and urine samples in the Hudson Valley, NY. During trapping, a body condition index value will be assigned and a blood sample taken to quantify hematocrit levels, which tend to be reduced with nutrient deficiencies. Snow--urine assays will be analyzed for urea nitrogen: creatinine ratios, an index of the habitat’s immediate ability to meet nutritional requirements. Ectoparasites will be collected from cottontails during trapping, and centrifugal fecal floats in both zinc sulfate and sucrose solutions will allow me to determine endoparasite burden and species present. I expect to find filarial worms, pinworms, whipworm, tapeworms, roundworms, ticks and fleas. We will test whether NEC maintains a higher nutritional plane and body condition in native vegetation than invasive,
if the nutritional plane is higher in areas with only NEC than where NEC and EC are sympatric, as well as if parasite species and burdens differ in these areas or are a function of a lower nutritional plane.

Name: Gunderson, Matthew  
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Primary Department: EFB  
Type of Abstract: Research Abstract  
Research Category: Field Science: Biology & Ecology  
Level of Research: Graduate - M.S.  
Title: Habitat-assemblage modeling of aquatic macrophytes as a guide for enhancement of fish habitat  
Abstract: Macrophytes are a significant component of many aquatic systems, having profound beneficial and harmful effects both ecological and economic. We developed a series of models to predict aquatic macrophyte species assemblages and productivity for sites with various environmental characteristics in the upper Niagara River, New York. Coupled with previous research relating fish and macrophyte species assemblages in the Niagara River, these models could be incorporated into the design of future habitat enhancement projects aimed at benefiting desirable species of fishes and restoring natural habitat forming processes.

Name: Huffman, Kelly  
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Primary Department: EFB  
Type of Abstract: Research Abstract  
Research Category: Laboratory Sciences  
Level of Research: Graduate - M.S.  
Title: Environmental Determinants of Sex Ratio in St. Lawrence River Northern Pike (Esox lucius): Development of a Molecular Sex Identification Tool and Experimentation with Physical and Chemical Variables  
Abstract: Sex determination and gender ratio within fish populations can be influenced by environmental factors and selective mortality and therefore represents an important marker of population health. Sex ratio is typically assessed in mature adult fish during the reproductive phase or through internal examination however, gender determination at early stages of development (e.g., egg and larval) presents a challenge because gonads are not identifiable precluding investigation of sex linked biological processes. We propose the development of a molecular diagnostic tool to determine gender at any life stage. Based on next generation sequencing data, a cDNA library can be developed to produce gender specific transcriptomes whereby male linked markers can be identified. If successful, the male specific assay will be used in experimental trials to test environmental factors hypothesized to influence expected sex ratios. Northern Pike males are heterogametic (XY chromosomes) and a 50:50 male to female sex ratio is expected, but in the St Lawrence River, ratios exhibit female dominance (25:75). Specifically, we will investigate the effect of temperature, dissolved oxygen, and xenoestrogen
treatments on sex ratio for Northern Pike eggs and larvae. We will incubate batches of fertilized eggs in controlled treatments and compare sex ratio outcomes using the molecular gender determination test. Pike will be raised in each of 4 treatments, low dissolved oxygen, increased temperature, a xenoestrogen treatment (estradiol), and a control. Results will be used to enhance understanding of mechanisms driving Northern Pike sex ratio in the St. Lawrence River.

Name: Karkuff, Stefan
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Rebecca J. Rundell, Assistant Professor. Department of Environmental and Forest Biology, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Graduate - M.S.
Title: Quantifying forest subsidies to food webs in woodland ponds
Abstract: Woodland ponds, found in northeastern temperate forests, receive large nutrient inputs from terrestrial-derived plants, mainly leaf litter. Upon entry into ponds, the nutrients released from leaves become available for uptake into lower trophic level organisms. Few authors have investigated the relative contributions of terrestrial inputs to the diet and biomass of organisms in woodland ponds. I’ve attempted to elucidate these questions through an in situ mesocosm experiment and stable isotope analysis.
During a six week experiment carried out in seven woodland ponds, I collected biomass estimates of algae and zooplankton exposed to different litter substrates (red maple, American beech, eastern hemlock, and no litter [control]) and measured several abiotic factors. Litter treatments were deployed across a canopy cover gradient. Zooplankton biomass was significantly reduced in red maple treatments. Dissolved oxygen in red maple buckets was also less than other treatments, suggesting heterotrophy by respiring bacteria. An isotope study of δ¹³C and δ¹⁵N in pond organisms showed that algae and zooplankton nutrient assimilation is strongly influenced by the litter present. These results suggest the importance of terrestrial inputs to woodland ponds, although not all litter types have equal effects.

Name: Looi, Alexander
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Ceili Bachman, Masters Candidate, SUNY College of Environmental Science and Forestry
Alexander Looi, Masters Candidate, SUNY College of Environmental Science and Forestry

Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Graduate - M.S.
Title: ALGAL AND ZOOPLANKTON RESPONSE TO A FLOOD PULSE IN A DROWNED RIVER MOUTH WETLAND

Abstract: The spring flood pulse, through the release of mineralized nutrients, can jump start the spring growing season. To quantify these effects on the water chemistry and micro-biota of a drowned river mouth wetland in tributaries of the St. Lawrence River, soil cores from different elevations were flooded with 1.5 cm of river water per day for two weeks. Flow through rate was simulated by replacing 25% of the previous day’s surface water. Removed water was used to grow algae and subsequently two groups of Ceriodaphnia for each week of the experiment. Algal density increased with an initial nutrient release, then declined at the flow through rate. There was no difference in Ceriodaphnia growth between treatments. However, there was a higher growth rate in Ceriodaphnia grown in the second half of the experiment despite a decrease in algal density, suggesting a change in the food quality of the algae. Thus, food quality appears to matter more to Ceriodaphnia than food quantity. This quantified data will be applied to a flood pulse model to simulate nutrient dynamics in the St. Lawrence wetlands.

Name: McMullen, Justin
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Jirawan Torit, King Mongkut’s University of Technology Thonburi, Bangkok, Thailand

Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Graduate - M.S.
Title: Trichloroethylene Degradation by Genetically Modified Tobacco (Nicotiana tobaccum var. xanthi)

Abstract: Trichloroethylene (TCE) contamination is a major problem in groundwater systems throughout the world. Phytoremediation strategies have been used in the past with good results; however, the effectiveness of this technology could be enhanced by use of genetically modified plants that contain genes known to enhance the degradation of TCE. The human cytochrome P450 2E1 gene, which is known to metabolize TCE, has 5 homologous genes identified in the Arabidopsis thaliana genome, one of which was shown to greatly enhance the effect of TCE degradation (Strycharz et al. 2006). These genes have subsequently been transformed into the test plant (Nicotiana xanthi) using T-DNA insertional mutations. Here, we report on the ability of the genetically modified tobacco to metabolize TCE more efficiently.

Name: Miano, Andrew
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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Graduate - M.S.
Title: The Influence of Spawning Habitat on Round Goby (Neogobius melanostomus) Egg Predation for Broadcast Spawning Species
Abstract: Egg predation by Round Goby is a commonly referenced concern associated with their recent invasion of the Great Lakes. Surprisingly, few empirical studies have investigated Round Goby as egg predators. While both broadcast spawning and nest-building species may be impacted by Round Goby egg predation, broadcast spawning species may be of particular concern, as they do not guard their nests. Broadcast spawning species vary significantly in their spawning habitat, which may affect Round Goby egg predation outcomes. This study will examine how differences in spawning habitat influence Round Goby egg predation rates on several broadcast spawning species. A laboratory experiment will be used to investigate Round Goby egg predation rates on Walleye, Northern Pike, and Muskelunge eggs in six different habitat treatments. A complementary field study will quantify density, distribution, and diet of egg predators in known spawning locations. Field comparisons of these three species will be used to determine the extent of egg predation in known spawning habitats. Together, laboratory and field observations will quantify habitat-specific egg predation risk by Round Goby among these three broadcast spawning species, helping managers to better understand the effects of the invasive Round Goby on native sportfish.

Name: Ren, Qing
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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Graduate - M.S.
Title: Evaluation of Effectiveness of the Personal and Non-personal Interpretation at International Crane Foundation
Abstract: Interpretation is widely applied as an important educational approach that improves the audience’s knowledge, promotes pro-environmental attitude and behaviors, and then contributes to the management and conservation of the resources. This research compared and explored the effectiveness of two types of interpretation at the International Crane Foundation, WI, in order to inform the management of conservation education. The results suggested that participating in personal interpretation had an advantage in improving the audience’s knowledge level, especially in a short term, but did not differ much from non-personal interpretation in influencing the audience’s attitude and behavioral intentions. Meanwhile, both types of interpretation were educationally effective in promoting understanding of scientific facts and behavioral intentions to support conservation, but did not affect the visitors’ attitude significantly. In addition, the time spent on human interpretation program was not a strong predictor for the influences on the audience. Qualitative analysis indicated that the aesthetical and emotional elements were most influential for the visitors, and they mainly obtained these experiences by viewing the captive crane exhibit in a well-planned and accessible semi-natural environment. Therefore, the non-personal interpretation components, especially the exhibit
facility of high quality, are unexpected important for producing positive influences on the audience’s knowledge and supportive behaviors.

Name: Scales, Lindsey
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2 Center for Global Health and Translational Science, Department of Microbiology and Immunology, SUNY Upstate Medical University
3 School of Life Sciences, College of Agriculture, Engineering, and Science, University of KwaZulu-Natal
Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Graduate - M.S.
Title: Exploring the influence of migration temperature thresholds on captive migratory birds: a study of turkey vulture behavior.
Abstract: Reducing stress and providing an adequate environment are important factors when it comes to captive animal care. Using behavioral measures for management is often underappreciated, but noninvasive, observational methods can be a low-cost means of doing robust research. Two turkey vultures (Cathartes aura) were observed at the New York State Zoo at Thompson Park in Watertown, New York to study their behavioral responses to winter temperatures in a region where they are not normally found during winter. The vultures were kept in an outdoor enclosure exposed to the elements, and later moved to an indoor enclosure that was sheltered on all sides. Enclosure temperatures were recorded at the start and end of each behavioral scan. Behavioral observations were recorded using scan sampling, and frequencies of behaviors were compared by temperature. Behaviors that differed significantly included hunching (more frequent at cold temperatures), watching, and resting (both more frequent during warm temperatures). Our results indicate that exposure to temperatures below a migration temperature threshold (MTT) has significant impact on behavior, and that zoo managers should consider fluctuations in ambient temperature when designing housing for migratory bird species.

Name: Velardi, Sara
Authors with Affiliations: Velardi, S. Environmental Interpretation within Department of Environmental and Forest Biology, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Graduate - M.S.
Title: The Value of Professional Development Workshops in Science and Environmental Education: A Mixed Methods Study on the Effect of Project Learning Tree’s Workshops on Educators’ Use and Attitude of Project Learning Tree Curriculum
Abstract: Newly developed science-learning standards put more emphasis on students’ active engagement in scientific problems, such as inquiry-based learning. In order to adhere to these new standards, science educators must be prepared to teach these new approaches to science
education. Professional development workshops are a means in which teachers can hone their personal teaching skills and collaborate with other teachers on different methods for student achievement. The American Forest Foundation funded a research project to see how effective New York Project Learning Tree’s (NYPLT) workshops currently are and how best to improve and strengthen their programs. Surveys and interviews were conducted with NYPLT facilitators and educators. Quantitative and qualitative analysis was used to determine major findings. There was found to be no correlation between the types of workshops taken and how often educators utilize the curriculum in their professional lives. Educators found the “hands-on learning” to be the most beneficial aspect of the workshop. Major barriers in implementation of PLT curriculum were “time constraints.” PLT facilitators can potentially remedy this barrier by demonstrating more activities within the workshops for the educators. Overall educators find value in PLT curriculum through the “active learning” for their students and the ability to “adapt lessons” from the PLT curriculum to their own lesson plans. Recommendations for future professional development workshops include continuing in-person workshops with active participation from educators supplemented by online materials. Future study into the effect of professional development workshops should include larger sample sizes of educators.

Name: YOUKER, TESS
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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Graduate - M.S.
Title: Environmental factors affecting ranavirus prevalence among aquatic-breeding amphibians in natural and constructed ponds.
Abstract: Emerging infectious diseases have been implicated as contributing factors to recent amphibian population declines. One such disease is ranavirus, caused by a group of viruses documented in fish, reptile, and amphibian species on five continents. Mortality rates exceed 90% at the larval stage of many aquatic-breeding amphibian species. As part of a long-term wetland restoration study beginning in 2010, The Upper Susquehanna Coalition in collaboration with SUNY-ESF created a network of 71 hydrologically isolated ponds incorporating four pre-existing ponds at Heiberg Memorial Forest in Tully, New York. One target species of the restoration, the wood frog, experienced larval die-offs in three ponds in 2011, and preliminary testing using PCR assay verified ranavirus infection in all three sites. Two die-offs of wood frog and green frog tadpoles have since been observed in other sites, and testing of samples collected each year since 2011 is currently underway. To identify factors influencing susceptibility to infection, we are collecting ongoing data on tadpole populations, environmental conditions, water quality, and ranavirus prevalence during and between epidemics. We will use general linear models to determine which biotic and/or abiotic variables are most influential in ranavirus outbreaks, to develop a predictive model that can be applied to other landscapes. Based on previous studies we expect temperature and hydroperiod to have highest predictive value. This will be especially applicable to future wetland
restoration endeavors, as the Heiberg system incorporates both natural and constructed ponds and offers a unique opportunity to comparatively analyze disease outbreaks in each.

Name: BERDUGO MORENO, MONICA BIBIANA  
Authors with Affiliations: Berdugo-Moreno, M, Dovčiak, M. Department of Environmental and forest biology, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210.  
Primary Department: EFB  
Type of Abstract: Research Abstract  
Research Category: Field Science: Biology & Ecology  
Level of Research: Graduate - Ph.D.  
Title: Mosses of the forest floor of a montane conifer forest can store moisture for six hours.  
Abstract: Mosses are important components of conifer forests and may play a significant role in regulation of moisture availability at the microsite scale. To determine the effect of mosses on understory moisture dynamics of a montane conifer forest, we surveyed ground cover, including moss cover by species in 20 sites, using ten 1-m² sample plots per site. The sites were located between 1100 and 1350 m in spruce-fir forests of Whiteface Mountain (Adirondack, NY). To study the water retention capacity of mosses, we monitored water storage capacity and water release rate of frequent moss communities under controlled conditions. Our field studies showed that moss cover increased with canopy density, and along with litter, it was the dominant ground cover type. Of the 21 frequent moss species, four were dominant and arranged in two contrasting communities; Hypnum imponens and Pohlia nutans formed tight smooth mats, while Dicranum fuscescens and Paraleucobryum longifolium formed tall turfs. Experiments demonstrated that the density (g/cm³), and thus the overall biomass (kg/ha), of these two dominant moss communities decreased with elevation and that they differ also in their water traits. The tall turfs stored more water per unit area of covered understory, while the tight smooth mats had a slower water release rate that allows to H. imponens and P. nutans retain water as long as six hours after being completely saturated. This slow release rate may influence the hydration status and physiological processes that effect survival and growth of forest tree seedlings and affect broader forest ecosystem.

Name: Brainard, Andrew  
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Primary Department: EFB  
Type of Abstract: Research Abstract  
Research Category: Field Science: Biology & Ecology  
Level of Research: Graduate - Ph.D.  
Title: The influence of recreational boat traffic on non-native macrophyte biomass and native diversity  
Abstract: Propagule pressure is theorized to increase the likelihood of successful invasions. In freshwater ecosystems, a leading vector for overland transport of non-native species is from recreational boats. We sought to quantify propagule pressure and test how it influences lake macrophyte community composition, specifically non-native biomass and native diversity.
We quantified propagule pressure in five kettle lakes located in central New York (CNY) and eleven lakes in the Adirondacks (ADK) through questionnaires to determine the number of waterbodies boaters had previously visited. Macrophyte community data was collected by sampling quadrats via scuba (CNY – n = 900; ADK – n = 777). In lakes with increased boat traffic, non-native macrophyte biomass increased (CNY – p = 0.05, R² = 0.91; ADK – p < 0.001, R² = 0.86). In the kettle lake district, native species richness was reduced in public lakes with greater boat traffic and increased non-native biomass (p = 0.01) compared to private lakes; native and total diversity were not statistically different in public and private lakes.

This study highlights the importance of propagule pressure in aquatic invasion ecology, and offers empirical data to test previously developed theoretical models on propagule pressure and invasion success.

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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Graduate - Ph.D.
Title: Toxicity screening of inorganic nanoparticles to Tomato
Abstract: The toxicity of nanoparticles (NPs) has been widely investigated in recent years. However, most data are based on the interaction between a certain type of nanoparticle and a certain plant. To provide a complete toxicological profile of the NPs, the phytotoxicity of four nanoparticles (Ag, CeO2, CuO and Al2O3) and their corresponding bulk particles (BPs) and salt particles were directly compared in this study. The result indicates that there is no significant difference on plant growth between AgNPs, CeO2NPs, Al2O3NPs (20-55nm) and their bulk particle (80-100mesh), while CuNPs highly inhibit tomato’s transpiration, and the inhibition is concentration dependence. Additionally, after ten day’s exposure, the concentration of Ag, Ce, Cu and Al in plant leaves, stem and root were detected by ICP (Inductivity coupled plasma) separately. The results showed that most NPs were coated on tomato’s root, and small amount of NPs accumulated in tomato’s leaves and stem. The NPs accumulated is significantly higher than BPs. This research indicated that the toxicity of nanoparticles is size dependence and type dependence.

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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Graduate - Ph.D.
Title: Fishy infections: investigating mycobacteriosis in laboratory zebrafish

Abstract: The zebrafish (Danio rerio) has become a prominently used vertebrate model organism. Studies using the zebrafish model include, but are not limited to, investigations of development, genetics, infectious diseases, cancer, and aging. Due to the increased usage of zebrafish in research and the value placed on maintaining healthy mutant and wild-type stocks, laboratory zebrafish health is of utmost concern. Mycobacteriosis is a common chronic bacterial infection of laboratory zebrafish caused by Mycobacterium species that is well recognized in marine and freshwater fishes. The pathology and control of zebrafish mycobacteriosis are not yet fully understood. Considering the common occurrence of mycobacteriosis in zebrafish facilities and need for increased knowledge, the aims of this project are investigative and experimental. Discovery based aims are to investigate outbreaks at different zebrafish facilities to improve understanding of the epidemiology and onset of the disease. Also, experimental aims are to test the effect of infection on fecundity as well as the susceptibility of Mycobacterium species to antibiotic treatment. Results will assist in the identification, implementation of management procedures and development of remediation techniques that all zebrafish research facilities as well as other fish facilities can use to improve fish health.

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Primary Department: EFB

Type of Abstract: Research Abstract

Research Category: Social Science

Level of Research: Graduate - Ph.D.

Title: Quantifying the Effects of Horticultural Therapy on Spinal Cord Injury Patients

Abstract: Horticultural therapy is the use of therapeutic gardens to promote the mental health and physical recovery of many different types of patients. At the Syracuse Veterans’ Affairs Medical Center, we have installed gardens on the outdoor rooftop and in two indoor sitting areas. In addition, we have worked with the patients in the planting, care, and harvesting of these plants for various purposes. By working with the patients in this fashion, we have engaged them in a form of physical therapy to supplement their current therapy, as well as encouraging them to participate in social activities with their fellow patients. For the hospital patients, we hope to be able to monitor certain vitals while they are working with us, as well as quantify the time spent working with the plants as an extension to their existing therapy. We also hope to install grow racks in volunteer patients’ homes, where they would be responsible for all of the plant care, to determine if this therapy program could extend to the home and reinforce the patients’ prescribed health routine.

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**Primary Department:** EFB

**Type of Abstract:** Research Abstract

**Research Category:** Field Science: Biology & Ecology

**Level of Research:** Graduate - Ph.D.

**Title:** Impact of changing landscapes on gastrointestinal parasite communities in people and mantled howler monkeys (Alouatta palliata aequatorialis)

**Abstract:** Changing ecological landscapes are often associated with changes in wildlife and parasite populations. We investigated the interaction between forest degradation and human encroachment on both mantled howler monkey (Alouatta palliata) and human parasite populations in Ecuador. This study aimed to: 1) chronicle primate parasitism, 2) investigate associations between environmental degradation and parasitism, and 3) assess human risk factors associated with parasitism. Human and monkey endoparasite communities were characterized using fecal extractions and PCR based analysis. Humans from surrounding communities were administered demographic surveys to evaluate risk factors associated with parasitism. Of ninety-six howler monkey fecal samples collected, 2 species of apicomplexan, 6 other protozoa, 4 nematodes, and 1 platyhelminth were detected. Four parasite congeners were also found in people: Entamoeba sp., Balantidium sp., Blastocystis sp., and Strongyloides spp. Proximity of agricultural plots and a local biological research station were both significantly associated with the presence of Strongyloides sp. - monkeys were more than four times likely to harbor Strongyloides sp. if they lived in disturbed forest. Monkeys infected with Controrchis sp. were found further from human settlements than uninfected individuals and ten times more likely to be found in primary forest. No evidence of shared Blastocystis subtypes was found between howlers and people. Several significant human factors were associated with parasite communities, including age of participant, family size, water treatment, proximity of monkeys to people, and recent medical treatment. Our results support the hypothesis that anthropogenic disturbances can place both primate populations and humans at risk of select gastrointestinal parasites.

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**Primary Department:** EFB
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Graduate - Ph.D.
Title: Trichloroethylene Plume Detection Using Hyperspectral Imaging
Abstract: Phytoremediation is both an effective and efficient method of removing a variety of contaminants from the environment. However, post-installation monitoring can be costly, time consuming, and potentially have adverse effects on the plant system. Many contaminants, particularly chlorinated organic solvents such as Trichloroethylene (TCE), can be detected in leaf tissue using hyperspectral imaging. Ideally, it could also provide valuable information to scientists considering establishment of new bioremediation sites or to have the ability to determine areas of highest contaminant aggregation. This non-invasive method could be miniaturized into a portable unit to be used in situ for real-time analysis of contaminant location and migration. This novel, interdisciplinary study contains three phases. Phase 1 was to repeat previously reported studies in which metabolites of TCE were detected in leaf tissue in Poplar (Populus trichocarpa DN-34 and OP-367). In Phase 2, we are determining leaf level physiological changes that occur due to TCE exposure using SDS-PAGE. Lastly, in Phase 3, we will begin the development of a portable hyperspectral imager which will be designed specifically for TCE metabolite detection in plants.

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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Graduate - Ph.D.
Title: Harnessing the Interaction of Plants and Bacteria in Wetland Systems to Remediate Trichloroethylene Contaminated Groundwater
Abstract: The Environmental Protection Agency (EPA) has classified trichloroethylene (TCE), a common groundwater contaminant, as a carcinogen. Exposure has detrimental effects on mammalian liver, kidneys, central nervous system and reproductive system. Phytoremediation is the preferred method for remediation in lieu of traditional removal methods that are invasive and expensive. The utility of wetland plants for phytoremediation of TCE has not been extensively researched as is the case for poplar trees and larger plants. To fill that void, this research focuses on wetland plants such as Carex crinita, Iris versicolor, and Scripus atrovirens. Post exposure, the plant tissue will be analyzed by gas chromatography for TCE and its metabolites. Serial dilutions and Denaturing Gradient Gel Electrophoresis (DGGE) will be employed to detect shifts in the soil microbial community population. This research will shed light on the mechanisms underlying the degradation of TCE in wetland systems.

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Responses of tree populations to recent climatic trends in northeastern mountain forests: Thinking beyond range margins

Abstract: Montane spruce-fir forests in the northeastern United States are expected to be vulnerable to rapid climate changes. Recent studies suggest that climatic changes are already affecting two foundational tree species of this forest, red spruce (Picea rubens) and balsam fir (Abies balsamea). We studied changes in range limits, abundance, and growth rates of spruce and fir along climatic (elevational) gradients on 12 mountains in the Northeast. We hypothesized that recent climatic warming has resulted in upslope shifts of lower range margins and increased tree abundance and growth at historically climatically stressed high elevations. We found that elevational range margins of red spruce and balsam fir appear stable in the region while abundance changes within a species range seem primarily driven by well documented red spruce decline. Tree cores and forest plot resurveys on Whiteface Mountain, NY revealed that spruce growth rates were historically greater at low than high elevations. Since the 1970s however, we found that growth rates no longer differed across the elevation gradient. More recently spruce has synchronously increased growth rates across the mountain suggesting the influence of a large scale factor (likely climate). Balsam fir growth at high elevations has remained stable since the 1960s while low elevation fir has shown steadily increasing growth rates since the 1990s suggesting different limiting factors. These marked changes in tree growth provide new insight into individual tree species responses to climatic changes that may not yet be easily observable when studying population level shifts across elevational climatic gradients.
Exploring How to Walk the Talk: Examining the Practical Application Models of Science Communication in Long-Term Ecological Research Sites

Abstract: This proposed study seeks to investigate the relationship between science communication at a theoretical level and the practice of science communication in long-term ecological research sites (LTERs). In particular, this study proposes to examine if and how science communication practitioners at LTERs follow theoretically established models of science communication, such as the deficit model, the dialogue model, and the participation model. Specifically, the proposed research will investigate the practical application of models of science communication within LTERs funded by the National Science Foundation. Do the practitioners fall neatly into categorical models, or do their practices blur the boundaries of established models? Do practitioners use more than one model through the course of their work? Are there other models that have not yet been identified? Semi-structured interviews will be conducted with science communication practitioners at LTERs to understand how their practices relate to established models of science communication, how they view their roles and responsibilities, and how they view their audience or audiences. I will select individuals from each participating organization to interview based on their responsibilities within the organization. In this study, a science communication practitioner is anyone affiliated with an organization with responsibility to communicate, report, or interpret the findings of his/her organization with any other group, excluding K-12 educational programs. Understanding how practitioners perceive their roles as science communicators and their attitudes towards public participation is important for developing a more complete understanding of the relationships between stakeholders in the science communication process and could help inform and improve the practices of LTERs.
understanding of landowner perceptions and stakeholder analysis. Most research to date has focused on evaluating motivations of landowners in areas of a single level of development pressure. The objective of this study is to further analyze landowner behaviors by examining and comparing their motivations in areas of lower and higher development pressures. This research will address the following questions: 1) what are the motivations of landowners for placing a conservation easement on their property? 2) do these motivations vary depending on the level of development pressures? 3) what is the primary motivation of landowners for adopting conservation easements in areas of higher and lower development? and 4) do landowner property characteristics, general land uses, conservation easement knowledge, and landowner demographics affect landowner motivations? The research uses a mixed methods approach combining a survey questionnaire with a subset of follow-up interviews. The study population will consist of landowners who hold conservation easements in the Thousand Islands and the Mid-Hudson Valley region of NYS.

Along with further understanding characteristics and motivations of landowners who chose to become involved in PLC, the broader impacts of this study will provide benefits to conservation organizations that may include: public awareness and community engagement, greater overall acceptance toward PLC, justifying investments in PLC, and improving how land conservation benefits are described and understood.

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Primary Department: Environmental Science
Type of Abstract: Research Abstract
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry
Level of Research: Graduate - M.S.
Title: Cancer and non-cancer risk assessment from exposure to inorganic arsenic in tube wells water in Hounde town, Burkina Faso
Abstract: Groundwater is the main drinking water source in Burkina Faso: many villages use tube wells water. Since two decades, the problem of arsenic-contaminated water has been brought to light through some water quality control campaigns throughout the country. Not only was the purpose of my work to determine the rate of inorganic arsenic contaminated tube wells water in the city of Hounde, but also to assess the health risk to which inhabitants are exposed, and eventually to make proposals to manage this risk. This work was conducted during November 2010. Water samples were collected from 34 tube-wells located in the five sector of the town. Arsenic content in groundwater was determined by atomic absorption spectrophotometry using hydride generation method. Human health risk was evaluated using the standard risk evaluation models and reference values (Reference dose and slope cancer factor). Finally, Arsenic concentrations from the tube-well water ranged from 1 to 83.6 μg/l. Arsenic concentrations of 41% of the water samples exceeded the WHO guideline value (10 μg/l). The results from the health risk assessment have shown that the current level of inorganic arsenic in tube wells water exceeds the current cancer risk criterion (10-6) and that the hazard indexes are greater than 1.0 for the majority of the general population. This study indicates that people within Hounde town are at non-acceptable risk for developing several pathologies such as hyper pigmentation, keratosis, cancer, etc. due by chronic exposure to arsenic in drinking water.
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Primary Department: Environmental Science
Type of Abstract: Research Abstract
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry
Level of Research: Graduate - M.S.
Title: Estimation of Hotspots of Air Pollutants and Dry Deposition by Trees in Urban Areas
Abstract: Recent studies have evaluated predictions of local urban air quality. These studies had a limited number of air monitors, and simplifying assumptions and complex processes created difficulties in capturing city scale pollutant distributions. This research focuses on using a local dispersion model to estimate the spatial distribution of NO2 and PM2.5 in New York City, and pollutant removed via dry deposition by urban forests. We will use data from 100 locations from the New York City Community Air Survey. With two year of monitoring data, the average concentrations from air monitoring will be calculated and temporal and spatial trends of air pollutants will be observed. The US National Emission Inventories will be used along with meteorological data as inputs to the US EPA’s AERMOD air quality model. Estimated concentrations will be adjusted to observed concentrations to develop predicted pollutant surfaces. Those estimates will then be used as inputs to the USDA i-Tree-Eco model along with temperature and leaf area index profiles to estimate dry deposition to urban forests. These predictions will be compared to estimated pollutants from the spatially distributed air pollutant deposition model that is part of the i-Tree modeling suite, and a coupling of processes from these modeling platforms will be explored. It is expected that the combined prediction approaches will lead to better air quality predictions, improved estimation of dry deposition, and better delineation of pollution nonattainment areas. The study will be able to inform the best place for urban forests to improve local air quality.

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Primary Department: Environmental Science
Type of Abstract: Research Abstract
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry
Level of Research: Graduate - M.S.
Title: Soil-atmosphere CO2, CH4, and N2O fluxes across time and space in a forested watershed.

Abstract: Soil-atmosphere greenhouse gas (GHG) fluxes vary greatly in time and space across northern forests, making it difficult to accurately evaluate the contribution of forest soils to total forest GHG budgets. To address this issue, we investigated the influence of landscape hydrogeomorphic characteristics on CO2, CH4, and N2O flux dynamics across time to better constrain estimates of soil GHG fluxes at the watershed scale. Monthly GHG flux measurements taken between June 2011 and July 2013 were complemented by high temporal resolution GHG sampling over a 24 hour period on four separate days to account for the effect of photosynthesis and diel temperature cycles on GHG fluxes. Gas fluxes were related to various indicators of overall watershed conditions, namely stream discharge, stream chemistry, meteorological conditions, antecedent moisture conditions, and topographic position. Topographic position was an important explaining variable for gas fluxes, and temperature was positively correlated to CO2 flux at each study site. Average study period CO2 fluxes ranged between 0.61-2.89 g C m^-2 day^-1, and the higher fluxes occurred at sites with well-drained soils. Average study period CH4 fluxes ranged between -2.53 to 330.34 mg C m^-2 day^-1. Negative CH4 fluxes (indicating a sink) were found at the hillslope and lowland sites, whilst the wetland was a hot spot for CH4 emissions. Average study period N2O fluxes ranged between -0.72 to 0.70 mg N m^-2 day^-1. Relating landscape structure to GHG flux across variable environmental conditions offers a potential method for up-scaling GHG flux measurements from the plot to watershed scale.

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Primary Department: Environmental Science
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Graduate - M.S.
Title: The uptake and depuration of pharmaceuticals ibuprofen and naproxen in Yellow perch (Perca flavescens) after aqueous exposure
Abstract: and naproxen belong to the widespread family of NSAID drugs and are two of the most commonly used pharmaceuticals worldwide. Following their use, these pharmaceuticals and their metabolites may enter the environment, primarily through wastewater discharge. They are may contribute to harmful effects to non-target aquatic organisms such as fish, that are exposed to these contaminated environments throughout their entire life cycles. In this thesis, the uptake, depuration and bioconcentration of ibuprofen and naproxen were studied along with the production of their metabolites. The uptake these pharmaceuticals exhibited complex kinetics. The uptake was slow, followed by slow depuration. Though slow, naproxen exhibited faster uptake and depuration than ibuprofen leading to faster half-lives and shorter bioconcentration. The ibuprofen metabolite, 2-hydroxy ibuprofen was detected in fish tissues throughout the duration of the experiment, whereas carboxy ibuprofen was only detected in the depuration phase. Naproxen metabolites were not detected in fish tissues.
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Primary Department: Environmental Science

Type of Abstract: Research Abstract

Research Category: Field Science: Biology & Ecology

Level of Research: Graduate - M.S.

Title: Riparian forest dynamics along the Sacramento River, CA: Pre- versus Post-dam Patterns in Tree Species Succession

Abstract: The riparian ecosystem along the Sacramento River corridor in California’s Central Valley has been greatly impacted by human activities, particularly land conversion and flow alteration. Though the construction of Shasta dam in 1945 has dampened peak flows, the middle reach between Red Bluff and Colusa remains geomorphologically active. This reach hosts floodplain forests dominated by Fremont cottonwoods (Populus fremontii), pioneer species which establish on bare soil surfaces following flood disturbance and channel migration. Sediment deposition, floodplain accretion and increasing canopy cover over time facilitate the establishment of later-successional species, boxelder (Acer negundo), walnut (Juglans hindsii) and Valley oak (Quercus lobata). We investigate riparian community dynamics by using dendroecological methods to document the colonization timing of each species (i.e., how soon each species establishes after floodplain creation). We calculated colonization timing using tree cores collected from stands located on floodplain surfaces of a known age range. We compared colonization patterns on surfaces created before and after Shasta Dam to evaluate how changes to the natural flow regime may have impacted the forest’s successional trajectory. F. latifolia, J. hindsii, and Q. lobata colonizations lagged floodplain creation by ≥50 years in the pre-dam period, but were more similar to those of pioneers, P. fremontii and S. goodingii, on post-dam floodplains. Notably, A. negundo and J. hindsii colonized 20 years sooner on post-dam floodplains. Increased competition with later-successional species threatens to further reduce pioneer stand areas in the future, and may be remedied with flow augmentation to amplify channel migration and floodplain creation.

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Type of Abstract: Research Abstract
**Research Category:** Field Science: Hydrology, Chemistry and Biogeochemistry  
**Level of Research:** Graduate - M.S.  
**Title:** The removal of pharmaceuticals ibuprofen and naproxen from natural wastewater by subsurface vertical flow constructed wetlands  
**Abstract:** Constructed wetlands are a natural wastewater treatment technology. They can efficiently remove pharmaceuticals, an emerging xenobiotic contaminant, from the aquatic environment. An experimental non-vegetated subsurface vertical flow constructed wetland was created to examine the removal efficiency of commonly used pharmaceuticals ibuprofen and naproxen in natural wastewater by sorption and microbial degradation. Relatively short hydraulic retention times (HRT) of $\frac{1}{2}$-d, 1-d, and 2-d were studied to determine the optimal HRT for practical implementation and maximum pharmaceutical removal. A lack of correlation was found between pharmaceutical removal and HRT, which is in contrast to previous studies of a similar nature. This may be due to the fluctuating influent pharmaceutical concentrations. However, a correlation between classes of varying influent pharmaceutical concentrations with their subsequent removal was discovered. Three negative removal events were observed, which was attributed to desorption events due to a change in temperature and pH and/or the low influent pharmaceutical concentrations. Using the wastewater treatment plant located in Minoa, NY as a model site, both sequencing batch reactors (SBR), a conventional wastewater treatment process, and constructed wetlands were effective in removing pharmaceuticals in-situ. Pharmaceutical removal in the SBR was slightly greater than in the constructed wetlands, which may be due to the large amount of sludge sent to the landfill from the SBR. In summary, ibuprofen and naproxen were readily removed from wastewater by the SBR and constructed wetland. In addition, pharmaceutical removal from wastewater is not dependent upon HRT, but on influent concentrations, removal mechanisms, and additional environmental parameters.

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**Primary Department:** Environmental Science  
**Type of Abstract:** Research Abstract  
**Research Category:** Social Science  
**Level of Research:** Graduate - M.S.  
**Title:** Understanding pesticide use on Santa Cruz Island, Ecuador: A case study and trade-off analysis of island farmers and relevant stakeholders  
**Abstract:** Pesticide application in the Galapagos Islands has the potential to lead to environmental degradation and loss of ecological uniqueness. The current state of pesticide use on Santa Cruz Island exists not only as a result of poor control over use and sale of pesticides, but also due to farmer application. The high agricultural demands of a growing community and tourist destination, along with growing rates of invasive species, puts pressure on farmers to adopt pesticides as a necessary tool. This study looks at survey data and narratives of Santa Cruz farmers and other relevant stakeholders. It identifies several influential factors, including environmental attitudes, presence of invasive species, pressures of the local market, farmer demographics, and local policies. These influences are looked at using an integrative framework,
which allows us to view the problem from multiple perspectives and lays the foundation for identifying potential complex economic, social, and environmental trade-offs. It also allows a comprehensive view of the various stakeholders, their values, the current and potential processes and governance strategies, and the inherent power and inequality struggles. The findings include suggestions for a more sustainable agriculture in Galapagos, requiring a revision of policy, farmer education, and an island-based incentive program.

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Primary Department: Environmental Science
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Graduate - M.S.
Title: Simulating the influence of engineered macropores in river intra-meander zones on enhanced mixing of river water and groundwater
Abstract: Despite the U.S. Clean Water Act’s (CWA) massive commitment of $540 billion in funding, more than 42% of U.S. rivers are still in poor biological condition, principally due to nutrient pollution. One potential solution to improve water quality in meandering rivers is through intra-meander zone (IMZ) filtering, by transporting river water into the groundwater zone and promoting physical, chemical, and biological treatment of nutrient pollutants. A small background amount of such filtering occurs naturally, and is called hyporheic exchange flux (HEF). But these transport processes are relatively slow due to low permeability in the IMZ. The goal of this research is to engineer higher permeability zones, called macropore, into the upstream face of IMZ, to enhance the rate and spatial extension of HEF. Our investigation uses a MODFLOW groundwater model to quantify how engineered macropores affect transport parameters critical to IMZ filtering. The scientific questions we pursue include (1) how do volumes and spatial extents of HEF differ between IMZ with and without macropores, and (2) how do volumes and spatial extents of macropore flow change with different shapes of macropore construction? Our MODFLOW model domain simulates a well-documented river from the Bonoa’s work (2008), with a tight meander bend promoting HEF across the meander neck. We expect our research to advance low-cost, readily scalable, techniques to clean river water through macropore enhanced intra-meander zone filtration.

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Type of Abstract: Research Abstract
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry
Level of Research: Graduate - M.S.
Title: Predicting Occurrences of Ice Jam Flooding on the Mohawk River at the End of the 21st Century
Abstract: A sizable number of past flood events on the Mohawk River have been attributed to ice jams. However, the Mohawk region is expected to see a 3° to 4° C increase in temperature by 2070. Given that the historical average daily January temperature in the region is -5.5°C, the mean January temperature would rise to be near 0°C. One would assume this would lead to an overall decrease in river ice and would lessen the chance of future flooding from ice jams. The work presented here takes a long-term perspective to consider whether present day threats from ice jamming will remain several decades from now.

Based on an analysis of historic ice jam flooding occurrences on the Mohawk River as well as rivers in Ithaca, NY and Dover-Foxcroft, Maine, we formulated a rule-based model to predict ice jam flooding. The rule-based model considers factors such as ice thickness, temperature and precipitation. It identifies years that had enough ice to cause an ice jam and enough discharge to build up behind the ice and cause a flood. Our model correctly predicted about 80% of recorded ice jams across the three sites and gave false positives less than 30% of the time. We also applied our ice-jam model to climate model simulations in order to estimate future frequency of ice jam occurrence on the Mohawk River. This information is important for shaping perspectives on future flood risk on the Mohawk River.

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Primary Department: Environmental Science
Type of Abstract: Research Abstract
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry
Level of Research: Graduate - Ph.D.
Title: Hydrological ecosystem services: landscape influences on water quality in the Guadalupe lake watershed, Mexico City
Abstract: Landscape characteristics of thirty seven sub-catchments within the Guadalupe Lake Watershed (GLW) at the northwest of Mexico City, were examined to identify relationships among regulating and provisioning ecosystem services (ESs). We used water quality as the regulating ESs and percentages of agriculture and pasture lands as surrogates of food provision in the area. Other variables included were forest cover (%), rural-urban areas (%), elevation (m) and slope (deg.). Topographic and land use data were quantified at the entire catchment and upland-river buffer zone. Relationships among water chemistry and catchment and buffer data were compared using partial redundancy analysis and multiple linear regressions. Major sub-catchments dominated by forest exhibited the lowest stream physicochemical (nitrates, nitrites, conductivity, suspended and dissolved solids) and bacteriological (total and fecal coliforms) concentrations. Sub-catchments dominated by rural-urban areas exhibited the highest levels in most of all water quality parameters. Agriculture was not a dominant predictor for water quality, except for the first 100 meters of buffer, showing negative relationships with dissolved solids. Pasture lands were a good predictor for conductivity and suspended solids, exhibiting negative relationships among water quality and grazing activities in the area. Based on partial redundancy analysis, landscape factors accounted for more variation (51%) at 100 m buffer, being elevation and rural-urban areas the best predictors of stream water chemistry.
Our results will have broader relevance and applicability to watershed management in Mexico as well as to our understanding of the effects of human activities and natural landscapes in the provision of ESs.
Environmental Resources Engineering

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Primary Department: ERE
Type of Abstract: Class Project
Research Category: Engineering/Landscape Design
Level of Research: Graduate - M.S.
Title: Fine Tuning SUNY-ESF Carbon Footprint
Abstract: Climate change and its associated mitigation strategies have been discussed at various international, national, regional, and local forums. In efforts to support climate change mitigation initiatives, SUNY-ESF conducted campus greenhouse gas (GHG) emissions inventories for the years 2006 to 2013 using the Clean Air Cool Planet software. The main reference used under Clean Air Cool Planet is the American College and University Presidents Climate Commitment Implementation Guide, which follows the principal guidelines of the Greenhouse Gas Protocol Standards. For this project, we updated the SUNY-ESF GHG emissions inventory using Global Warming Potentials (GWPs) and emissions factors found in the Intergovernmental Panel for Climate Change’s (IPCC) 5th Assessment Report. Greenhouse gas emissions from electricity, heat, steam and transportation sectors were estimated for 2006 to 2013 inclusive, for comparison with existing SUNY-ESF GHG inventories.

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Primary Department: ERE
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Graduate - M.S.
Title: Macroinvertebrate response to stream flooding and restoration in the Mohawk River Basin New York.
Abstract: Floods constitute a major disturbance to streams, causing changes in ecosystem, community or population structure through the modification of their habitats and flow regime. Macroinvertebrates are critical to aquatic trophic systems but they are particularly susceptible to changes of flow, and their abundance and diversity has been shown to generally decline in response to increases or decreases in flow.
The objective of this study is to assess the response and recovery of the macroinvertebrate community to the historic flooding in 13 streams in the Mohawk River Basin caused by Hurricane Irene in August 2011 and posterior flood mitigation efforts. Macroinvertebrate data were collected in July and October 2011 and two new sets of data will be collected in July and October 2014. Macroinvertebrate Biological Assessment Profile (BAP) for Riffle Habitats will be calculated using: SPP (species richness), HBI (Hilsenhoff Biotic Index), EPT (Ephemeroptera, Plecoptera and Trichoptera richness), PMA (Percent Model Affinity), and NBI-P (Nutrient Biotic Index – Phosphorus). Values from the five indices are converted to a common 0-10 scale, with 10 corresponding to the higher water quality.

Initial macroinvertebrates results show that the 13 river sites had variable macroinvertebrate community structure before the 2011 flooding, which could indicate that communities at these sites could be affected by different biophysical factors or be in various states of recovery from prior flooding events. This study aims to increase the understanding of the susceptibility of macroinvertebrate communities to severe flooding, and how recovery trajectories are affected by stream restoration and local biophysical controls.

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**Type of Abstract:** Research Abstract  
**Research Category:** Engineering/Landscape Design  
**Level of Research:** Graduate - M.S.  
**Title:** Changes in aquatic habitat with changes in river geometry and roughness  
**Abstract:** In the Delaware River Basin (DRB), the federally endangered dwarf wedgemussel (Alasmidonta heterodon) is acutely sensitive to reservoir-induced hydrologic alteration of its habitat, such as low flow depth and high water temperatures, particularly during the summer. The National Park Service is working with partners to better understand habitat requirements and the influence of hydrologic alteration on dwarf wedgemussel habitat. Questions remain on how dwarf wedgemussel habitat parameters of flow depth and wetted perimeter can be improved through in-channel river restoration, independent of hydrologic alteration. Specifically, “how does in-channel river restoration of width to depth ratio, channel slope, and bedform roughness affect flow depth in the DRB?” Methods include using the hydrologically altered DRB summer low flow hydrograph at Callicoon, NY as an initial discharge, allowing the HEC-RAS model to simulate changes in the hydrograph due to river restoration, and analyzing the modified output discharge for changes in flow depth and wetted perimeter. Expected results include: a) increases in river roughness due to restoration will increase water depth and increase wetted perimeter; b) reductions in width to depth ratio will increase water depth and decrease wetted perimeter; and c) reductions in channel slope will increase water depth and decrease water velocity, which may lead to higher river water temperatures. Developing a better understanding of hydrologic alteration of the DRB, historic flow regimes, and ecological flow needs of biota, including potential increases to flow depth related to changes in river geomorphology, is key to sustaining processes and components of this system.

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Primary Department: ERE

Type of Abstract: Research Abstract

Research Category: Engineering/Landscape Design

Level of Research: Graduate - M.S.

Title: SHIFTS IN STREAMFLOW REGIMES DUE TO HYDROLOGIC ALTERATION

Abstract: Methods are needed to understand and predict streamflows in systems undergoing anthropogenic and climatic alteration. This study is motivated by a need to develop methods to accurately estimate historical and future flow regimes of the Delaware River to inform management decisions for the endangered dwarf wedgemussel (Alasmidonta heterodon). Many streamflow regimes in this system have undergone substantial alteration within the past 100 years. Here flow duration curves (FDCs), a common hydrologic tool used to assess flow regimes, are created and examined at 145 Delaware catchments which have undergone a variety of different hydrologic alterations. Linear regression models are developed for various percentile flows of the FDCs. These models use watershed characteristics that describe observed flow regimes in altered as well as unaltered systems. Based on the results obtained, the characteristics that have the most significant influence on the shape of the FDCs can be isolated as being descriptors of the alteration. Once these models are developed to include these key variables, given a specific alteration (e.g. the construction of a dam), a new flow regime can be estimated. The results of this study may prove to have broader applications in regards to water resources management as human interference continues to alter flow regimes.

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Primary Department: ERE

Type of Abstract: Research Abstract

Research Category: Engineering/Landscape Design

Level of Research: Graduate - M.S.

Title: Forest-based Rolled Erosion Control Products for the Sustainable Management of Forests

Abstract: Soil erosion is a significant issue in the sustainable management of forests. Rolled erosion control products (RECPs) are a highly effective method to reduce erosion and re-establish vegetation. Due to the large amounts of low-value residuals (LVRs) available in forests, forest-based LVRs should be considered for integration into erosion management practices. This systematic study considers the innovative use of forest-based LVRs in RECPs for the control of soil erosion, control of suspended solids in receiving waters, and enhancement of vegetative growth. New RECPs were manufactured out of two different types of LVRs (leaf litter and spruce needles), and their performance was compared to a commercially available RECP (straw). The comparison of RECP performance was based on measurements of soil loss and turbidity obtained using laboratory rainsplash erosion tests (ASTM D7101). The ability of the RECPs to enhance the growth of vegetation was evaluated using laboratory seed germination methods (ASTM D7322). The leaf litter and spruce needle LVR RECPs were found to be highly effective
at reducing soil loss and turbidity in comparison to bare soil, and were also more effective than the straw RECP tested. The leaf litter and spruce needle products did enhance the growth of vegetation in comparison to bare soil, but the commercial straw RECP was more effective at vegetation enhancement. Overall, the use of LVRs as a material source for RECPs shows great promise.

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Primary Department: ERE
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Graduate - M.S.
Title: Modeling mixing effectiveness of bioreactors for anaerobic digestion
Abstract: The use of anaerobic digestion has been widely increasing for wastewater treatment due to its ability to also recover energy. Unfortunately, scaled-up digesters do not always run at their optimum due to the variability of the inlet feed as well as the high cost of experimentation on large-scale reactors. This research aims to simulate the mixing patterns observed in an anaerobic digester containing fluids exhibiting non-newtonian behavior, using computational fluid dynamics (CFD) with OpenFOAM software. Specifically, the CFD simulations will examine how rheological properties of municipal wastewater sludge containing high solids (>20% Total Solids) content affect the flow conditions and dispersion patterns in a homogenizer-like stirred anaerobic digester. The effect of particle size on hydraulic retention and flow patterns for various solids concentrations are examined by performing residence time distribution (RTD) experiments in the CFD. The CFD simulation results are tested for accuracy by comparison with results from RTD experiments. An effective CFD model allows for detailed prediction of required optimal conditions and for scaling up to larger reactors to operate at their maximum potential.

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Primary Department: ERE
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Graduate - M.S.
Title: Modeling the Effects of Land Use and Climate Change on Streamflow in the Delaware River Basin
Abstract: Forest-cover loss and drinking-water reservoirs in the Delaware River Basin of New York are suspected of altering summer low flows, which could degrade in-stream habitat for the endangered dwarf wedgemussel. Our project analyzes how low-flow statistics change with land-cover change for 30 years of model-simulated streamflow hydrographs for three watersheds of concern to the National Park Service, including the East Branch, West Branch, and main stem of the Delaware River. We use three treatments for land cover, ranging from historical high to low forest cover. We subject each land cover to three climate scenarios – pre-colonial (1501-1530), historic (1981-2010), and projected (2041-2070) – provided from GCMs, to isolate land cover from potential climate-change effects. The hydrographs are simulated using a TOPMODEL-based United States Geological Survey hydrologic decision-support tool, which uses the variable-source-area concept and water budgets to generate streamflow. Model parameters for each watershed change with land-use treatment and parameters capture changes in soil-physical properties that control how rainfall moves to the stream, affecting infiltration, soil-water storage, and evapotranspiration. Our preliminary results demonstrate that low-flow statistics for the 3-day low flow, the hydrograph recession coefficient, and the number of events below the critical flow needed to provide sustainable habitat for dwarf wedgemussel change with land cover. Upcoming simulations will examine how changes in climate affect low-flow statistics. The study hopes to inform policy makers on how land cover changes can be used to restore in-stream habitat for the endangered dwarf wedgemussel for current and future climate conditions.

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Primary Department: ERE
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Graduate - M.S.
Title: Applications of Partial Least Squares Regression to the Regional Regression of Flow Duration Curves
Abstract: Flow duration curves (FDC) represent the streamflow quantiles of a site as a function of exceedence probabilities. These quantiles can be estimated at ungauged river sites by employing regional regression models. This project examines the application of partial least squares (PLS) regression to estimate FDC quantiles, and compares these results with those from a similar USGS experiment using seemingly unrelated regression (SUR). For this analysis, FDC’s and watershed characteristics at 182 gauging stations in the southeast United States that are part of the USGS WaterSMART program are employed. In particular we are interested in how PLS performs as we vary both the number of explanatory variables (EVs) and PLS components. We also considered the use of “flow regimes” that split the FDC into sections of low, medium, and high probability quantiles, as used in the SUR experiment. PLS appears to perform as well as or better than SUR in this initial experiment. Using PLS works best when using a limited number of EVs that can generally explain the entire flow duration curve, and then using all of the components from the PLS model.

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**Primary Department:** ERE

**Type of Abstract:** Research Abstract

**Research Category:** Engineering/Landscape Design

**Level of Research:** Graduate - M.S.

**Title:** Understanding the Role of Water Vapor Transport in Extreme Precipitation Events in Nepal

**Abstract:** In a changing climate, countries like Nepal in South Asia face challenges in forecasting extreme precipitation events due to the region’s complex topography and lack of forecasting infrastructure. Specifically, climate change is predicted to increase the frequency of atmospheric rivers (ARs), which are concentrated bands of high moisture known to cause extreme precipitation and flooding events. While ARs have been detected in the United States (US) and Europe using remotely sensed data, AR detection has not been developed or tested in South Asia. In this research we develop and test AR detection algorithms for Nepal by modifying a proven algorithm used in the western US and Europe. After detecting AR events, we test if those events correlate with observed extreme daily precipitation events, to determine if AR detection will assist in extreme precipitation forecasting. Our AR algorithm uses ERA-Interim reanalysis data to compute integrated water vapor transport (kg m⁻¹s⁻¹) and determine the latitude specific threshold values, for four seasons. Extreme precipitation are determined for both monsoon and non-monsoon seasons. Our initial results indicate that ARs coincide with extreme precipitation. We are continuing this analysis to better understand how ARs relate to extreme precipitation events across all seasons. New methods to monitor the role of ARs in precipitation events will help manage water resources, which is critical given the melting of Himalayan glaciers that feed major watersheds of Nepal. In addition to understanding extreme events, our study will also aid in a better understanding of seasonal climate anomalies and the global water cycle.

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**Primary Department:** ERE

**Type of Abstract:** Research Abstract

**Research Category:** Engineering/Landscape Design

**Level of Research:** Graduate - Ph.D.

**Title:** A tool to efficiently extract, visualize, and analyze data from twelve regionally downscaled climate change models covering North America

**Abstract:** Ecosystem service provision is sensitive to temperature, precipitation, and moisture. Output from regional climate models could inform ecosystem service management efforts including conservation, agriculture, and urban forestry. The North American Regional Climate Change Assessment Project (NARCCAP) provides free access to output from twelve regionally downscaled climate change models over North America at a 30 km spatial and 3 hour temporal

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resolution. There is no accessible and simple tool, however, to extract, visualize, and analyze this data.

This work develops a set of tools to: (1) estimate local accuracy of climate models for 1981-2000 by comparing monthly average temperature and precipitation values for observed, modeled, and reanalysis data; (2) calculate monthly average temperature, precipitation, and changes between past (1971-2000) and future (2041-2070) time periods; and (3) produce formatted climate change factors for eight weather variables as input to iTree-Hydro, a biophysical model that quantifies tree cover effects on urban hydrological processes.

The tool is used to visualize and characterize the range of modeled climate change predictions for Syracuse – including seasonal patterns – and to examine which models best predicted past observed data. The tool can be used for urban and rural areas anywhere in North America and can inform ecosystem service management models such as iTree-Hydro to provide estimates of future urban water budgets.

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Primary Department: ERE

Type of Abstract: Research Abstract

Research Category: Laboratory Sciences

Level of Research: Graduate - Ph.D.

Title: Anaerobic digestion of food waste: The effect of protein content on methane yield

Abstract: Anaerobic digestion has emerged as an interesting treatment alternative for food waste, with the potential to decrease in about 30% the landfill requirements in the U.S., while producing methane and recovering renewable energy from it. However, information about how effective anaerobic digestion is when different types of food waste are treated is still needed. This study aims to determine how waste composition affects methane production. Specific objectives for this study were to examine the effect of food waste composition on methane yield, to determine microbial characteristics during the process, and to analyze the effect of composition on ammonia production. Feedstock with different contents of protein-rich food waste (0%, 15%, 30% of VS) was anaerobically digested in three continuously stirred tank reactors. Semi continuous tests at mesophilic temperature were carried out with daily feeding at an organic loading rate of 2 g VS/L-day and a hydraulic retention time of 30 days. Solids concentrations, biogas production rate, methane content and ammonia concentration were analyzed every 2 days. Microbial characteristics were analyzed monthly with scanning electron microscopy. Biogas production rates were of 0.53, 0.612 and 0.56 L biogas/L-day with 0%, 15%, 30% of protein-rich food waste, respectively. In presence of protein-rich food waste, ammonia levels in the mixed liquor were on average 83% (with 30%) and 40% (with 15%) higher than without protein-rich food waste. Significant differences in methane yield and ammonia accumulation among compositions were found. Observed results indicate a positive effect of protein-rich food waste addition (observed at 15%) combined with an inhibitory effect of ammonia accumulation (observed at 30%) The highest methane yield was obtained with 15% protein-rich food waste and ammonia accumulation was proportional to the content of protein-rich food waste.
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Primary Department: ERE
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Graduate - Ph.D.
Title: Phosphorus Recovery from Filtrate of Anaerobically Digested Dairy Manure for Struvite Fertilizer Production
Abstract: Modern industrialized dairy farming has resulted in intensive production of dairy manure, which can lead to nitrogen and phosphorus pollution of water resources. High contents of phosphorus, nitrogen and magnesium in anaerobically digested dairy manure (ADDM) and limitation of P resources provide this motivation to investigate recovery of P as a valuable product. A recent chemical technology for phosphorus recovery is precipitation of phosphorus at high pH (8.5-10) in the form of struvite (MgNH4PO4*6H2O) crystals. High Ionic strength, high alkalinity and high calcium content resist precipitation of struvite in ADDM filtrate. In this research, an airlift crystallizer is used to form struvite. The advantage of using airlift reactors compared to the fluidized bed reactors and agitated reactors are simple structure, low capital cost, low energy consumption and easily-controlled liquid circulation. Bench scale stir tests have been designed to investigate effect of pH adjustment to remove calcium interference as CaCO3 precipitates. Furthermore, proper recirculation (dilution with effluent) ratio will be used to reduce ionic strength effect on struvite formation in ADDM solution. To estimate the effects of proposed methods on struvite precipitation several parameters including orthophosphate, total phosphate, ammonia, Mg, Ca, TSS, TDS, EC and alkalinity will be analyzed. It is expected that adjusting pH to 9-10 can reduce Ca2+:Mg2+ and Ca2+:PO43- molar ratios and enhance struvite formation. Also, dilution of solution will provide more reactive phosphate to form struvite.

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Primary Department: ERE
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Graduate - Ph.D.
Title: Developing nitrate hotspot maps using landscape denitrification potential predictions
Abstract: Urban land use is known to generate excess nitrogen (N) through anthropogenic activity. The loss of vegetative land cover in urban areas interrupts the N nutrient cycle, where removal can occur by denitrification or plant uptake of NO3-N, a plant available form of N. Urban receiving waters are then polluted as stormwater carries elevated concentrations of N, leading to anthropogenic eutrophication. Urban planning tools are needed to identify NO3-N hotspots as watershed areas having elevated NO3-N, high runoff potential, and low likelihood for removal via nutrient cycling in stormwater flowpaths to the receiving waters. Landscape areas with elevated NO3-N are identified using land use based data on pollution sources,
including atmospheric deposition, leaky sewers, pet waste, and fertilization. Areas with relatively high soil moisture are flagged for high runoff potential, which are predicted based on gravitational controls through use of topographic index calculations. We predict areas with low likelihood for removal via buffering or nutrient cycling capacity using inferences about low denitrification potential, which correlates with low soil moisture and organic matter. We develop this method using data from Syracuse, NY, by processing topography, land use, vegetation, and soils data to predict, and test for, NO3-N hotspots across the landscape. The intellectual merit of this research is development of a data parsimonious (e.g., existing data) mapping tool that uses denitrification potential to predict NO3-N hotspots. This research will assist in urban restoration by guiding placement of green infrastructure interventions to restore nutrient cycles and improve water quality.

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Primary Department: ERE
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Graduate - Ph.D.
Title: Modeling Green Infrastructure processes within i-Tree Hydro
Abstract: Urban hydrographs are impacted by impervious cover and grey infrastructure, making them flashier, more polluted, and with reduced baseflow components. Stormwater managers are trying to repair urban hydrographs by restoring the pre-development hydrological cycle, which involves using green infrastructure (GI) to retain and infiltrate stormwater runoff. Our goal was to create GI structures and functions in the i-Tree Hydro model, a scoping level urban forest effects water balance model. The GI structures include green roofs, rain gardens, retention and detention ponds, porous pavement, and rain barrels. The GI processes will be developed using i-Tree Hydro functions in the existing pervious area model code, modified to represent increased interception, infiltration, storage, and evapotranspiration. Model code simulating the runoff storage and delay, common to ponds, are added to the modified pervious area code. The updated model is tested with data from the Syracuse, NY municipal area, by simulating the Save the Rain GI practices. We expect simulations with Save the Rain GI structures and functions will generate: a) increased infiltration, evapotranspiration, and interception due to increases in vegetative cover and pervious area; b) increased baseflow to overland flow ratios within the urban water balance; and c) decreased pollutant loading values for storm events. Validating the model against measurements obtained from a range of GI structures tests the strength of different model routines depending on the GI’s main functions. This model development, and its subsequent testing and validation, provide a framework for future urban hydrology focused extensions of i-Tree Hydro.

Name: UKWUANI, ANAYO
Abstract: In complex solution such as dairy farm wastewater (liquid manure), that has solids, organic and inorganic compounds, recovery of such volatile compound like ammonia nitrogen depends to a great deal on factors that affect its volatilization and the amount of energy used. In aqueous solution, ammonia exists as free ammonia (NH$_3$) and ammonium ion (NH$_4^+$). Formation of free ammonia from ionized ammonia is a factor of increasing pH and temperature of the aqueous solution. It is this free ammonia that is vaporized and recovered. Ammonia is very soluble in water and this solubility decreases with increasing temperature. The vaporization of free ammonia (NH$_3$) depends on its concentration in aqueous solution and decreasing solubility due to increasing temperature. Liquid manure contains high amount of TDS and the extent of this total dissolved solids (TDS) may influence these behaviors (dissociation and vaporization) of ammonia-N. An increase in TDS concentration implicitly implies an increase in salinity and ionic strength of the solution and may affect vaporization of volatile compounds. These three parameters directly or indirectly impact the recovery of ammonia from liquid dairy manure by altering the rate of its volatilization and thereby requiring more energy to provide necessary heating. To test ammonia recovery from dairy farm wastewater (liquid manure), a batch distillation operation was performed using laboratory kjeldahl apparatus. Anaerobically digested dairy manure (ADDM) and undigested dairy manure (UDDM) were used for this purpose. The experiment was conducted at temperatures 80, 90, 100, 105°C, and pH 9, 11. Ammonia vaporized was condensed by tap water and absorbed to 0.5 N sulfuric acid solutions. Samples were collected over time to track decreasing ammonia concentration in the manure filtrate and increasing NH$_3$ in the acid solution.

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Primary Department: ERE
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Graduate - Ph.D.
Title: GreenWall Treatment of High Strength Organic Wastewater: Why won’t my plants grow?
Abstract: The overall goal of this research is to investigate the use of vertical gardens to treat high strength organic wastewater generated by small to medium sized food and beverage producers. The objective of this research is to determine if high strength organic wastewater is toxic to plants or if growth is inhibited because of poor nutrient availability, specifically nitrogen. In earlier experiments, plants survived but most did not grow in high strength organic brewery wastewater, perhaps due to the absence of nitrogen in plant available forms such as ammonia and nitrate. The current experiment is designed to determine if plants with another source of nitrogen would grow in the wastewater. Legumes were subjected to four different treatments: 1) Control: Irrigation with Hoagland’s solution containing all required nutrients but without rhizobium inoculation; 2) Hoagland’s solution with inoculation; 3) brewery wastewater with inoculation; and 4) brewery wastewater without inoculation. Legume nodules were only observed in treatments inoculated with rhizobium. Measured plant growth in treatments with Hoagland’s solution was greater than treatments irrigated with brewery wastewater. Measured growth of plants in brewery wastewater with inoculation was greater than without inoculation. These results demonstrate that brewery wastewater is not directly toxic to plants that are able to obtain nitrogen through biological fixation. Future research will include experiments that investigate microbial mineralization of organic nitrogen in brewery wastewater to determine if sufficient forms of plant available nitrogen can be produced.
Environmental Studies

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Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Graduate - M.S.
Title: Visitor Perception of Personal Automobiles and Public Transportation in National Parks
Abstract: Today, over 275 million people visit National Parks throughout the United States every year. In order to accommodate travelers, the National Park Service often faces the conflict of meeting tourist transportation needs and preserving the environment. One of the solutions is the addition of public transportation, a method that reduces traffic congestion, pollution, and other associated impacts. However, the auto-tourism centric ideology ingrained in American culture inherently clashes with trying to get visitors to actively use public transportation within parks. The question on NPS staff’s minds is this: how do we get visitors out of their personal vehicles and into public transportation?
This study will investigate the reasoning as to why park visitors choose either their personal vehicles or public transportation and how that choice shapes visitor experience. The purpose is to provide insight as to how to entice park visitors to use public transportation in order to help facilitate a less road dependent structure. While there has been an expansive amount of research done in terms of the ecological impacts of roads, there has been little done in regards to visitor perception of roads, vehicle use and, in particular, alternative transportation. Through the analysis of existing studies, the focus of my research will be on visitor experience in four National Parks in the United States with varying public transportation structures: Yosemite, Acadia, Zion, and Yellowstone. While there have been studies done in particular parks, there is great need for a more comprehensive look at National Parks as a whole.

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Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Graduate - M.S.
Title: Drilling Between the Lines: A Multi-State Media Analysis of the Risks and Benefits to Hydraulic Fracturing in the U.S.
Abstract: News media often serves as a necessary bridge between emerging technologies and the general public. The form and language used by media outlets can significantly impact the public’s interpretation of those technologies including perceived risks and benefits. In this project, we investigated how regional newspapers portray a controversial issue – hydraulic fracturing (HF) – in four U.S. states with varying levels of HF resource development: Texas,
Pennsylvania, New York, and Michigan. Using the Socio-Political Evaluation of Energy Deployment (SPEED) framework, we examined the economic, social, and cultural context surrounding HF in the different states as depicted through news media to determine how this information is presented to the public, thus impacting public discourse. Though the states differed in their media focus on the issue, media coverage was generally negative, focusing more on the risks of HF than the benefits. We also found that the majority of reporting covered the legal, environmental, technical and political aspects of HF more than public safety, economic and aesthetic considerations.

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Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Graduate - M.S.
Title: The role of partner organizations in strategic environmental communication: a proposal to study the Seafood Watch campaign
Abstract: Partner organizations can be a critical link in delivering appropriate messages from the source to the audience in public communication campaigns. However, the specifics of this relationship dictate the eventual ability of the strategic message to influence the environmental behaviors of the audience. Therefore, in the context of Monterey Bay Aquarium’s Seafood Watch campaign, the relationship between Seafood Watch headquarters and the Conservation Outreach Partner organizations is crucial to the successful delivery of the sustainable seafood message to seafood consumers. This proposed investigation seeks to explore the nexus of the phenomenological and contextual elements of the participant actions in the campaign partner relationship. Specifically, this research asks: How do partner organizations function in the structure of communicating a consumer conservation action campaign, Seafood Watch, to the public? Since the partner relationships are both contextually imposed and actively constructed, a two-perspective approach will best capture the interplay of the multiple levels of influence. To describe accurately how partner organizations function in the structure of communicating Seafood Watch to the public, the top-down expectations of Seafood Watch leadership and the bottom up influences of the participation of the organizational partners will be integrated. This will be accomplished through case study-style qualitative inquiry using interviews with key informants from Seafood Watch and a purposive sample of Conservation Outreach Partner organizations. The results of this study will help environmental communication planners understand potential cooperative campaign structures to reach audiences efficiently on the enormous scale of today’s environmental problems.

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Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
**Level of Research:** Graduate - M.S.

**Title:** The Emergence of Preventive Chemical Management as a Salient Environmental Policy Concern in China

**Abstract:** The research attempts to examine the precautionary principle’s application in China’s chemical management policy, including consideration of risk assessment. The precautionary principle promotes preventive measures in face of scientific uncertainty. It has been integrated into a number of regulations and agreements, including the Rio Declaration and the European Union’s regulation on Registration, Evaluation, Authorization, and Restriction of Chemicals (REACH). China’s gross output value of chemical industry has surpassed the United States and become the largest in the world. In recent years, health and environmental issues resulting from chemical pollution in China have been frequently reported, involving industries such as electronics and textiles. Environmentally sound management of chemicals is getting increased attention from the Chinese government. The development of China’s chemical management policy may be observed from its policy amendments in recent years. In this context, what (combination of) principles guide China’s chemical management policy becomes an interesting question. Drawing on literature review and interviews with key stakeholders, the analysis shows that elements of both the precautionary principle and risk assessment are present in China’s chemical management policy. However, the precautionary principle is not clearly defined in the country’s mandatory chemical management policy. There is also a trend of risk assessment being developed in recent regulations and publications, but its implementation in China is still nascent.

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**Primary Department:** ES

**Type of Abstract:** Research Abstract

**Research Category:** Social Science

**Level of Research:** Graduate - M.S.

**Title:** Framing Urban Agriculture as a Social Movement: An Analysis of Stakeholder Websites

**Abstract:** Urban agriculture (UA) as a social movement holds the potential to create positive social and ecological changes in the communities where practiced, but this potential may be limited by the number of operations and how it is conducted. In this research, we examined the framing of UA in proponent websites using resource mobilization theory to draw comparisons between use of specific rhetorical framings by location and group. Locations for analysis included the Eureka/Arcata/McKinleyville tri-cities area in California; Austin, Texas; and Syracuse, New York. Websites were coded to discern statements regarding the benefits of urban agriculture, alignment of specific organizations with different social movements, and evidence of benefits received as a result of being part of such movements. Results indicated that websites were making alignments with social movements, though some more frequently than others, and that organizations tended to promote social benefits over environmental benefits.
Name: White, Krystal

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Primary Department: ES

Type of Abstract: Research Abstract

Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry

Level of Research: Graduate - M.S.

Title: Hydrological Performance within a Great Lake Basin Alvar Plant Community in a Natural Ecosystem and Intensive Green Roof System: A Comparative Investigation into Water Quality and Nutrient Transport.

Abstract: The intensive green roof on the Gateway Center of SUNY College of Environmental Science and Forestry (Syracuse, NY) is host to a native Great Lakes Basin plant community known as alvar pavement barrens. Alvar plants survive in harsh conditions of high temperature and drought, conditions similar to a green roof ecosystem. Soil substrate and plant selection are important factors in stormwater and nutrient retention. The goal of the study is to determine hydrological performance and the impacts on nutrient transport and retention in the native ecosystem and on the green roof. Methods include analyzing the soil nutrients, pH, depth, texture, hydraulic conductivity, moisture and pore water as well as runoff quality and quantity. The native alvar environment consists of thin soils on limestone bedrock; the intensive green roof provides deeper soil depth. Soil in the native alvar ecosystem is fine grained with a low hydraulic conductivity; it is alkaline and has high concentrations of magnesium, nitrogen and carbon. The green roof soil is coarse grained material with a high hydraulic conductivity; it is also alkaline and has high concentrations of phosphorous, potassium and calcium. Heavy storm events in the native alvar ecosystem create periods of flooding followed by sustained drought, the nutrient levels are relatively stable. Heavy storm events will impact the green roof by leaching nutrients from the soil, impacting water quality of the runoff and reduce the nutrients available for plant uptake. This study will inform the green roof soil and flora management practices.
**Forest and Natural Resources Management**

**Name:** Badalian, Vartan  
**Primary Department:** FNRM  
**Type of Abstract:** Class Project  
**Research Category:** Social Science  
**Level of Research:** Graduate - M.S.  
**Title:** The Town of Cazenovia: Climate Smart Community  
**Abstract:** As progression into the 21-century continues, major climate policy decisions must be made in response to rising resource and energy demands and energy use. Here, we present a variety of greenhouse gas (GHG) reduction strategies that the Town of Cazenovia can consider in its effort to become more sustainable and green. 

The methods were strict yet simple in gathering data. Inputs were gathered from various sources such as 2010 Census, National Grid, etc. From there, the data was inputted into various potential strategies within CAPPA software and reductions were calculated. These strategies include alternative transportation, smaller municipal vehicle fleets, waste reduction and management, energy efficiency and conservation through education and upgrades to municipal equipment, lighting, and water systems as well as facility-scale energy improvements. Other strategies include building retrofits and restoration, alternative energy source implementation, urban forestry and composting, and wastewater treatment upgrades. These strategies, which at first may seem narrow, in reality allow the Town of Cazenovia to choose how to transition into the future, with a consensus of a 2025 target year to adopt these tasks.

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**Primary Department:** FNRM  
**Type of Abstract:** Research Abstract  
**Research Category:** Field Science: Biology & Ecology
**Title:** Parent material, N cycling, and foliar chemistry in northern hardwood forests

**Abstract:** The weathering of parent material is the primary source of Ca, Mg, K, and P in soils and ecosystems. The influence of parent material on N cycling is less often investigated. The objective of this study was to examine foliar nutrients and soil mineralization in relation to parent material in 20 sites in the White Mountains of New Hampshire, USA. We measured concentrations of total Ca, Mg, K, and P in C horizon material collected in 1-3 soil pits per site. Nitrogen mineralization was measured in laboratory incubations of Oe horizon material. Leaf litter was collected and analyzed for N, P, Ca, Mg, and K by species: sugar maple (Acer saccharum Marsh.), American beech (Fagus grandifolia Ehrh.), yellow birch (Betula alleghaniensis Britt.), white birch (Betula papyrifera Marsh.), red maple (Acer rubrum L.), and pin cherry (Prunus pensylvanica). Hierarchical cluster analysis was applied to nutrients in the C horizon. A two-way ANOVA was used to investigate the effect of parent material type and tree species on foliar nutrient concentrations. Sites fell into two clusters corresponding to the underlying bedrock and presumably the glacial till parent material. One cluster was 5 sites located on Rangely schist; the other 15 sites were on Conway and Mt. Osceola granites. This distinction in parent material was reflected in foliar Mg and P concentrations, with higher foliar concentrations in sites on the schist than on the granites (p<0.0001). There was no difference in foliar Ca concentration on the two lithologies (p=0.30). Surprisingly, foliar N concentrations were higher in sites on the schist than the granites (p<0.0001). However, N mineralization rates were not significantly different between these two groups of sites (p=0.68). Parent material may deserve more attention as a control on N accumulation in ecosystem development.

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**Primary Department:** FNRM

**Type of Abstract:** Research Abstract

**Research Category:** Field Science: Hydrology, Chemistry and Biogeochemistry

**Level of Research:** Graduate - M.S.

**Title:** Decomposition of wild-type, hybrid, and transgenic American chestnut leaf litter after one year

**Abstract:** American chestnut was once a dominant canopy species in forests across the northeastern United States. The native population has been decimated over the last century due to a disease, and the loss of this species has had severe consequences to the forest ecosystem. In an effort to bring the American chestnut back into its native range, hybrid chestnuts have been created by backcross breeding with resistant Chinese chestnuts, and transgenic American chestnuts have been created by inserting a disease-resistant gene into the wild-type American chestnut. Introducing transgenic plants into the environment requires evidence that ecosystems are not negatively impacted. Our study examines foliar litter decomposition and nutrient composition among a hybrid American chestnut (GR68-B1, K-BC1), two transgenic types (Darling 1 and Hinchee 4) and wild-type American chestnut litter (Zoar). Nylon mesh litterbags containing approximately 10 g of foliage for each type were incubated for 1 year on the mineral soil surface in a shelterwood stand at Lafayette Experiment Station and were retrieved October...
2013. There were no statistically significant differences in mass remaining or nutrient concentrations (except for Ca). Darling 1 exhibited a higher Ca concentration than the other 3 types (Tukey’s procedure at α=0.10). These results suggest that decomposition dynamics of transgenic foliage are similar to the wild-type trees. It will be interesting to see if the differences in Ca concentration persist after the second year of decomposition.

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Primary Department: FNRM

Type of Abstract: Research Abstract

Research Category: Field Science: Biology & Ecology

Level of Research: Graduate - M.S.

Title: Invasive Species Risk and Vulnerability Mapping for Adirondack Park Recreational Infrastructure

Abstract: Humans are important vectors for invasive species dispersal. Wild-land recreationists can be effective contributors to the dispersal of terrestrial invasive plant species into natural areas; carrying propagules on clothing, equipment, and pets. We assume that recreationists originating from areas with an abundance of invasive plant species are more likely to act as vectors for transporting propagules from one or more of these species to their chosen trail. Combining never before available Adirondack trail registry data; statewide invasive species data; and habitat data we will provide invasive species dispersal risk and vulnerability assessments for Adirondack Park recreational infrastructure, specifically hiking trails. Assessments and demonstrated methodology can be used by state agencies and conservation organizations as a mechanism to prioritize future invasive species monitoring and management investments.

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Primary Department: FNRM

Type of Abstract: Research Abstract

Research Category: Field Science: Biology & Ecology

Level of Research: Graduate - M.S.

Title: Is Sap Sweetness Consistent Among Sugar Maples Genetically Cloned By Rooted Cuttings?

Abstract: Increasing sugar maple sap sweetness is economically important as it requires less sap to produce a gallon of syrup. It is known that certain sugar maples genotypes are able to produce sweeter sap. Replicating these sweeter trees would allow sugar bush managers to increase sap sweetness and reduce energy needed to boil the sap into syrup. However, a successful way to replicate sweet trees with propagules that maintain high sap sweetness has not been developed.
No study to date has successfully replicated sugar maples through rooted cuttings and analyzed the sap sweetness. If it is found that rooted cuttings maintain sap sweetness across replicates it would be the ideal way to reproduce genetically sweeter trees.

In the 1970's rooted cuttings from ten sugar maples were planted in Heiberg Forest Memorial Forest from parent trees originating in Vermont, Heiberg Forest, and Oakwood Cemetery. Sap sugar concentration was tested in 1984 and 1986 while the trees were small. Sap sweetness was consistent among replicate clones. The trees are now large and are currently being sampled for sap sweetness this spring by taping the trees with a 16 gauge syringe needle and analyzed using a digital refractometer. Results of this study show that rooted cuttings is an effective way to replicate genetically sweeter trees. Replication through rooted cuttings is more effective than previously attempted methods and will allow maple syrup producers to decrease energy and labor required to produce syrup.

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Primary Department: FNRM
Type of Abstract: Research Abstract
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry
Level of Research: Graduate - M.S.
Title: Sources of variability in tissue chemistry in northern hardwood species
Abstract: Detecting change in tree nutrients helps calculate the nutrient budget over time but requires understanding the variability of nutrient concentrations within trees, among trees, across stands, across sites and from year to year; any of these sources of uncertainty could lead to spurious interpretations of change over time. To quantify these variabilities, we analyzed nutrient concentrations (N, P, Ca, Mg and K) of four tissue types (bark, branch, foliage and wood) in six dominant species across 7 northern hardwoods stands and in 6 years. The variability of nutrient concentrations within trees due to sampling position was smaller in foliage than in bark, branches, or wood. In foliage, P concentration had the smallest variation (CV < 5%) for all species. Foliar N and P also varied less than Ca, Mg, or K among replicated trees for all species. Over decades, foliar N in yellow birch increased and wood K in American beech decreased (P < 0.05). Foliar K exhibited a decreasing trend over time in all species (P < 0.05). In monitoring long-term changes in tree tissue chemistry, a lower sampling intensity is needed to detect a given rate of change in foliar N or P than other elements or tissues. Uncertainty analysis is important to designing monitoring approaches and to correctly interpreting change over time.

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Primary Department: FNRM
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Graduate - Ph.D.
Title: ADK-TReD: a tool for quantifying recreation in support of management and community planning

Abstract: Recreation and its associated benefits represent a common activity among local and global visitors to the Adirondack Park, and as such, serves as a key component of the region's service economy. As the result of land-use decisions and policies that protect environmental quality and wilderness character, recreation is often the focus of decision-makers and a driver of local economic development. However, a gap exists in our understanding and ability to manage this important resource for a sustainable landscape. Quantitative information describing the recreational user base and the distribution of use across a complex trail network exists in a system of over 250 trail registers, maintained largely for the purposes of search and rescue. Recent work determined a 95% confidence in trail register compliance and motivated a collaboration between the New York State Department of Environmental Conservation and the Adirondack Park Regional Geographic Information Systems Consortium to collect and digitize extensive trail register data from 2012, and incorporate these data into the Adirondack Park Trail Register Database (ADK-TReD). To quantitatively understand the benefits of recreation across the trail register system, TReD was used to spatially map and profile the flow of over 400,000 global and local users to destinations along a 2,350 mile trail network crossing 103 communities in the Adirondack Park. TReD can be analyzed as a relational and spatial database to support recreation and land use planning, broader conservation and management decisions, community and economic development, and stewardship of the land-based resources of the Adirondack Park.
**Landscape Architecture**

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**Primary Department:** LA  
**Type of Abstract:** Research Abstract  
**Research Category:** Social Science  
**Level of Research:** Graduate - M.S.  
**Title:** The discourse of obesity in planning and participation in New York City gardens  
**Abstract:** There is great potential for the future development of urban agriculture initiatives to address food security issues in New York City, but what health impacts does urban gardening offer? Initiatives such as the Gardens for Healthy Communities (GHC), a program of Green Thumb, formed as part of a city-wide effort to combat obesity. However, this public health initiative faces many obstacles in achieving its intended outcome, due to a combination of compounding economic and social factors. The goal of creating 'healthier' communities may not develop simply by virtue of having a garden in a low-income community that may suffer from high rates of obesity. This project will seek to understand the inner workings behind the obesity framework in urban agriculture initiatives as a public health promotion strategy in the GHC initiative.
Paper and Bioprocess Engineering

Name: Zelie, Matthew
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Primary Department: PBE
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Graduate - M.S.
Title: Use of hot-water extracted sugar maple (Acer saccharum) for the production of pulp for papermaking and enzymatic hydrolysis
Abstract: A variety of physicochemical changes have been observed on hardwoods after hot-water extraction (HWE), in addition to the primary removal hemicelluloses for further processing and the production of fuels, chemicals, and materials. These changes, which include an increase the content of free phenolic hydroxyl groups and porosity of wood, as well as a decrease in the acetyl group content, may be associated with an increased efficiency of delignification of hot-water extracted hardwoods. A 3.5 to 6.5 times higher solubility of wood particles (30 mesh) in different organic solvents (Soxhlet extraction) has also been observed. Moreover, a delignification effect has been observed for the acetone:water (AW 9:1) extraction of hot-water extracted wood (>20% of the total lignin removed). In this study, the potential for increasing the amenability of hot-water extracted wood (model species: sugar maple) for the production of pulp for papermaking and for enzymatic hydrolysis was further explored by AW extraction of hot-water extracted wood chips in an M/K digester. After the extraction, wood was grounded to 30 mesh and used to evaluate enzymatic hydrolysis (Cellic CTec2/HTec2, Novozymes) for the production of glucose. Extracted wood was also refined on an 8” Bauer single disc refiner with power measurement equipment. Refined pulp was screened and used for the production of handsheets (TAPPI procedure and appropriate paper tests). These studies are expected to aide in taking advantage of a more accessible wood structure observed for hardwoods after HWE, in order to enhance biorefinery operations for the production of paper or glucose.

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Primary Department: PBE
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Graduate - Ph.D.
Title: Synthesis of novel green lignin-based wood adhesives
Abstract: The objective of this work is to synthesize novel green lignin-furfural based adhesives to replace commercial phenol-formaldehyde (PF) resins which are environmentally unfriendly products of the petrochemical industry. Lignin as a bio-renewable alternative to phenol in PF resins is projected to be produced in abundance in byproduct streams of lignocellulosic
biorefineries. Various lignin fractions from biorefinery operations have been characterized in our previous studies and are evaluated as adhesive raw materials in this work. Hot water extraction (HWE) has been suggested as a successful pretreatment for hardwood targeting removal of hemicelluloses. Along with hemicelluloses, HWE dissolves ~10% of lignin in the extract. After lignin is separated by ultrafiltration, the extract is subjected to acid hydrolysis. In this study, lignin obtained before and after acid hydrolysis is evaluated for its potential to produce lignin-furfural-based adhesives. The retentate fractions before and after acid hydrolysis contain a mixture of lignin and carbohydrates (mainly xylose-originated). If subjected to acid hydrolysis, these fractions produce furfural as a result of dehydration of xylose-based carbohydrates. In this study, furfural formed in situ is evaluated as a lignin-cross linking agent and a formaldehyde replacement. The effect of two catalysts – hydrochloric and formic acid and the effect of different formulations of phenol, formaldehyde and furfural added ex situ on lignin condensation are investigated. The condensation reaction is followed by molecular weight studies by size exclusion chromatography. The tensile mechanical properties of adhesive blends are evaluated using MTS Sintech 1/S and compared to those of commercially available PF resins.

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Primary Department: PBE
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Graduate - Ph.D.
Title: Biorefinery: Recovery of Lignin from Fast-Growing Species for High-Value Application
Abstract: As the predominant energy source, fossil deposits are limited and not renewable; it is vitally important to develop alternative sources of transportation fuels, chemicals, and materials. Emerging biomass-based chemical and fuel industries are becoming an important approach represented in the development of biorefineries. In one such type of hardwood-based biorefinery, the process is recommended to start with hot-water extraction (HWE) to remove most of the hemicelluloses/xylans. It may then be followed by delignification of extracted wood in acetone/water with oxygen (AWO) for the production of cellulose and lignin. By disassembly into three main streams, cellulose, hemicelluloses, and lignin, wood can be converted into value-added chemicals and materials. Due to the short-rotation and high yields, fast-growing species, such as willow and Paulownia, are considered important raw material for this type of biorefinery. This study is focused on the recovery of lignin, for the production of bio-based transportation fuels, chemicals and polymeric materials. The lignin recovered from the HWE-AWO sequence is sulfur-free and of a higher purity than currently available technical lignins. Due to these favorable features, the value of lignin is expected to increase from $0.06/pound which is the value of its current use as power and energy to $0.60/pound for adhesives, and even $3–5/pound for carbon fibers. In the present work, lignin was recovered from the spent liquor produced in the HWE-AWO sequence performed on the fast-growing species, Paulownia tomentosa and Paulownia elongata, and characterized. Results showed a benefit of using the HWE-AWO sequence in comparison to the AWO delignification.
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Primary Department: PBE

Type of Abstract: Research Abstract

Research Category: Laboratory Sciences

Level of Research: Graduate - Ph.D.

Title: Enzymatic Hydrolysis of Old Corrugated Cardboard (OCC) Fines from Recycled
Linerboard Mill Waste Rejects

Abstract: A significant fraction of short fibers commonly called as “fines” is produced while
recycling pulp and papers. These fines are usually rejected as solid waste stream that further
require landfiiming and pose environmental problems and an economical burden. The major
component of these fines rejects are primarily cellulose that can be hydrolyzed into sugars for
possible fermentation into biofuels, bioplastics or other sugar based products. In addition to
environmental advantages, use of these fines also offers benefits such as negative costs and
production of fermentable sugars without requiring any complex pretreatment processes that are
required to hydrolyze and eliminate inhibitors from hydrolysate. In this study, enzymatic
hydrolysis of reject fines from a recycled OCC mill was investigated by modifying the traditional
process to reduce costs. Different strains of cellulases were tested for their compatibility and
Trichoderma Reesei was found to be the most effective at loading levels of 5 – 50 FPU /g of
oven dry mass). A maximum hydrolysis yield of 43% sugar (g/g-OD fines) with 50 FPU was
observed at an optimum temperature. The presence of fillers (up to 30% by mass) in the fines
increases the required dosage of enzymes that increases the costs of hydrolysis. It was found that
the required enzyme loading can be lowered by addition of nonionic surfactants and separation
of fillers to reduce their inhibitory activity.
Sustainable Construction Management and Engineering

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Primary Department: SCME

Type of Abstract: Research Abstract

Research Category: Laboratory Sciences

Level of Research: Graduate - M.S.

Title: Mechanical Properties of a Radiation Crosslinked Wood-Plastic Composite

Abstract: Wood-plastic composites (WPCs) are building materials that are nontoxic alternatives to pressure treated lumber and are stronger, sustainable alternatives to plastic lumber. While sustainability is an advantage, concerns regarding the durability and weight of WPCs have been expressed. The focus of this study was to examine the potential benefits of irradiating WPCs in order to enhance their mechanical properties. WPCs were irradiated, post extrusion, at dose levels of 0, 50, 100, 150, 200 and 250 kGy with an electron beam. The crosslinked WPCs were then evaluated using a third point bending test (ASTM D4761) along with scanning electron microscopy (SEM). It was found that ultimate strength and modulus of elasticity (MOE) increased with increasing dose. SEM images indicate greater polyethylene crosslinking when compared to cellulose chain scissioning.
UNDERGRADUATES

Chemistry

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Primary Department: Chemistry
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Deletion of Genes Regulating Nitrogen Metabolism in a Crop Pathogenic Bacterium
Abstract: Ralstonia solanacearum is the causative agent of bacterial wilt in many important crop species, such as tomatoes and potatoes. Economic losses from plant infection with this bacterium can be quite devastating, so developing a means of control could be an important agricultural development. Genes related to pathogenicity are currently being evaluated as a means of reducing the impacts of this pathogen. The rpoN genes encode θ54 transcriptional regulator proteins. These proteins allow RNA polymerase to bind to DNA at specific promoter sequences and initiate expression of certain target genes. The RpoN proteins have been found to regulate a variety of genes including genes involved in nitrogen metabolism. Knockout mutants for the rpoN1 and rpoN2 genes will be generated, as well as a double mutant that lacks both genes. These mutants will be screened for their ability to utilize various carbon and nitrogen sources. The pathogenicity of the mutants will also be evaluated in tomato plants. It is expected that the mutant strains will be restricted in their ability to utilize certain carbon and nitrogen sources. The mutants are expected to have reduced ability to infect tomato plants, which could have implications for control of this pathogen in agricultural systems.

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Primary Department: Chemistry
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Green synthesis of pharmaceuticals facilitated by water-soluble dendritic palladium complexes
Abstract: The Suzuki-Miyaura cross-coupling reaction (Suzuki reaction) is a highly efficient method of Carbon-Carbon bond formation, making it widely used in the synthesis of biaryl intermediates of pharmaceuticals. The coupling is conventionally performed at elevated temperatures and in organic solvents leading to adverse economic and environmental impacts.
Previous studies in our group suggest that water soluble dendrimers, able to complex palladium, are viable Suzuki catalysts able to afford quantitative yields of the target compounds in water at close to ambient temperatures. They are, however, not ideal for catalyzing the reaction between hydrophobic reagents due to lack of contact with water-insoluble substrates. The goals of this study are to design and test water-soluble dendritic-palladium complexes containing a hydrophobic core, able to solubilize and selectively bind hydrophobic substances, in an attempt to improve the spatial arrangement of the catalyst and reagents in water. The structure of these novel “green” catalysts consists of calix[n]arene (n = 4,6,8) as the central core with water soluble poly(ester-ether) dendrons attached at the upper rim of the cycle (see figure below). This presentation will discuss our progress in the synthesis of these unique macromolecules by Williamson ether synthesis and Cu(I)-catalyzed alkyne-azide cycloaddition. Our ability to reproducibly form the depicted compound with chemical and structural purity is confirmed by diverse analyses (NMR, MALDI-TOF, DLS, ICP and TEM). Upon completion, this work aims to achieve unprecedented yields for the Suzuki reaction in water and produce the first Suzuki catalyst to mimic enzymatic character by selectively incorporating reagents.

Name: Grassa, Michael


Primary Department: Chemistry

Type of Abstract: Research Abstract

Research Category: Laboratory Sciences

Level of Research: Undergraduate

Title: Determining the role of PA2449 in pyocyanin biosynthesis in Pseudomonas aeruginosa, PAO1

Abstract: Pseudomonas aeruginosa PAO1 is an opportunistic pathogen known to have an arsenal of virulence factors that can affect immunocompromised patients. One of these virulence factors is the redox-active phenazine compound, pyocyanin. The production of pyocyanin is regulated by multiple mechanisms, which include stress response and quorum sensing (QS). In a previous study, we found that the PA2449 gene was required for the biosynthesis of QS homoserine lactones and pyocyanin. This study focused on a particular strain of P. aeruginosa that lacked the ability to produce pyocyanin. We restored the production of pyocyanin in this strain by inserting a vector encoding a gene responsible for pyocyanin biosynthesis, rhlI. We then did various studies to determine the levels at which the toxin was produced compared to the wild type strain. We found that in smaller volumes of medium, the mutant strain production levels were similar to the wild type, 219 µM. In larger volumes of media the two strains produced a similar amount of pyocyanin although the timing of the production between the two strains was different, 4.5 hours for the wild type and 9 hours for the mutant strain containing the vector. We also analyzed other strains with knockouts relevant to the PA2449 gene. This led us to discover the potential role for PA2449 in pyocyanin production, in repressing the expression of MexEF- OprN allowing the intracellular accumulation of PQS. This study will allow us to
further understand the mechanisms that Pseudomonas, as well as other bacteria, use when producing toxins.

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Primary Department: Chemistry
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: The Role Of Genes PA2003-PA2005 in the Regulation of D-3-Hydroxybutyrate Metabolism in Pseudomonas aeruginosa PAO1
Abstract: Polyhydroxyalkanoates (PHAs) are a common family of biodegradable plastics that are used to create a variety of bulk-commodity plastics. Polyhydroxybutyrate (PHB) belongs to the PHA family of bioplastics and has been the most widely studied PHA member. As presence of biodegradable plastics, such as PHB, become more prevalent in everyday products, it is of interest to understand how these plastics are being degraded in the natural environment. Pseudomonas aeruginosa is a common soil bacterium that exhibits the ability to degrade PHB and use the monomer of this polymer, D-3-hydroxybutyrate (D-3-HB), as a carbon source. P. aeruginosa converts D-3-HB into acetoacetate through the enzymatic action of the cytosolic protein D-3-hydroxybutyrate dehydrogenase (BdhA). Using mutant strains of P. aeruginosa lacking the function of the bdhA, PA2004, or PA2005 genes, complementation assays were performed to determine the role of these genes in D-3-HB metabolism. The experimental results indicate that the PA2004 gene codes for a putative transporter protein responsible for the uptake of D-3-HB into the cell and the PA2005 gene encodes a transcriptional regulator that mediates expression of the bdhA-PA2004 gene operon. Characterization of PA2005 gene function, as well as the putative transporter of D-3-HB, encoded by the PA2004 gene, has provided insight into the genetic and metabolic processes responsible for PHB degradation by P. aeruginosa.

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Primary Department: Chemistry
Type of Abstract: Research Abstract
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry
Level of Research: Undergraduate
Title: SEDIMENT-WATER NUTRIENT ANALYSIS IN THE ST. LAWRENCE RIVER WETLANDS
Abstract: Nutrient concentrations found within the sediments and waters of a wetland directly correspond to the wetland’s biological productivity. The nutrient concentrations may change due to changes in water levels. In the St. Lawrence River wetland system, a water level management program has been implemented to raise the water levels of the wetland in hopes of replenishing fish spawning habitats. This experiment will analyze the chemistry in the wetland’s sediments and surface water in order to evaluate if any changes in chemistry have occurred.
Once obtained, data will be compared for differences between depths in the sediment, differences between sites, and differences when compared to the previously obtained surface water data of the site. We expect to see lower nutrient concentrations in the sediment at the managed sites, as well as higher nutrient concentrations at lower soil depths, due to a flux of nutrients into the water from the raised water levels. We expect to see higher nutrient concentrations in the sediment when compared to the surface water. Sediment cores were taken from six areas: three managed wetlands and three un-managed wetlands. Each area contained three elevations for a total of eighteen sites. The sediments will be tested for phosphorus, nitrogen, iron, organic matter and clay content using individual procedures for each analyte. The previously obtained surface water has been tested for phosphorus, nitrogen and chlorophyll a. The phosphorus and the nitrogen data was directly compared between the surface water and the sediment.

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Primary Department: Chemistry
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Deregulation of fatty acid transport in Escherichia coli for enhanced control of biodegradable plastic copolymer production
Abstract: The accumulation of enduring petroleum-based plastics is a continuing problem for modern societies, and there is an increasing demand for biodegradable alternatives. Polyhydroxyalkanoates (PHA) are one such alternative for petroleum-based plastics that have been shown to be produced effectively in bacterial systems utilizing fatty acids. The global regulatory genes arcA and ompR are known to regulate steps involved in fatty acid transport and metabolism, making them promising candidates for research. In this study, we deleted the arcA and ompR genes in order to deregulate fatty acid uptake. To measure the effect of these deletions, copolymers were produced using recombinant E. coli and the repeating unit composition was analyzed. Residual fatty acid levels in media were also measured to determine a difference in uptake. We expect to see an increase in fatty acid uptake by the recombinant strains, particularly the strain with both gene deletions, as well as a potential increase in the amount of polymer they produce. We also expect to see a difference between the ratios of repeating subunits in recombinant versus the parental strain. If the expected results are observed, this will mean that we can achieve a greater control over fatty acid transport into bacterial cells and obtain new ratios of repeating subunits that were previously unobtainable. This could open up new areas of research into producing plastics with very specific properties, giving PHAs a wide array of modern applications.

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Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Characterization of Polyhydroxyalkanoate-based Electrospun Fibers
Abstract: Polyhydroxyalkanoates (PHAs) are biopolymers that can be made using recombinant Escherichia coli (E. coli) and have potential to be used in a broad range of applications including drug delivery, carbon storage, and even as precursors for biofuels. PHAs can be electrospun into fibers that can be very useful for the environment or healthcare industry. In this experiment we studied the production and characterization of PHA electrospun fibers. These fibers were characterized using Scanning Electron Microscopy (SEM) to observe fiber morphology. The PHA fibers were doped with carbon nanotubes (CNTs) that were sonicated into the electrospinning solution to make it easier to embed in the fibers. The purpose of the carbon nanotubes is to make the films stronger. It is predicted that well-made PHA-based fibers will have a very small diameter (0.5-5 microns), no beading, and evenly dispersed carbon nanotubes. A solution of 1:4 dimethylformamide:chloroform was found to be the optimal solvent for the electrospinning process. This combination yielded the most uniform fibers with little to no beading, which were about 3 µm in diameter. Future work will include tensile strength tests that test the amount of tension that can be placed on the film.

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Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Comparative Analysis of the Chemical Composition and Energy Content of Bark from Sugar Maple (Acer Saccharum) and White Pine (Pinus Strobus) and Effect of Hot Water Extraction
Abstract: Aside from its biological importance, tree bark possesses a number of important commercial applications; bark can be utilized as a fuel or a source of medicinal extracts, for example. To assess the potential for biofuel and biopharmaceutical applications, the chemical composition including ash content, amount of extractives, and lignin content of sugar maple (Acer saccharum) and white pine (Pinus strobus) bark was determined and compared. In addition, the combustion energy of the barks was measured through oxygen bomb calorimetry. Measuring the energy content of a woody biomass species and its relation to chemical composition is important in determining whether using a given species as a biomass energy crop is economically feasible. The barks were subjected to hot-water extraction (HWE) at 160 degrees Celsius for 2 hours (Parr reactor, # 30 mesh) in an attempt to decrease the ash content, increase the energy content, and extract potentially viable biopharmaceutical compounds. The chemical composition and the combustion energy of the extracted barks was subsequently determined and compared to the composition and combustion energy before HWE. The phenolic hydroxyl group content of hot water extracts was also determined.

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Primary Department: Chemistry
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Determination of PTE Concentrations in Mice Biological Samples
Abstract: PTE is a non-commercialized chemical compound currently found in Onondaga Lake that has resulted from a coal coking operation that occurred at the Solvey Process. PTE has an analogous structure to DDT, which causes researchers at ESF and SU to question the toxicity of this compound. As part of the study, known concentrations of PTE are being injected into the mice. Mice are observed for behavioral changes and other defects. After a known period of time, the mice are dissected and liver, blood, fat, hippocampus, and cortex tissue samples are collected. For my research specifically, I am extracting the PTE from the mice tissues and using a GCMS to detect the concentration of PTE in the mice. This research is important for determining the concentrations at which PTE is being metabolized into various mice tissues and how much of this potentially toxic compound is accumulating over time. Currently, PTE is being detected in the mice biological tissue samples, with higher concentrations in the blood, liver, and fat tissues and lower concentrations in the cortex and hippocampus tissues. With further analysis we should be able to determine exact concentrations of PTE throughout the mice.
Environmental and Forest Biology

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Primary Department: EFB

Type of Abstract: Class Project

Research Category: Laboratory Sciences

Level of Research: Undergraduate

Title: Inheritance of an oxalate oxidase transgene in American chestnut

Abstract: The oxalate oxidase (OxO) gene originates from wheat and is useful in detoxifying the oxalic acid (or oxalate) that the chestnut blight fungus, Cryphonectria parasitica, uses to attack the tree. Adding this gene through genetic engineering is extremely useful for enhancing blight resistance in the American chestnut because the only way that the pathogen can attack the American chestnut tree is by secreting oxalic acid into its tissues, killing cells and thus forming a canker. In genetic engineering it is important to confirm that the transgene, in this case OxO, is stably integrated into the genome and is inherited as any other gene in chestnut. In this experiment, samples from crosses of wild type and transgenic (Hinchee1) trees were genetically monitored in order to identify which individuals contain the OxO transgene. Each transgenic chestnut could also have a GFP visual marker gene. In addition to demonstrating inheritance of the OxO gene, this experiment began tests to see if the OxO and GFP genes would segregate in the F1 offspring, producing some trees with only the OxO construct. According to PCR among the chestnut samples, 46.7% of the samples were positive for OxO and showed a band on the agarose gel at 500 to 600bp. Thirty samples in total were tested and fourteen of them were positive for the OxO gene.

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Primary Department: EFB

Type of Abstract: Research Abstract

Research Category: Laboratory Sciences

Level of Research: Undergraduate

Title: Gold Nanoparticles in the Environment: Studying the Genetic Toxicity and Bioavailability in Hydroponic Exposures and Soils with Lycopersicon esculentum (Tomato ‘Brandywine’)

Abstract: Gold nanoparticles (AuNPs) are being researched and proposed to act as biosensors for pesticides and they are currently used in medical applications to treat rheumatic diseases. This creates regulatory concerns, as NPs possess unique chemical and physical properties that can impact living systems. The use of AuNPs is economically increasing, but there is insufficient
studies looking at the toxic effects on food crops and the environment. It has been shown that AuNPs cause biotoxicity as they have the potential to be internalized in the exposed plants. There are two objectives of this study: to look at the real world bioavailability that occurs in soil-based systems and to determine how different times of exposure impact the expression of stress response genes to AuNPs using the model crop, tomato. Tomatoes were exposed to 3.5 nm AuNPs for increasing times, while the controls were in water. In the soil study, tissues were analyzed by ICP-MS to determine the uptake of AuNPs. In the genetic study, RT-PCR was used to analyze the changes in gene expression levels. The results showed that difference in soil characteristics does affect the plant’s take up; agriculture soils allowed the most uptake of AuNPs. For the genetic study, the stress response genes showed changes in expression at different exposure times. This shows that tomatoes grown in agriculture fields have the potential to uptake AuNPs that can cause toxic effects. Future studies should focus on the potential for these to have similar impacts when humans eat these treated crops.

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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Hungry, Hungry Earthworms: How Invasions Affect Decompositional Enzyme Activity
Abstract: In forested regions of North America with no native earthworms, invasive earthworms from Eurasia have a large impact on the below- and aboveground environment. These earthworms rapidly consume leaf litter, thereby accelerating decomposition and altering microbial activity. While these ecosystem-level changes are poorly understood, previous research has suggested that they may have cascading effects on carbon sequestration, nutrient cycling, and plant communities. In this study, we compare activity rates of hydrolytic enzymes (secreted by microbes to degrade labile compounds such as cellulose and chitin) and oxidative microbial enzymes (degrade recalcitrant compounds such as lignin), using a colorimetric enzymatic assay technique. We predicted that the production of hydrolytic enzymes would be less, and the secretion of oxidative enzymes would be greater in soils invaded by earthworms, as compared to uninvaded soils. Soils were collected monthly from Mohonk Preserve, in Gardiner, NY, and were assayed, as well as dried for moisture percentage, organic composition, and pH. Results revealed that earthworms do have a significant effect on the types of compositional enzymes produced by microorganisms, and could therefore have an impact on overall ecosystem health and function. These findings may affect our understanding of ecosystems, changing future forest management plans and research models to incorporate the impacts of microorganisms and invasive species.

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**Primary Department:** EFB  
**Type of Abstract:** Research Abstract  
**Research Category:** Social Science  
**Level of Research:** Undergraduate  

**Title:** A quantitative research synthesis of human-avian conflict in agricultural systems  

**Abstract:** When crop yield is compromised by ‘pest’ species, human-wildlife conflicts can occur. This can lead to conservation concerns for taxa providing ecosystem services, such as birds. These birds may be managed by farmers in both legal and illegal manners, leading to avian conservation obstacles. The goals of this study were as follows: (1) conduct a synthetic review of articles related to human-avian conflict in agriculture and agroforestry systems; (2) identify research gaps relating the social and cultural influences on the management of pest birds; and (3) find potential relationships between bird species, crops, country, and intensity of crop depredation. After filtering search results to meet our specific criteria, we analyzed 25 articles from 22 countries that included 64 species of pest birds. Although we identified 13 bird management techniques, these papers lacked insight into the social drivers influencing farmers’ decisions in labeling a bird a pest. Most articles focused mainly on the economic loss of farmers. The influence of social, cultural, and economic components of management decisions was largely ignored. No significant relationship between crop type and intensity of depredation was found. Given that intensity of depredation was not dependent on crop type, pursuing the social, economic, and cultural drivers of these conflicts may be more revealing. These factors should be considered for future regional conservation plans.

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**Type of Abstract:** Research Abstract  
**Research Category:** Field Science: Biology & Ecology  
**Level of Research:** Undergraduate  

**Title:** Nest Selection Characteristics of Piping Plovers (Charadrius melodus) on the South Fork of Long Island, NY  

**Abstract:** To properly manage the populations of endangered birds it is important to understand the factors of nest survival. Ground nesting birds, such as the Piping Plover (Charadrius melodus), are at risk of nest loss from predation and tidal flooding. Nest selection characteristics may affect those threats. I compared nest characteristics of the Piping Plover between low-wave energy bay shorelines and high-wave energy ocean shorelines on the South Fork of Long Island, NY in the summer of 2013. These nest characteristics included the substrate composition and vegetation cover as well as nest distance from vegetation and high tide line. I compared nests from the Peconic Bay (n=25) and the higher-wave energy Atlantic Ocean (n=26). Percent cover by sand was greater for ocean nests than bay nests (P < 0.001), as was percent cover by vegetation (P < 0.001). Percent cover by shell was greater for bay nests than for ocean nests (P < 0.001). The ratio of the distance from the nest to the high tide line to beach width was 0.87 for
ocean nests and 0.72 for bay nests. These findings can be used to assist land managers in the protection of the threatened Piping Plover. Understanding the nest site characteristics, land managers can use vegetation management on ocean beaches due to the large percent of vegetated nests, and continue predation management on both bay and ocean beaches. Also understanding the preferred nest sites, pre-nest fencing can be established to protect ideal nesting habitats from human conflicts.

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Type of Abstract: Research Abstract
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry
Level of Research: Undergraduate
Title: Examination of olfactory cues in oviposition sites of Culiseta melanura, the principal vector of eastern equine encephalitis virus.
Abstract: Olfactory cues in oviposition sites have made excellent tools in the management of pest species. Very little research has been conducted on whether Culiseta melanura, the principal vector of Eastern Equine Encephalitis virus selects oviposition sites based on olfactory cues. Olfactory volatiles were extracted from red-maple crypts visually confirmed to house C. melanura. These volatiles were then extracted, and run in a dual choice behavioral bioassay to determine attraction of female C. melanura. Twenty-percent of C. melanura test subjects responded positively to volatiles, while the other eighty-percent seemed to respond neutrally. These results suggest some olfactory cue in oviposition site selection in C. melanura, however further and much more extensive testing should be conducted. The threat of EEE transmission from this vector to any mammalian host is staggering, and control measures should be developed and implemented immediately in order to eliminate EEE from the environment from now, into the foreseeable future.

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Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Undergraduate
Title: Population Genetics of the Creek Chubsucker Across a Drainage Divide in Central New York State
Abstract: Song Lake, located just south of Syracuse, NY, is an endorheic water body that sits on the divide between the Susquehanna River and Lake Ontario drainage basins. This lake has become of interest recently because of a population of Chubsucker (Erimyzon sp.) discovered there. The population of interest appeared to exhibit characteristics of both a Creek Chubsucker, Erimyzon oblongus, and Lake Chubsucker, Erimyzon sucetta. Its taxonomic identity, thus, has become a matter of debate. Our objective was to resolve the taxonomic status of that population
using a combination of genetic and morphological traits. DNA sequences (cytochrome oxidase, cytochrome B and ITS regional sequences) revealed that the isolated Song Lake population is identifiable as E. oblongus. Morphometric measurements and meristic counts also confirm that this population should be classified as E. oblongus. Samples of Creek Chubsucker from the Susquehanna (to the south) and Ontario (to the north) drainages were identical for genetic and morphological traits. An interesting observation, however, was that color pattern of the Song Lake population, with a dominant mid-lateral band, matches that for Susquehanna basin fishes, while those from the Ontario basin differed in having a vertically banded pattern. Those color differences suggest a level of genetic variation across the drainage divide, however we conclude that the Song Lake population does not warrant protected status as an evolutionarily significant unit.

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Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Strain Typing Mycobacterium marinum from outbreaks at zebrafish research facilities
Abstract: Throughout the scientific community zebrafish (Danio rerio) are used as model organisms in many applications due to their rapid and transparent development as embryos and regenerative abilities. These animals are housed at high density in large colonies that may number in the tens of thousands. As with any similar husbandry situation, there are also disease problems, with impacts that range from killing fish prematurely to sublethal impacts that cost companies and researchers time and money. One such problem is mycobacteriosis, caused by numerous Mycobacterium species. The pathogens spread when fish are exchanged with no precautions for biosecurity and the bacteria can persist in the water and live on surface biofilms, making control more difficult. Mycobacterium marinum is one species that is of particular interest because it is highly virulent, often resulting in serious outbreaks, and it is also a concern for occupational health because it can cause skin infections in humans. To understand the spread of this species and characterize outbreaks, I used various microbiological and molecular biology techniques to identify strains of Mycobacterium marinum, and made comparisons between different samples from the same outbreak and distinct facilities. Using this information we hope to then be able to track which strains were spread between specific facilities to better understand its epidemiology.

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Type of Abstract: Research Abstract  
Research Category: Laboratory Sciences  
Level of Research: Undergraduate  
Title: Analysis of Disinfectants on Mycobacterium spp.  
Abstract: The zebrafish, Danio rerio, is an important model organism in the field of biomedical research. Unfortunately, these fish are negatively impacted by different species of Mycobacterium which cause subclinical infections, lesions on the body, and sometimes premature death. When new fish are introduced to a facility, it is typically by eggs only, and the standard disinfection practice, a treatment of 50ppm sodium hypochlorite, has unknown efficacy for killing mycobacteria. This study tested 100ppm and 150ppm bleach, as well as 1.5% and 3% hydrogen peroxide, to determine the germicidal efficacy for use in fish facilities. Cultures of M. gordonae, M. chelonae, M. peregrinum, and M. abscessus grown in Middlebrook broth were used. Each trial included a positive control, low concentration, and high concentration of disinfectants. Bleach was applied for 10 minutes and deactivated by sodium thiosulfate while hydrogen peroxide was applied for 5 minutes and removed. Plate counts were made on the treatments resulted in complete killing of all Mycobacterium species tested. Bleach treatment impacted growth of all species except M. chelonae. The hydrogen peroxide only impacted M. chelonae and M. peregrinum. ANOVA statistical analysis showed the following significant differences: 1) bleach treated cultures of M. peregrinum and M. abscessus exhibited less growth than untreated; 2) the 3% peroxide treatment of M. chelonae had reduced growth compared to controls; 3) the 1.5% and 3% peroxide treatments of M. abscessus showed decreased growths relative to controls.

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Type of Abstract: Research Abstract  
Research Category: Laboratory Sciences  
Level of Research: Undergraduate  
Title: The Effect of Bleach and Hydrogen Peroxide on Mycobacterium Species  
Abstract: The laboratory zebrafish, Danio rerio, is a model organism used in numerous area of biological research, and is also subject to its own diseases. A common disease in zebrafish is mycobacteriosis, caused by Mycobacterium species. Elimination of Mycobacterium spp. is crucial in both preserving research studies as well as preventing the spread of the zoonotic pathogens to humans. Because of the common practice of exchanging fish between facilities, as well as a lack of a standard protocol for disinfection, these infections have become commonplace. In order to investigate the efficacy of disinfectants, this study tested the germicidal effect of sodium hypochlorite and hydrogen peroxide on M. chelonae, M. gordonae, M. peregrinum, and M. abscessus. Concentrations of 100 ppm and 150 ppm sodium hypochlorite (from bleach) were tested as well as 1.5% and 3% hydrogen peroxide. Statistically significant decreases in growth were observed in the treatments of M. abscessus with hydrogen peroxide and M. peregrinum and M. abscessus with sodium hypochlorite. When treated with 1.5%
hydrogen peroxide, M. abscessus showed a 14-fold germicidal effect. When treated with 150 ppm sodium hypochlorite, M. peregrinum showed a 135-fold germicidal effect and M. abscessus showed an 11-fold germicidal effect. The disinfectants tested did not result in total elimination of Mycobacterium spp., and therefore future studies should test additional disinfectants at different concentrations and application durations. Additionally, the current protocol for the application of bleach to zebrafish eggs cannot be relied upon for complete disinfection of mycobacteria.

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Type of Abstract: Research Abstract  
Research Category: Field Science: Biology & Ecology  
Level of Research: Undergraduate  
Title: Influence of soil calcium availability and stand age on the structure and functional diversity of arthropod communities: a case study in two northern forest stands  
Abstract: Calcium depletion in northern hardwood forests as a result of decades of acidic deposition may have impacts on the forest floor invertebrate community, while stand age can influence soil calcium available for biological uptake by plants and animals. Forest floor macroarthropods are part of the detrital food web, and calcium content of foliar and organic soil horizons may influence the diversity of taxa with high calcium demands. Macrinovertebrate diversity plays an important role in forest ecosystem processes of decomposition and nutrient cycling, and represent an important food source for higher order consumers. This study investigated how stand age and soil calcium availability shaped macroarthropod community structure in northern hardwood forests. We compared macroarthropod communities from two sites in the White Mountains of New Hampshire: one with moderate soil calcium and another with depleted soil calcium. Within each site, we sampled from two stand ages: mature hardwood >100 yr and ~30 yr. Over 3,000 macroarthropods were collected from the two sites, representing 11 orders. Aranae and Diplopoda were the most abundant orders overall. High abundance of Aranae may be the result of high prey densities, while Diplopoda abundance may be the result of high quality detritus, or may reflect that most Diplopoda are generalists and tolerant of a wide range of conditions. The low calcium forest had higher abundance of Pseudoscorpiones and Psocoptera in both stand ages, compared with the higher calcium site. Multivariate analyses will provide further insight on how calcium availability shapes macroarthropod communities.

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Primary Department: EFB  
Type of Abstract: Research Abstract  
Research Category: Field Science: Biology & Ecology  
Level of Research: Undergraduate
Title: A survey of Adirondack meiofauna and an investigation into the phylogenetic dimension of community assembly

Abstract: Community ecology involves the investigation of factors and processes that regulate the assembly and interactions among populations located in a particular environment. Phylogenetic perspectives on ecological communities (especially community assembly patterns) can incorporate a consideration of environmental filters and niche space, dispersal mechanisms, competition, and geographic limitations within a historical (phylogenetic) framework. I conducted a preliminary phylogenetic community assembly study focused on relatively unknown meiofaunal communities (interstitial eukaryotes between 60 μm and 2 mm) from 24 lakes in New York State’s Adirondack Mountains. I photographed microscopic unicellular eukaryotes and animals using differential interference contrast (DIC) microscopy and sorted organisms first by phylum and then to the lowest identifiable taxonomic ranking. Pooled interstitial lake communities contained at least 12 animal phyla, many of which also contained several major lineages. Using published phylogenetic hypotheses, I constructed trees to represent relationships among the meiofaunal focal groups in order to visualize community structure and serve as a foundation for my future research combining phylogenetics with community assembly. I calculated net relatedness indices for each lake. Raquette Lake had the largest spread with an index of 0.04 while Pleasant Lake had the most clumping with an index of 1.00. Adirondack lakes comprise highly diverse and disparate (i.e. with respect to number of phyla) communities and the phylogenetic structure of these communities varied between lakes. These communities are an untapped resource for the investigation of phylogenetic community ecology and for the discovery of new species.

Name: Garramone, Isabella

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Primary Department: EFB

Type of Abstract: Research Abstract

Research Category: Social Science

Level of Research: Undergraduate

Title: What do Participants Think of their Experience at an ESF Summer Camp? An Analysis of ESF SCIENCE Participant Surveys from 2006-2013

Abstract: ESF SCIENCE (Summer Camps Investigating Ecology in Neighborhood and City Environments) is a camp run by Outreach with ESF students as instructors that exposes middle- to high- school age participants to urban environmental science. In order to provide immediate feedback about the camps, an end-of-camp survey was created and has been administered to SCIENCE Corps participants since 2006. Approximately 741 surveys from 2006 to 2013 were analyzed and categorized according to emergent themes. Answers that contained parts of multiple categories were counted in each of those categories, and percent responses per category were averaged over all 8 years. The overwhelming majority of responses were about activities that included a food component. Overall, 92% said they would recommend this camp to a friend; 62% of these said they would recommend it because it was fun or “cool,” and an additional 25% would because the camp is educational. The results of this survey can help the SCIENCE Corps in the future by providing baseline data that instructors can reference for methods to alter their programs. Additionally, it can help to show potential funders that the camp is successful in
approaching informal science education in a way that is educational as well as fun for all participants and instructors. A more effective survey for obtaining specific data, as well as more information on non food-based activities and lessons, could include utilizing more specific questions, multiple choice questions and a Likert rating scale.

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**Type of Abstract:** Class Project  
**Research Category:** Field Science: Biology & Ecology  
**Level of Research:** Undergraduate  
**Title:** Comparison of the Diversity within Lake and Creek Foam: What’s in the Foam?  
**Abstract:** The foam of lakes is relatively understudied as compared to the foam that accumulates in streams. Aquatic hyphomycetes are indicator species and play important roles in the aquatic food web. The purpose of this study was to find out what aquatic hyphomycetes and other organisms make up the composition of lake foam. Foam samples were gathered from Skaneateles Lake and Butternut Creek and observed with a compound microscope. A Sørenson’s coefficient of community similarity value of 0.004 was calculated, indicating very low overlap of species in the lake and creek foam. We rejected the null hypothesis that lake and stream foam contain the same diversity of organisms (t-test; p<0.05.) We saw that there was an overall greater diversity in the foam of Butternut Creek than in Skaneateles Lake. Hyphomycetes are important to study because they have a fundamental role in matter circulation, energy flow, and biological balance.

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**Type of Abstract:** Research Abstract  
**Research Category:** Field Science: Biology & Ecology  
**Level of Research:** Undergraduate  
**Title:** The Impact of Human Activity on Sedimentary Stored Carbon Levels Within a Mangrove Forest  
**Abstract:** The objectives of this study were to examine the impact of human activity on organic content levels in mangrove sediment. Sediment samples and forest structure data from four sites in Utila, Honduras ranging in degradation levels were recorded and analyzed. Results indicated that forest structure differences are likely influenced more by environmental factors and setting differences than by human impacts and degradation. Additionally, the sediment from the most impacted sites had the greatest levels of organic content, while sediment from the least impacted, marine protected area, had a significantly lower average organic content level. These findings have noteworthy implications for conservation, as the sites that are being dredged and cleared are also those with the highest organic content levels. Ultimately, the findings of this study suggest an urgent need for the conservation of sites that have previously been overlooked and continuously degraded.
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**Type of Abstract:** Research Abstract  
**Research Category:** Field Science: Biology & Ecology  
**Level of Research:** Undergraduate  
**Title:** Color preference in members of the order Lepidoptera: a case study in central New York  
**Abstract:** Flower color is an important signal utilized by angiosperm plants to attract insect pollinators, especially those in the order Lepidoptera (moths and butterflies). Insects are thought to have, both by innate as well as learned methods, preferences for certain colors. It was hypothesized that a specific wavelength of color would be more attractive to nocturnal Lepidoptera, and that wavelength preference would vary by the taxonomic level of family. This was tested by setting up a light with interchangeable filters in a field over the course of 48 days, collecting and identifying (and later releasing) specimens caught. A total of 577 moths were caught, belonging to 15 families. The most commonly caught family was Crambidae, followed by Geometrical. When results were analyzed it was found that moths were predominantly attracted to ultraviolet wavelengths, however, there is no correlation between what family an individual is in and the wavelength of light they were attracted to. Knowing this information may lead to an ability to best practices about what outside lighting choices people choose to minimize disturbance of Lepidopteran flight at night. It also is helpful for outreach and education, as programs can use the most efficient light color to collect insects as a teaching tool and to increase awareness and interest in insects.

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**Type of Abstract:** Research Abstract  
**Research Category:** Field Science: Biology & Ecology  
**Level of Research:** Undergraduate  
**Title:** A mussel by any other name: Implications of potential zebra mussel invasions in Song Lake  
**Abstract:** Song Lake, located in Tully, New York, has no stream inlets or outlets and allows only private boating and swimming access to residents. These two factors have contributed to a historically low incidence of non-native species introduced to the lake. Currently the only known mussel population in the lake belongs to the Unionidae family, also known as “pearly mussels,” which are experiencing high rates of population declines throughout North America. We designed a meccosm experiment to determine how the ecosystem dynamics within Song Lake might be affected by the colonization of Dreissena polymorpha (zebra mussels), an invasive species known to promote dramatic alterations in the ecological balance of many North American aquatic systems. We accomplished this by comparing phytoplankton consumption, levels of total dissolved phosphorous, and the average rate of change in dissolved oxygen found in the sediments within aquarium tanks containing D. polymorpha and Lampsilis radiata, the
resident unionid species of Song Lake. Data analyses showed that tanks containing D. polymorpha exhibited the highest overall rate of decline in chlorophyll-a, with a statistically significant difference between the D. polymorpha and L. radiata tanks from initial readings to day 1. This implies that overall phytoplankton consumption rates were highest in the D. polymorpha tanks. We also found higher rates of increase in biologically available phosphorus in the D. polymorpha tanks, with a statistically significant difference after 13 days. Finally, the L. radiata tanks showed a statistically significant higher rate of oxygen consumption at the sediment-water interface compared to the control, which implies that the unionids promoted more microbial activity in the sediments.

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**Primary Department:** EFB  
**Type of Abstract:** Class Project  
**Research Category:** Laboratory Sciences  
**Level of Research:** Undergraduate  
**Title:** Non-cryo Technique For Capturing High Resolution Images Of Snow In A Scanning Electron Microscope  
**Abstract:** Water shortages have been a major problem faced by cities and municipalities that has been becoming more and more exaggerated over the last decade. One solution being investigated by the U.S. Department of Agriculture includes analysis of snowpacks to determine the amount of water that will be released into a given area during the spring melt. By utilizing electron microscopy to analyze the size of snowflakes from different locations it becomes possible to more accurately determine the amount of water trapped in a snowpack of a specific region. One major limitation with this technique is the cost of a scanning electron microscope capable of such analysis. Through the use of cyanoacrylate to preserve snowflakes it is possible for labs that do not have a cryo-SEM to conduct such studies of their own at a low cost. This technique also allows for easy and rapid sampling in the field and preservation of samples without costly freezers or cryogenic equipment. Utilizing cyanoacrylate and a small plastic container chilled to 0°C it is possible to preserve snowflakes in a way that allows analysis to be conducted at room temperature.

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**Primary Department:** EFB  
**Type of Abstract:** Research Abstract  
**Research Category:** Laboratory Sciences  
**Level of Research:** Undergraduate
Title: Properties and Microbial Community Analysis of Soil from the Tahawus Mine Site

Abstract: Metal contamination from electroplating companies, coal burning power plants, and mining and transit have contaminated many environments with metals that are toxic to plants, microorganisms, and people. As of May 2004, the United States has over 40,000 contaminated sites according to the EPA. Physical and chemical properties of soil i.e. pH, conductivity, redox potential, particle size, and metal and organic content affect the types and abundances of soil bacteria and fungi present. This also impacts plant recruitment and survival. Our study site is the Tahawus Mine, located outside Newcomb, New York, within the Adirondack Park. The site was originally an iron mine, which then switched over to titanium extraction, and is now in a shutdown phase. Physical and chemical properties of the soil substrate at different locations within the mine site will be assessed and compared where both colonizing and introduced plants are surviving and where they are not. ICP MS will be used to assess the concentration of metals present in the soil. Physiochemical properties such as pH, conductivity, and water holding capacity will be analyzed. The types and numbers of bacteria, molds, and actinomycetes are being assessed and compared between sites. It is hypothesized that areas with a more diverse soil community will be more conducive to plant establishment and growth while less hospitable sites will show a different or less diverse soil community and exhibit low plant recruitment and survival. It is hoped that this comparison will better guide land management and soil amendments to facilitate plant establishment.

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Primary Department: EFB

Type of Abstract: Class Project

Research Category: Laboratory Sciences

Level of Research: Undergraduate

Title: The American Chestnut Project: The Molecular Aspect of Reproducing The American Chestnut Tree

Abstract: The American Chestnut Project is focused on replenishing the USA with the native Chestnut tree by genetically modifying the trees for survival. The American trees have been dying off due to Chinese chestnuts that were brought over to America in the 1900’s. The trees that were brought over from Japan contained the blight, Cryphonectria parasitica. This blight has killed over 3 billion American chestnut trees. The goal is to bring back the American trees by using selective genes from the Chinese trees that show resistance to the blight. To ensure the pick up of the genes, during the embryo stage, DNA purification is performed and gel electrophoresis is used to check for the presence of the genes. Once the embryos that contain the genes are identified, the RNA of the seedlings is extracted and purified. The RNA is used to create cDNA to test the level of expression of the genes to ensure that the level of expression is within the desired range. Those not within the range are removed and the positive groups are analyzed by planting the seedlings to perform leaf assays. The area consumed by the blight is measured; those with a diameter similar to a Chinese tree are kept and planted. Throughout this process, there are significant numbers of embryo’s that haven’t taken up the genes of interest. If the embryos show resistance to the blight then they’re planted in the field to see how maturity will affect their ability to fight the blight.
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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Undergraduate
Title: Small Mammal Consumption of Hypogeous Fungi in Newcomb New York
Abstract: There have been many accounts of small mammals consuming and dispersing subterranean (hypogeous) fungi, yet few studies have been conducted in the Northeastern United States. For this reason, we analyzed several small mammal species including deer mice (Peromyscus maniculatus), southern red-backed vole (Myodes gapperi), eastern chipmunk (Tamias striatus) and short-tailed shrew (Blarina brevicauda) to determine the extent of fungal consumption in the central Adirondack Mountains in New York. Analysis of several other species caught infrequently during the study included smoky shrews (Sorex fumeus) woodland jumping mouse (Napaeozapus insignis) and northern flying squirrel (Glaucomys sabrinus). Examination of 57 fecal samples revealed fungal spores of the hypogeous fungi Glomus spp. and Russulaceae with one sample from eastern chipmunk containing Gautieria and one sample from flying squirrel containing spores of the family Boletaceae and Elaphomycetaceae not found in other samples. We found Russulaceae spores in 66% of eastern chipmunks and 35.7% of red-backed voles. Glomus spores occurred in 35.7% of red-backed voles, 16% of eastern chipmunks, 10% of short-tailed shrews and 5% of deer mice. Comparisons of fungal and insect items to sex, area and species resulted in few statistically significant differences (p > 0.05). However, it is clear that small mammals are consuming hypogeous fungi in the Northeast.

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Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Undergraduate
Title: Predation Avoidance Mechanisms of Juvenile Arapaima: Significance of Synchronized Breathing and Sound Production
Abstract: Arapaima spp. are large, commercially important but poorly studied freshwater fishes endemic to the Amazon and Essequibo rivers of South America. Arapaima are obligate air breathers with a modified lung-like swim bladder. Surfacing to respire exposes arapaima to a higher predation risk, especially the small juveniles. Surfacing in synchrony could reduce predation risk of individual arapaima. Synchronous breathing has been observed with many air-breathing fish, but it has not been documented with arapaima. Many fish are also known to produce characteristic sounds to startle predators when attacked, but such sounds have not been reported for arapaima. An investigation of predation defenses of juvenile arapaima was conducted by quantifying breathing frequency patterns over a diel cycle. Also, the ability to
produce startle sounds was evaluated by simulating predation (i.e. grasping the fish). Young arapaima exhibited synchronized breathing throughout the day; mean number of arapaima per breathing event was significantly higher (p<0.01) during daylight than dark. More pronounced synchronized breathing during daytime suggests a response to greater predation risk from visual predators like birds. A characteristic sound was recorded during respiration events. No disturbance sounds were observed when a simulating predation on smaller arapaima (30-50cm TL); however sounds were recorded with larger arapaima (75-125cm TL), both in and out of the water. This first demonstration of sound production ability in arapaima raises the possibility that these sounds could be used in various social contexts. Further investigation of these sounds is needed to understand their functions throughout the life of the arapaima.

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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Determining host-parasitoid linkages between Sirex noctilio and Sirex nigricornis through molecular techniques
Abstract: The European woodwasp, Sirex noctilio, is a wood-boring insect native to Eurasia and North Africa, which was accidentally introduced across the Southern Hemisphere where it caused extensive economic damage to conifer plantations. Discovered ten years ago in North America, S. noctilio competes directly with Sirex nigricornis, a native congener, through shared resources in host trees. The two species also share a suite of six parasitoids, which utilize both native and non-native species of woodwasps as hosts. To study these interactions, it is common practice to fell trees and split logs from which siricid larvae and their parasitoids are collected. It is exceedingly difficult to identify larval species due to their indistinct morphology. The objectives of this study were to: 1) differentiate between the native S. nigricornis and the non-native S. noctilio using PCR assays and 2) determine if such assays can be used to indentify host species from a parasitoid’s gut contents. DNA was extracted from 206 siricid larvae and 182 were identifiable as S. noctilio (111, 54%) or S. nigricornis (71, 34%) using PCR, illustrating the applicability of this technique to differentiate among Sirex species. Identification of species from DNA extracted from gut contents of parasitoids was also successful (28 of 46, 60%). However, identification of species from DNA extracted from host cadavers associated with parasitoid larvae was less successful (8 of 35, 23%). Being able to successfully identify trophic linkages associated with non-native species is important to understand how they will invade an area and their ecological impacts.

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Primary Department: EFB
Type of Abstract: Outreach Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Undergraduate
Title: Visitor Services Internship with the Long Island National Wildlife Refuge Complex
Abstract: During the summer of 2013, I worked with the Long Island National Wildlife Refuge Complex as a visitor services intern. Prior to the start of my internship (May 14, 2013), I met with my internship advisor Professor Beth Folta to discuss our expectations for the internship. As the visitor services intern, I split my time between two of the seven national wildlife refuges on Long Island, Wertheim National Wildlife Refuge and Morton National Wildlife Refuge. My primary responsibilities while at Morton National Wildlife Refuge were to staff the visitor contact station, maintain refuge facilities, assist biological interns with monitoring of endangered and threatened beach nesting birds, and research, develop, promote and implement five different interpretive programs at refuge. My main responsibilities while at Wertheim National Wildlife Refuge were assisting and leading programs to campers between the ages of 7 and 11 for the Barrens to Bay summer camp, counting entrance fees and roving interpretation for visitors along the refuge trails. Through this internship I became certified as a basic archery instructor, and attended the Flying Wild workshop held by the DEC. Upon the conclusion of the internship (August 10, 2013), both myself and my supervisors, Jody DeMeyere and Todd Weston, completed evaluation sheets.

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Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Undergraduate
Title: Nest site selection and differential defense responses based on nest substrate in Neotropical arboreal termites (Nasutitermes spp.)
Abstract: Nest site selection in a variety of species can be impacted by the assessment of predation risk. Predation risk is evaluated by factors such as nest height, concealment, and substrate type. With the assumption that predation risk varies among substrate types, Nasutitermes spp. were predicted to non-randomly select nest sites based on substrate type and to display differential defense response as a function of substrate. If provided with vibratory cues prior to nest breach, Nasutitermes spp. were predicted to react to the breach more quickly or with more soldiers. Seventy five nests were surveyed at the Palo Verde Biological Station in Guanacaste, Costa Rica to record nest substrate type, nest area, nest coverage by vegetation, and potential nest sites within a 10 m radius. Upon nest breach, the time to the first soldier’s arrival and the subsequent number of soldiers that flocked to the disturbance site were recorded for each active nest. Nasutitermes spp. nest site selection reflected the availability of accessible substrate types rather than reflecting a preference for one type. There was no change in defense response in relation to substrate type or the presence of advance vibratory cues. Nasutitermes spp. nest site selection is not influenced by substrate type, suggesting that substrate types may not experience differential predation risk.

Name: Ryan, Thomas
Title: Concentration of corticosterone in starlings based on light treatment

Abstract: LED and fluorescent light are useful forms of light, but have properties that vary from traditional light forms due to their synthetic origin. These properties may have adverse effects on the behavior, particularly stress level, of urban wildlife, should urban design begin to incorporate this technology. European Starlings, an abundant avian resident of urban areas, were captured via mist netting and subjected to differential light treatments intermittently over a course of fourteen days to determine the effects of said treatments on their stress levels. Fecal samples were collected at consistent intervals and these samples were extracted and subjected to an ELIZA hormone assay to determine the concentration of corticosterone, the “stress hormone” of birds. Results indicated a negligible difference in the concentration of corticosterone in the fecal matter of the captive birds both across treatments and over time, as analyzed by a 2-way ANOVA. Captive birds may have corticosterone levels influence more significantly by the nature of a captive study than by the specific light treatments themselves. These results indicate the lack of a significant effect of light treatment on the stress levels of birds.

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Type of Abstract: Research Abstract

Research Category: Field Science: Biology & Ecology

Level of Research: Undergraduate

Title: A comparison of light traps and zooplankton grabs for performing invertebrate assemblage surveys in the St. Lawrence River

Abstract: The near shore invertebrate assemblages of four bays along the St. Lawrence River were surveyed as an extension of a juvenile muskellunge survival study to better understand the potential prey base. Zooplankton and macroinvertebrates were collected using light trap and zooplankton grab sampling methods. Since larval muskellunge are visual predators, there is a need to understand the prey community composition. Two gears were compared to determine the optimal approach to represent invertebrate community structure. The light traps were set at night simultaneously for thirty minutes at each bay. In the laboratory, samples were scanned under a dissection microscope for rare organisms and subsampled to a minimum of 200 organisms counted in milliliter increments. The zooplankton grabs were performed during daytime by taking three 2L samples sieved through 60µ mesh within a 1 meter square plot. The two sampling methods produced similar species composition, but with very different community structure. The light traps had greater overall abundance and greater diversity; however it likely selected for photopositive organisms. The zooplankton grabs do not discriminate which organisms are being selected in the water column, but may be missing organisms which are benthic oriented during the day. The differences in the results of each method show the
importance of using multiple sampling methods, and indicate a strong bias may exist for surveys that employ a single gear.

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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Deciphering the Role of the aauR Gene in the Biosynthesis of Pyoverdine in Pseudomonas aeruginosa
Abstract: The opportunistic pathogen Pseudomonas aeruginosa is a gram-negative bacterium that causes fatal infections in patients with weakened immune systems. Production of two siderophores (pyoverdine and pyochelin) by P. aeruginosa mediates the uptake of extracellular iron, which is believed to increase virulence. Recently, we discovered that the biosynthesis of pyoverdine was dependent on acidic amino acid transport in P. aeruginosa PAO1. The acidic amino acid uptake regulator AauR in PAO1 is believed to activate transcription of the aatP and aatM genes, which encodes for an ATP-dependent amino acid transporter. We found that the growth of P. aeruginosa PAO1 on minimal media containing acidic amino acids (L-Glu, L-Gln, L-Asn and L-Asp) was dependent on the aatP/aatM genes, but not aauR. However, disruption of the aauR, aatP and aatM genes prevented the biosynthesis of pyoverdine under iron starvation. Subsequent analysis revealed that these three mutants exhibited siderophore activity when grown on siderophore-detection chrome azurol S agar plates. Since, siderophore production was confirmed for all strains, the next step is to determine the specific type of siderophores being produced by each strain. The ability to determine how aauR regulates pyoverdine biosynthesis has the potential to bring us one step closer to being able to control P. aeruginosa infections in patients with compromised immune systems.

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Research Category: Field Science: Biology & Ecology
Level of Research: Undergraduate
Title: Using Zooplankton as Indicators of Environmental Quality to Inform Management of Small Lakes of Eastern New York
Abstract: Zooplankton play an integral role in the function of aquatic food webs and may serve as indicators of productivity, biodiversity and ecosystem health. The objective of this study was to determine if zooplankton quality (based on total lipid content) and community structure are associated with physical and chemical variables that can be used as indicators of environmental quality among small lakes in eastern New York State. A diversity of small lakes in eastern New York State (n=25) were sampled for zooplankton with vertical tows (153um mesh nylon) and 50
were enumerated and identified and total lipid was determined. Physical variables were also collected including: dissolved oxygen, pH, conductivity, shoreline development, secchi depth, nutrients (i.e. total dissolved phosphorous, silica), residential density, and percent forest cover. Highly correlated environmental variables were identified using a Pearson correlation matrix. Significant correlations (<0.0001) included, depth and temperature, percent forest cover and conductivity, and resident density and conductivity. Canonical Correspondence Analysis (CCA) showed that particular zooplankton species exhibited strong correlations to percent forest cover, residential density, and overall size of body of water. Specific lakes grouped with factors including residential density, shoreline development and if they exhibited thermal stratification. Lake grouping by environmental variables will be related to zooplankton quality. Patterns observed can be used to inform how lake associations can develop strategies and improve management practices for lake ecosystem management.

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Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Potential for Ornamental Plants for Food Processed Waste Water Treatment
Abstract: The use of plants as a means of treating food processed waste water is a new and potentially beneficial type of phytoremediation. The objective of this study is to test how well selected plant species handle a high nitrogen and phosphorous waste water solution. In a best case scenario, the plants will not only survive in the waste water but will be able to reduce the high levels of nitrogen and phosphorous from the waste stream. The described portion of the experiment tested the survival potential of common ornamental plants, while other team members tested the survival potential of common agricultural plants. The common unit of measurement is the change in the biomass of the plants as the plants were grown in common Hoagland’s solution and in the experimental waste water.

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Primary Department: EFB
Type of Abstract: Research Abstract
Research Category: Laboratory Sciences
Level of Research: Undergraduate
Title: Research on strain of soil bacterium, BamANCPI as potential biological control treatment for chestnut blight fungus, C. parasitica.

Abstract: The American chestnuts, Castanea dentata were a magnificent and ecologically significant part of eastern U.S. forests until the early twentieth century, when chestnut blight (caused by the introduced fungus C. parasitica) wiped out nearly all mature trees and continues to be a problem in the United States today. Currently restoration efforts are underway, but so far there isn’t a single effective way to completely cure an infected tree. Some methods used to control the fungus include injecting a tree with fungicides, fungal hypovirulence, and the soil compress method. The latter utilizes some component in soil that can slow the blight fungus, and in some cases, heal cankers on trees. A strain of the soil bacterium, Bacillus amyloliquefaciens (denoted BamANCPI) was discovered to inhibit the growth of C. parasitica in vitro. Bacillus sp. have been used as biocontrol agents in other agricultural disease systems, such as controlling wilt from Fusarium oxysporum in tomatoes. As a pilot study, American chestnut trees were inoculated with the BamANCPI at Heiberg Forest, Tully, NY in an attempt to combat the fungus. In addition, chestnut seeds were submerged in liquid cultures of BamANCPI to introduce the bacteria into the plant before germination. The bacteria has been successfully re-isolated from tree tissue after both introduction methods, and its identity was confirmed with PCR and DNA sequencing. If treatment with BamANCPI proves to consistently reduce or prevent chestnut blight symptoms, this biological control method could be a noteworthy benefit to American chestnut restoration efforts.
Environmental Science

Name: Cowen, Matthew

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Primary Department: Environmental Science

Type of Abstract: Research Abstract

Research Category: Laboratory Sciences

Level of Research: Undergraduate

Title: Use of Soil Apparent Electrical Conductance to Develop a Soil Drainage Class Map for a Clearcut Plot in Heiberg Forest Using Geostatistical Analysis

Abstract: Soil apparent electrical conductivity (ECa) has been shown to be a useful variable in agricultural applications to differentiate soil physical and chemical properties. ECa data were collected from an 11.8 acre clearcut plot at the Heiberg Forest near Tully, New York on June 6th 2012. A geostatistical model was created to develop an ECa prediction surface as the basis for a soil drainage class map. The map was produced by calibrating the ECa model values to the corresponding to the drainage classes observed at test pits. The resulting soil drainage class prediction model provided a 2-m spatial resolution accuracy of 86%. Soil ECa data coupled with directed site sampling can provide high spatial resolution drainage class maps for use in forestry applications.

Name: Gaskill, Jacob

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Primary Department: Environmental Science

Type of Abstract: Research Abstract

Research Category: Field Science: Biology & Ecology

Level of Research: Undergraduate

Title: Examining the effects of pH and macrophyte diversity on benthic macroinvertebrate assemblages in Adirondack lakes

Abstract: Acidification in ecosystems, such as water bodies of the northeastern United States, causes significant changes in their biological communities. Changes in lower trophic levels can suggest how the entire system will react to increased acidification. Benthic macroinvertebrates are useful when examining the effects of acidification because different species are tolerant or sensitive to particular conditions and can act as indicators of water quality. Macrophyte diversity is another explanatory variable influencing macroinvertebrates. Many studies have examined macroinvertebrate assemblages in streams related to water quality, but macroinvertebrates in lakes are less well studied.

We compared the benthic macroinvertebrate assemblages in four Adirondack lakes with differing pH. We predicted that as pH decreased, the abundance and diversity of the macroinvertebrates would decline. To test this, we measured pH and collected 40 sediment samples from four Adirondack lakes using a PONAR. Macroinvertebrates were sorted, identified to the lowest possible taxon (generally family or genus) and tallied. Macrophytes were identified and diversity was estimated with the Shannon Diversity Index.
Macroinvertebrate diversity decreased with lower pH (p = 0.03) and increased with greater macrophyte diversity (p = 0.02). However, total macroinvertebrates abundance was not statistically significant with pH (p = 0.08) or macrophyte diversity (p = 0.07). Diversity is often considered a strong indicator of ecosystem health, thus our results suggest that further reduction of acidification may restore diversity of low trophic levels in the Adirondacks.

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Primary Department: Environmental Science
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: Comparison of net present value of residential photovoltaic installations in Arizona, Hawaii, New York and West Virginia
Abstract: A Net Present Value model of residential photovoltaic systems was developed to examine the variation in economic returns for various geographic regions in the United States. Existing government subsidies were excluded in the analysis to determine the underlying economic returns for the photovoltaic systems. In addition, carbon prices were modeled to reflect the variation in returns under differing levels of a carbon tax. Four states were selected, Arizona, Hawaii, New York and West Virginia, to represent different combinations of solar radiation and electricity prices. The scenarios in the model for carbon prices ranged from 0 - 100 dollars per ton based on the state average carbon emissions (CE) per kilowatt hour (Kwh) of electricity produced. The model also includes scenarios to reflect professionally installed (PI) and self installed (SI) systems, where the self-installed system cost three quarters of the professionally installed system. Hawaii was found to have the largest NPV with present values ranging from 19 to 32 thousand dollars. Arizona had an NPV of negative $6,700 to positive $5,000. New York had a similar range as Arizona with the present values ranging from negative $3,800 to positive $4,100. West Virginia’s range was from negative $12,000 to positive $1,600. This led to the conclusion that without existing incentives residential photovoltaic installations only made economic sense in New York and Hawaii out of the states tested.

Name: Moneymaker, Brigitte
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Primary Department: Environmental Science
Type of Abstract: Research Abstract
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry
Level of Research: Undergraduate
Title: The Effect of Soil Nitrogen Oxide (NOx) Emissions on the Photosynthetic Activity of Potential Biofuel Crops
Abstract: The purpose of this experiment was to investigate the impact of nitrogen oxide (NOx) fluxes on the photosynthetic activity of biofuel feedstock. In response to the growing threat of air pollution, the levels of trace gases in the soil are an important factor that can impact a crop’s
viability. In order to test the photosynthetic ability of biofuel crops at different NOx levels, the rate of gas exchange through stomatal conductance was measured for five different biofuel plots at the Great Lakes Bioenergy Research Center at the Kellogg Biological Station in Michigan. The soil NOx emissions were monitored through an automatic greenhouse gas analyzer, while gas exchange was measured with a handheld Leaf Porometer. The specific plots used were five separate fields of corn, poplar, soybean, switchgrass, all with differences in crop type and management inputs.

The most productive results from this experiment was that C3 plants (soybean and poplar) responded to increased NOx emissions by decreasing stomatal conductance, which was statistically significant at p<0.5. Alternatively, the C4 plants (corn and switchgrass) exhibited a threshold-like response with NOx fluxes reached ~3ug/m2h. When the temporal dynamics of NOx fluxes were graphed for each plot, there were significant spikes in NOx emissions that corresponded with significant precipitation and management events.

The implications of this experiment, reinforce the idea that lowered biofuel productivity due to soil trace gases could impact the potential of meeting the future demand for a more sustainable energy source. Further research in air and soil NOx emissions is needed to narrow down the specific physiological responses of biofuel feedstock to increased NOx emissions.

Name: Panossian, Marie
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Rutherford, Allison - Department of Sustainable Energy Management
Primary Department: Environmental Science
Type of Abstract: Class Project
Research Category: Social Science
Level of Research: Undergraduate
Title: Re-evaluation of SUNY-ESF’s CAP for Carbon Neutrality by 2015
Abstract: In 2009, the SUNY College of Environmental Science and Forestry (ESF) put into place its climate action plan (CAP), “ECN 2015: ESF Carbon Neutral by 2015,” with the objective to become carbon neutral by June 30, 2015. Climate action plans detail the sources of greenhouse gas (GHG) emissions and describe strategies to reduce GHG emissions. ESF required a re-evaluation of the initiatives detailed in ECN 2015 by 2014. Given that some strategies found in ECN 2015 have not been fully implemented, it is our task to (1) determine which initiatives should be pursued; and (2) modify ESF’s CAP. The Clean Air Climate Protection (CACP) software package was used to estimate the GHG emissions at SUNY-ESF. With the addition of new information and initiative updates, new GHG emissions estimates were calculated to inform GHG reduction strategies. We posit that ESF may achieve their goal of carbon neutrality by 2015 by continuing their existing CAP strategies and purchasing renewable energy.
Environmental Resources Engineering

Name: Alexander, Elliot
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Department of Environmental Resources Engineering
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Primary Department: ERE
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Undergraduate
Title: Stormwater Retention Simulation on the Gateway Building Green Roof – Syracuse, NY
Abstract: During extreme storm events, urban rooftop runoff is a contributing factor to combined sewer overflows (CSOs), which is a serious water pollution problem that occurs regularly in Syracuse, NY. The construction of the Gateway Building green roof has aided reducing the frequency and severity of these CSOs events. In recent years, Water Resources Engineers have been grappling with creating new methods of assessing stormwater retention in green roofs using computer models. The research that I will present addresses the need for methods of evaluating stormwater retention through the using public domain software, HYDRUS one-dimensional flow simulator.

The initial objective of this research was to apply the known soil properties of saturated water content and hydraulic to RETC software to develop a soil water retention curve for the green roof soil. In finding the soil water retention curve, the unknown soil hydraulic properties of residual water content, air entry potential, and a curve fitting parameter were computed using the RETC program. The next object of this research was to utilize the computed soil properties in the HYDRUS program to simulate storm water retention in two separate conditions. The simulation results indicated that a significant amount of water is retained in the soil for a week period, which demonstrates that the green roof soil has a satisfactory water holding capacity. In conclusion, the data obtained from this study is beneficial to the field of stormwater management through providing another tool of evaluating the performance of green roof systems.

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Primary Department: ERE
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Undergraduate
Title: Renewable Energy in the Andean Highlands
Abstract: Abra Malagá Thastayoc is a rural Andean community consisting of Quechua-speaking inhabitants practicing self-sufficient agriculture, pastoralism and traditional weaving techniques. Like many rural villages in Peru, this community lacks a connection to the electrical grid and there is little chance of this happening in the near future. Most local households do not have lighting, and community members must travel long distances to charge basic electrical devices.
The main objective of this work is to provide accessible sources of electricity to twenty households in Abra Malagá Thastayoc using off-grid alternative energy sources (a combination of solar and micro-hydropower) while also developing a sustainable model for rural electrification in the Peruvian highlands. The target audience is the community of ESF and Syracuse to see the work I have been doing in Peru for the past two years. The partners in this project are the ESF Engineering for a Sustainable Society Club, The Amazon Conservation Team, and Asociación Ecosistemas Andinos. Beginning in August 2012, this project has progressed quickly and out of the 20 homes without electricity, there are only 3 remaining.

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Primary Department: ERE  
Type of Abstract: Research Abstract  
Research Category: Field Science: Hydrology, Chemistry and Biogeochemistry  
Level of Research: Undergraduate  
Title: Pinniped Health and Algae Control Methods for Saltwater Pools at the National Zoo  
Abstract: In an effort to address eye problems in captive pinnipeds, the Smithsonian’s National Zoological Park made several modifications to correct the potential causes through a recent renovation of their American Trail exhibits. One of these modifications was switching the main disinfectant used by the life support system from chlorine to ozone. However, since these renovations, the pools have had a higher incidence of benthic algae. One of the chief concerns about the algae was how it might impact visitor experience. I administered a survey to assess the impact of the algae on the zoo’s visitors. Sixty-eight percent of visitors claimed not to see any algae during a period of high algae levels. The zoo still finds the algae undesirable, but wishes to avoid the cost of emptying and filling the pool associated with the current algae cleaning method. Thus, I examined alternative methods of controlling the algae. This included consulting with other zoos and aquariums, with similar pinniped exhibits, on their treatment system and cleaning methods and performing a literature review of algacides, barley straw, and hydrogen peroxide as potential methods of algae control. I also looked at why the new treatment system was less effective against algae, and how delaying salting the pinniped pools was affecting the efficiency of the new treatment system. As a result of this research, I provided several recommendations on how to reduce algae levels in the pinniped pools to the zoo.

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Primary Department: ERE  
Type of Abstract: Research Abstract  
Research Category: Engineering/Landscape Design  
Level of Research: Undergraduate  
Title: Infiltration Characteristics of Burned Soil  
Abstract: The infiltration rate of a soil varies with time and depends upon soil texture, structure, and uniformity. Soils that develop a crust due to sediment deposition during flooding, or as a
result of aggregate breakdown due to raindrop impacts or mechanical compaction demonstrate substantially lower infiltration rates than comparable soils without a crust. Similarly, fire can also reduce the infiltration capacity of soils by destroying soil structure, creating a hydrophobic layer, depositing ash, and removing sheltering vegetation. If the infiltration capacity is reduced, then less soil water is available to support soil microbial and plant life, groundwater recharge is hindered and surface runoff increases. Objectives of this research are to determine the effect that burning leaf detritus has on the infiltration rate of soils, and whether burned soils recover to pre-burn conditions over time. The experiment used replicated recompacted soil cores exposed to controlled burn conditions in steel drums filled with leaves to simulate forest floor conditions. Mini-Disk Infiltrometers were used to determine soil infiltration rates before the burn and after controlled burn. As expected, pre-burn infiltration rates were initially high and decreased to a steady state condition. The infiltration rates of post-burn soil cores did not follow this trend. Infiltration rates were initially zero or negligible for an extended period, and the steady state infiltration rates were substantially less overall. Heat from the burning leaves may result in changes of physical or chemical properties that cause hydrophobicity, reducing the infiltration rate.

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Primary Department: ERE  
Type of Abstract: Research Abstract  
Research Category: Laboratory Sciences  
Level of Research: Undergraduate  
Title: Palladium/Metal Oxide Based Nanostructures as High-Performance Hydrogen Gas Sensors  
Abstract: Pure palladium hydrogen sensors based on networks of ultrasmall nanowires sputter-deposited on a filtration membrane have shown promising results, especially when alloyed with other metals or when layered with other metals, but still cannot distinguish hydrogen concentrations below 3% or at high operating temperatures, thus limiting the safety and application of the sensors. This study reports on new resistance based sensors of alternating nanowire network layers of pure palladium and titanium dioxide. These sensors show promise at sensing both low hydrogen concentrations, as low as 0.01%, and at sensing hydrogen at an operating temperature of 150 degrees Celsius; a step in the direction of sensors that work at temperatures approaching 1000 degrees Celsius. Although the titanium dioxide layers are not as sensitive to hydrogen as the palladium, they help to increase the durability and potential operating temperature of the sensor by providing additional adhesion and sensing properties.
Environmental Studies

Name: Adams, Emily  
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Primary Department: ES  
Type of Abstract: Class Project  
Research Category: Social Science  
Level of Research: Undergraduate  
Title: Nothing Collapses: A Different Way of Communicating Environmental Issues  
Abstract: For my senior synthesis project, I completed a creative senior paper under the guidance of Janine DeBaise. My senior paper is a two hundred page fiction manuscript entitled Nothing Collapses. The manuscript is a science-fiction/dystopian based story with relevant environmental themes such as climate change, overpopulation, and the unhealthy relationship we often have with the environment. My main objective for this project was to explore a different, more entertaining way of communicating about important environmental issues to the general public. My target audience is anyone that enjoys science-fiction and dystopian novels, as well as anyone that has an interest in the environment. The main question I aimed to answer in the novel is: If the world looked grim and hopeless, and you had the opportunity to live out your life in a better, but completely illusionary place, would you? Or would you feel compelled to stay and try to improve your world?

Name: Adler, Kelsey  
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Primary Department: ES  
Type of Abstract: Outreach Abstract  
Research Category: Social Science  
Level of Research: Undergraduate  
Title: Policy to the People! A Summer Spent in Washington, D.C.  
Abstract: As an environmental policy major, I’ve always dreamt of working alongside leaders in the environmental field. This past summer, I was given that chance, and was offered an internship with Environment America, working in our nation’s capital. Environment America is an environmental advocacy group made up of 29+ state affiliates. As an intern, I worked on environmental protection by utilizing a variety of different methods and techniques, such as lobbying for strong environmental policy, and on the grassroots level by encouraging public involvement. My duties focused on energy efficiency legislation, in particular, the efficiency of buildings within the government sector, which is the fourth largest emitter of greenhouse gases in the country. Specifically, I conducted research on Section 433 of the Energy Independence and Security Act, which aims to make the federal government a leader in energy efficiency. Originally implemented in 2010, Section 433 requires all new federal buildings to reduce their fossil fuel use by 100% by 2030. Due to its drastic measures, Section 433 is an extremely controversial topic, and was being attacked by anti-environmental interests. My goal was to find real world examples of successful fossil fuel free buildings, in order to build support for the
protection of the existing legislation. I then turned this data into a draft report for Environment America.

This summer taught me that a single individual can make a difference, and together, we can change the world. By combining policy and grassroots movements, I am hopeful that our future will be bright.

Name: Alison Gibson
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Primary Department: ES
Type of Abstract: Outreach Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: Communication and Outreach Writing Assistant for the ESF Office of Communications
Abstract: As a Communication and Outreach Writing Assistant for the ESF Office of Communications, under the supervision of Claire B. Dunn, Director of Communications, I primarily submitted articles for publication on the ESF website. The target audience for the ESF website includes current students and faculty/staff as well as family, friends, and prospective students. Most of the stories were centered on campus events, including student activity pieces, first-year experience stories, and on-campus lectures. I helped produce two videos including footage from a student-organization sponsored trip to Pittsburgh for a climate change, young adult conference (Powershift 2013) and footage from a research study by graduate students which was filmed over the summer. The videos were posted through ESF’s social media outlets, including Twitter and YouTube. I learned the differences between writing for broadcast journalism and more traditional journalism writing while increasing my proficiency in Associated Press style. The outcomes included increased media attention to student-based stories and on-campus events.

Name: Alper, Gabrielle
Authors with Affiliations: Alper, Gabrielle
Primary Department: ES
Type of Abstract: Class Project
Research Category: Social Science
Level of Research: Undergraduate
Title: Tray Waste Campaign
Abstract: During the fall semester of 2012, interns for the Syracuse University Division of Sustainability held an education campaign and a study on tray waste in the 5 major dining centers at Syracuse University. The internship was supervised by Melissa Cadwell, the marketing manager of Syracuse Universities Sustainability Division, and Dr. Richard Smardon, the Environmental Studies internship supervisor. The purpose of the internship was to test the success of the tray waste education campaign. The internship consisted of preliminary research, the initial tray waste audit, the education campaign, and then a final waste audit to test the success of the campaign. The research involved visiting the Onondaga County Resource Recovery Agency Amboy Compost site, participating in the College & University Recycling Coalition Webinar regarding compost on campus, and internet research on the success of other schools. The audits consisted of Meg Callaghan, Liane DeRosa, and I going to Ernie Davis,
Sadler, Grant, Brockway, and Shaw Dining Centers and measuring the food that patrons were going to throw out. The education campaign included surveying dining center patrons, creating table tents, and making posters that were displayed in the dining centers. The final analysis involved statistical calculations of the contents of the waste audits and the surveys.

Name: Belis, Zachary
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Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: Urban Agriculture: A Policy Perspective
Abstract: This research involves the policies and law that have both encouraged and prohibited the growth of urban agriculture within United States’ cities. The first section outlines the history of urban farming in the United States. This research was done by exploring scholarly sources that have outlined the history of urban farming growth, the policies that were in place, as well as the social context of the projects. Following the background, the paper outlines policies at the federal, state and local levels that both encourage and hinder the growth of urban agriculture in American cities. This research was done by reviewing websites of government agencies as well as scholarly sources that have outlined policies at the various levels. The final section explores an urban farming effort within the city of Syracuse called the Helping Hands Urban Farm Garden. The research was conducted by interviewing the founder and coordinator of the Helping Hands Urban Farm Garden, as well as my personal involvement with the organization and project over the past three years. This research provides insight on the various tools behind putting together urban agriculture projects, and provides information about the difficultly behind these types of projects.

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Primary Department: ES
Type of Abstract: Outreach Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: Outreach Internship with the Regional Plan Association (RPA)
Abstract: From May 20th until July 31st, 2013 I had an internship with the Regional Plan Association (RPA) in New York, NY. I was working as a research and outreach intern for their Energy and the Environment department working on a number of projects. The projects included: doing research to determine the federal role for coastal adaptation and rehabilitation, doing research on the potential for new energy sources in New York City, and doing research on...
the various sustainability plans for the 31 counties that RPA advises. Most of my time was spent doing research for determining the federal role for coastal adaptation and rehabilitation. There was a workshop held among professionals in that field, so I had to tailor my research and findings to be appropriate for these people. My research included reading reports, conducting phone interviews, and using tools such as NOAA’s Sea Level Rise and Coastal Flooding Impacts Viewer, and ArcGIS. The other work I was doing was more private work, and was only presented to my field supervisor. Overall, my internship required me to do adequate research, and then be able to present it to various groups of people including professionals, and public figures, while making sure it was presented in a coherent and informative way. My faculty advisor for this internship was Richard Smardon, and my field supervisor at RPA was Laura Tolkoff.

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Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: Differing Perspectives of Biomass Energy in New York State: Comparing Newspaper and Website Biomass Communications
Abstract: For energy technologies such as biomass energy, an area concentrated on the alternative creation of energy through the use of organic matter such as wood, mass media and other online sources work to frame public perceptions of our energy system. In addition to being sources of information, they also serve as a space for public discourse. Two such sources for information that frame the implementation and study of biomass are newspaper reporting and online information through proponent websites. In this study we collected biomass proponent websites and biomass themed articles in four newspapers located near New York biomass research sites. To examine how biomass technology is framed for public readership in the state, we analyzed text using the socio-political evaluation of energy development (SPEED) framework, coding the materials to determine the tone of the materials as well as presence or absence of the following categories: technological, political, environmental, economic, aesthetic, health/safety and legal benefits and drawbacks. We found that newspaper and proponent websites vary in their content on biomass technologies, where newspaper publications generally show more emphasis on economic aspects of the technology, and industry publications show more emphasis on environmental aspects. With this, we found that the aesthetic, legal and health/safety categories were minimal or nonexistent throughout all content. While there was a noted difference in the present categories of websites and news articles, we found that both were mostly positive in tone. Though this is true, the proponent websites were overwhelmingly positive with no pages coded as negative.
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Sullivan, Joe.
Samblanet, Paige.

Primary Department: ES
Type of Abstract: Class Project
Research Category: Social Science
Level of Research: Undergraduate

Title: Village of Cazenovia Greenhouse Gas Inventory

Abstract: A Greenhouse Gas (GHG) Inventory was performed for the Village of Cazenovia. This inventory will aid the village in pinpointing the main GHG pollution sources within the village. GHG emissions were calculated using several standardized community protocols including Local Government Operations Protocol (LGOP) and Local Community Operations Protocol (LCOP) provided by International Council for Local Government Initiatives (ICLEI) Local Governments for Sustainability. Data regarding vehicle fleet miles traveled, municipal energy use, community energy use and municipal solid waste disposal was provided by our community liaison. This data was then tabulated in the ICLEI’s Clean Air Climate Protection (CACP) software. The result is in Tons of Carbon Dioxide equivalent (CO2e). This information will help to guide the Village of Cazenovia during their Climate Action Plan (CAP) development in the coming years.

Name: DeRosa, Liane

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Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Undergraduate

Title: Case Study on South Bronx, NY: The Role of Alternative Media in Informing or Reflecting Public Opinion on Environmental Justice Concerns

Abstract: This case study and literature review seeks to examine the relationship between environmental injustice and the inequitable disproportion of accessible information services among consumers from diverse public audiences in South Bronx, NY. There is a difference between having information available for an audience, and having knowledge of and access to that information. Media can be useful in informing the public of local environmental issues occurring in their respective regions, however, the process through which these publics consume information is often absent from the environmental justice conversation. In order to fully understand how socio-economically marginalized communities can become involved in the
process of decision making, it is important to understand how these communities become informed about environmental issues impacting them. Peer-reviewed literature was collected regarding cases of socio-environmental injustice and community disenfranchisement. In South Bronx, there are rates of public health issues at the 100th percentile, as well as an average annual income of under $15,000. The emerging need for a broader, more publicly-representative information service and an assessment of the relationship between socio-environmental disparities is valuable. The role of non-profit, nongovernmental and community-based grassroots organizations is important when analyzing how publics are being informed and socially mobilized to solve local environmental justice issues.

Name: Dolan, Teagan
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Primary Department: ES
Type of Abstract: Outreach Abstract
Research Category: Social Science
Title: Engaging and Empowering Appalachian Coal Communities through Water Quality
Abstract: The purpose of this research has been to understand how water quality testing in West Virginia coal-mining communities can be used jointly as a basis for environmental litigation and for engaging and empowering residents in political advocacy. Through a semester literature review and summer field study I was able to combine policy theory and environmental science. I utilized Sabatier’s Advocacy Coalition Framework (ACF), an examination of successful litigation by grassroots advocacy coalitions, and community-informed water quality testing in affected towns. I observed that grassroots organizations are using an inclusive approach based on the belief of equality as a means to unite communities, while water quality testing is utilized as a means to enforce pollution violations through litigation. The objective of my outreach efforts was to provide reliable water quality testing and education to communities struggling with the harmful impacts of mountaintop removal coal mining (MTR). In addition to building local capacity to monitor environmental change, these efforts also served as a mechanism for coalition building. Outreach materials generated through this project included maps of water quality developed through a community-based participatory process, and short informational publications describing MTR impacts on water resources and West Virginia regulations and policies. Materials were designed to be user-friendly to each participating community. Overall, this case study illuminates how science alone is not enough to pursue environmental justice. Engaging communities with and through that science is imperative in creating change. This proves especially challenging in the isolated, historically disenfranchised, and polarized communities of Appalachia.

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Type of Abstract: Outreach Abstract
Research Category: Social Science
**Level of Research:** Undergraduate

**Title:** Exploring the Similarities: How Studying One Type of Law Will Help You Understand Another

**Abstract:** The United States Social Security Administration (SSA) is an independent agency of the United States federal government that administers Social Security, a social insurance program consisting of retirement, disability, and survivors’ benefits. Upon gaining a thorough understanding of the overall Social Security process, this procedure is compared to those of civil cases and settlements, like environmental cases, filed within the state and federal court systems. Though dissimilar in some aspects, the overall disability determination process parallels those of federal and state filed lawsuits, suggesting that by studying the Social Security process, a person is simultaneously gaining a broader understanding of other civil and criminal proceedings—expertise that could prove to be beneficial throughout any professional’s career.

**Name:** Gaffney, Connorlynn

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**Primary Department:** ES

**Type of Abstract:** Class Project

**Research Category:** Social Science

**Title:** Rosamond Gifford Zoo Camp

**Abstract:** The Rosamond Gifford Zoo has an advanced education department which provides many programs for the benefit of the zoo and community with the purpose of expanding knowledge of the environment. Over the summer the zoo has a Zoo Camp program which is an all day camp in which various aged-children come to the zoo, do crafts, walk around, and learn about animals and the environment. As a camp counselor I was responsible for creating lesson plans, coordinating curriculum, and utilizing the “bio-fact room” to educate children on various animal species and environmental situations. The bio-fact room was a small closet full of preserved animal specimens and artifacts which are used to help the children understand the intended lessons. Teaching children in an informal environment helped to further my understanding of the classes I have taken, and how to apply the theories presented in a real world situation.

**Name:** Guyer, Casey

**Authors with Affiliations:** Casey Guyer (SUNY ESF), Steve Menges (Clark University) and the Central New York Regional Planning and Development Board (Syracuse, NY)

**Primary Department:** ES

**Type of Abstract:** Research Abstract

**Research Category:** Social Science

**Title:** Reduction of Greenhouse Gas Emissions in the City of Oswego by 2020

**Abstract:** In recent years many communities have developed Climate Action Plans to reduce the effect they have on the physical environment. The purpose of this research was to present multiple initiatives for the City of Oswego to use in their Climate Action Plan to reduce their greenhouse gas emissions. Along side the Central New York Regional Planning and Development Board we met with multiple government officials and local community members.
to receive their input on what they would like to see to achieve a diverse Climate Action Plan. From there we used the Climate and Air Pollution Planning Assistant (CAPPA) workbook to quantify the reduction in greenhouse gas emissions from those initiatives. We found that with the initiatives highlighted by the community, the City of Oswego could reduce their greenhouse gas emissions 33,059 MT CO2e by 2020. The City of Oswego could lower their greenhouse gas emissions by over 20% and lower the effect they have on the environment.

Name: Hoffman, Maureen
Authors with Affiliations: Chris O’Neil, Director at Chittenango Landing Canal Boat Museum
Primary Department: ES
Type of Abstract: Outreach Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: Outreach at the Chittenango Canal Boat Museum
Abstract: The Chittenango Landing Canal Boat Museum provides the public with an opportunity to learn about the historic Erie Canal. The Erie Canal was the first transportation route that connected the Eastern seaboard to the Great Lakes; in doing so it played a central role in helping New York to become the economic hub it is. My objectives for my internship at the museum were to learn the inner workings of a non-profit organization. I worked with my supervisor, the director of the museum Chris O’Neil on a number of projects. We worked on developing funding through grant research, marketing, and a brochure for the New York State Parks. We also worked on revamping their bike rental program with the creation of rack cards, comparing and contrasting to successful programs, and interpretive maps. The museum has a number of education programs, but is lacking a natural history interpretation programs for children. My internship also helped to create a lasting program to teach and give children insight into the importance the natural surroundings were in building the Erie Canal. The program is focused on the role trees play in the building of boats. The children learn how to identify trees on the site and learn why certain trees were used in the production of materials for use of the canal.

Name: Hutchins, Sarah
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The Town of DeWitt, East Syracuse, NY 13057
Sleight, N. B.A. Environmental Science, State University of New York College of Environmental Science and Forestry, Syracuse, NY 13210
Smardon, R. Department of Environmental Studies, State of New York, College of Environmental Science and Forestry, Syracuse NY 13210
Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: A Climate Action Plan for the Town of DeWitt
Abstract: Anthropogenic emissions of carbon dioxide into the atmosphere are a major contributor to global temperature increase. Therefore, it is imperative for municipalities to take immediate action in decreasing these carbon emissions. Through the Central New York Climate
Innovation Program (C2IP), the author assisted the Town of DeWitt in the continued creation and implementation of their Climate Action Plan through data analysis and feasibility studies regarding strategies involving the transportation sector within both the municipality and the community. A compiled list of proposed emission reduction strategies was proposed to the Town of DeWitt. The list was discussed and plausible projects were researched to find applicable data to calculate emission reductions after implementation. The author used ICLEI’s emissions analysis software, Climate and Air Pollution Planning Assistant (CAPPA), to determine potential cost savings and emissions reductions to further determine if these projects were to be implemented and/or continued. This data was compiled into a draft Climate Action Plan for the Town of DeWitt. The draft included outputs from CAPPA, a summary of the benefits of the strategy implementation, a case study and a list of co-benefits. Transportation strategies accounted for 5.1% of emission reductions within the municipality and 4.65% within the community.

Name: Kim, Jin
Authors with Affiliations: David Sonnenfeld, Department of Environmental Studies, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: Exploration of the Advantages and Disadvantages of the Basel Convention
Abstract: The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Convention) was adopted in March 20, 1989 and is the only international convention that regulates the transboundary movement of hazardous waste. Although the Convention has been in force since 1992, there are many inconsistencies. Today, there are 181 parties that have ratified the Convention, which includes China, Ghana, and India. Although those countries have ratified the Convention, they contain the three largest electronic waste landfills. Guiyu, China is home to the largest electronic waste landfill in the world. Agbogbloshie, Ghana is home to the most contaminated water bodies in the world. New Delhi, India is predicted to become the number one site for electronic importation. The citizens of those countries are constantly exposed to heavy metals such as cadmium, arsenic, lead, mercury, and beryllium, which cause respiratory, nervous system, and cancerous health problems. The inconsistencies are exploited by the United States and other parties of the Organization for Economic Cooperation and Development (OECD). Electronic waste exportation is ignored when they are marked as “donations” or accompanied with monetary bribes. The United States has yet to ratify the Convention and therefore is not subject to the rules of the Convention. There is no enforcement procedure in place for parties not bound by the Convention. The Convention needs strict enforcement procedures in order to be a successful regulatory action.

Name: Kirschen, Leanna
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Moran, Sharon. Department of Environmental Studies, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Catz, Karen. Jewish National Fund, Rockville Centre, NY 11570
Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Undergraduate

Title: I. The Jewish National Fund: A Hands-On Educational Experience

Abstract: Under Dr. Sharon Moran, I completed my Senior Synthesis project as an internship in December 2013 on the Jewish National Fund (JNF). JNF is a global nonprofit organization that works to improve Israel’s environment, community and ecology. JNF was founded in 1901 by Theodor Herzl and has since grown into a well-known international institution. It works in six action areas in Israel: ecology and afforestation, water, community development, research and development, tourism and recreation and education. Also, the organization recently developed a water management system in the Negev, a desert in the southern region, that utilizes water resources as new sources of freshwater.

At JNF, I worked as an intern under Caren Katz, Director of the Northeast Center of Excellence in New York. As an intern, I contacted donors and fundraisers, helped plan and work at fundraising events. I also organized all donations in JNF’s online system, Salesforce. I learned not only about the everyday operations of an office (a setting in which I will most likely be working in the future), but also learned more about working for a nonprofit organization, which has always been a dream of mine, and enhanced my communication skills.

As an environmental studies major, I am connected to forestry and ecology, as well as community planning, sustainability and research. This made JNF the perfect choice for me, as it covers all of these bases with their ongoing projects in Israel.

Name: Labuszewski, Amelia

Authors with Affiliations: Selfa, Theresa, Associate Professor. Department of Environmental Studies, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210

Primary Department: ES
Type of Abstract: Class Project
Research Category: Social Science
Level of Research: Undergraduate

Title: Factors affecting willow biomass commercialization

Abstract: As the consequence of a continued reliance upon fossil fuel sources becomes a reality both economically and environmentally, governments and private sector industry are searching for possible solutions. In New York State, one solution may lie in the woody tissue of the shrub willow; a plant whose impressive rate of growth, yield, and relatively low environmental impact make it a viable choice for woody biomass energy. The State University of New York College of Environmental Science and Forestry (SUNY-ESF) has been an important player in willow biomass research since the 1980’s. Currently, SUNY-ESF is working with ReEnergy Holdings LLC., a power provider with multiple plants on the east coast, specializing in the use of biomass and waste for the production of energy, on a project that will take decades of willow research into the next steps of commercialization. In 2012, both organizations embarked upon an outreach program that helps local farmers establish willow crops through funding provided by the United States Department of Agriculture (USDA) Biomass Crop Assistance Program (BCAP), and a guaranteed market for the willow on behalf of ReEnergy. Possible hurdles to willow biomass development include social issues, issues surrounding other forms of renewable
energy, the availability of support programs and resources, and issues with past, current, and future policy. Understanding the nature of these forces and how they may interact in the broader scope will be critical if the development of shrub willow as a renewable energy source is to be successful.

Name: Phillips, Amanda  
Authors with Affiliations: Irvine Nature Center  
Primary Department: ES  
Type of Abstract: Outreach Abstract  
Research Category: Social Science  
Level of Research: Undergraduate  
Title: Camp Counseling and Environmental Education  
Abstract: As a camp counselor at Irvine Nature Center under the supervision of Steve Mickeltz, the Director of Camp Affairs, I will be engaging young children in hands on outdoor learning over the course of this upcoming summer. My objectives for this position are in line with those of the camp—to help forge a meaningful connection between children and their natural environment. In addition, I would like to gain valuable experience working with elementary school aged children as I would like to pursue a career as a professional educator for youth. The camp programs are designed for children between the ages of 4 and 9. The outcomes of the camps are valuable hands on learning opportunities for the children, as well as an increased interest in science and the outdoors. Throughout the summer, I will be working with other counselors, both directly and indirectly, and my field supervisor, Steve Mickeltz. Together, we lead camps, prepare lesson plans, and communicate with families and other staff members.

Name: Regan, Carolyn  
Authors with Affiliations: Regan, Carolyn. Department of Environmental Studies, State University of New York, College of Environmental Science and Forestry, Syracuse NY 13210.  
Primary Department: ES  
Type of Abstract: Class Project  
Research Category: Social Science  
Level of Research: Undergraduate  
Title: Internship Experience: The Long Island Pine Barrens Society  
Abstract: Under the supervision of Dr. Richard Smardon, I completed an internship with the Long Island Pine Barrens Society during the summer of 2013. The Society is a not-for-profit group stationed on the east end of Long Island and focuses on environmental education and advocacy, particularly for and regarding the Pine Barrens ecosystem. I held the position of Project Assistant and worked under the guidance of Executive Director Richard Amper from May through August. I performed many administrative and office related tasks such as front desk management, organizing donation funds and arranging schedules. Additionally, I worked on several ongoing projects of the society, including the production of an episode of a local TV program, the organization of an event to honor the Society’s 30-year anniversary, the attendance of many public forums regarding local environmental concerns and a day of lobbying in Albany for water quality reform. To document this experience, I submitted to Dr. Smardon a bi-weekly journal of my activities, an internship agreement contract and a final evaluation of my performance completed by Mr. Amper. My time with the Society helped to show me the inner-
workings of an environmental group and I believe will prove excellent preparation for a future career in the professional environmental world.

Name: Schwabach, Erica
Authors with Affiliations: Schwabach, Erica. Department of Environmental Studies, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Primary Department: ES
Type of Abstract: Outreach Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: Baltimore Woods Nature Center’s Nature in the City Internship
Abstract: During the duration of the Fall 2013 semester, I completed a semester long internship with the Baltimore Woods Nature Center’s “Nature in the City” program which takes place in Syracuse city schools. When I began seeking out internships for the fall semester, I was looking for something that would be meaningful to me and my interests; namely, a local school or nature center where I could teach nature education. It seemed that the Nature in the City program was the fit for me because it incorporated teachings of scientific knowledge with broader knowledge about the nature all around us, in our own “backyards”. Not to mention that the program was centralized in the Syracuse city school system which I knew would be an interesting and meaningful experience for me. As the internship manifested and progressed, I was faced with various challenges and setbacks but loved the work that was given to me and found it to be eye opening and enriching. My objectives for the internship were to learn the skill of teaching children about nature in a more formalized setting and also to complete a project for the Baltimore Woods Nature Center that would benefit them from having had me as an intern. Upon completion of the internship these objectives seem to have been met. I left the experience having learned a great deal and was certainly less naïve about the state of the public city school system than I had previously been.

Name: Sofko, Pierce
Authors with Affiliations: DeBaise, Janine. Department of Environmental Writing and Rhetoric, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Primary Department: ES
Type of Abstract: Class Project
Research Category: Social Science
Level of Research: Undergraduate
Title: Honeybees and Humans: A Subtle Beauty in Unforgiving Efficiency
Abstract: During the last six to seven years bees throughout the world have been suffering catastrophic issues. Since 2007 Colony Collapse Disorder has threatened both bees and beekeepers. And a no better example is what has happened in the United States. About one third of all food that is eaten in the United States either is directly, or indirectly related to bees ability to pollinate. Beekeeping is also a large and profitable industry, which has suffered heavy losses. The importance of bees is underplayed in the current American culture, and the impacts of colony collapse disorder is not widely enough understood. In my Senior Synthesis Paper I explore and discuss the possibility to help repair the damage from Colony Collapse Disorder by
encouraging and informing about urbanized beekeeping. This way more people will become involved with the issue, and perhaps even more people will be inspired to keep bees.

Name: Thiel, Emily
Authors with Affiliations: Thiel, Emily. Department of Environmental Studies, State University of New York, College of Environmental Science and Forestry, Syracuse, NY, 13210
Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: Fossil Free Divestment Campaign: Rhetorical Appeals Used in Social Media
Abstract: I conducted a rhetorical analysis of web-based content from the Go Fossil Free campaign led by 350.org to examine rhetorical appeals used by individual environmental activists and how these appeals differ based on institutional affiliation and gender. Go Fossil Free is currently sponsoring campaigns around the world to pressure institutions to divest from fossil fuel companies. The absence of previous research allows this study to fulfill an exploratory role in understanding the relationship between environmental activism and social media in the context of rhetorical appeals used. Being a vehicle of persuasion, rhetoric is essential to campaigns because it allows the recruitment of other individuals to the cause, a key attribute of grassroots movements. Focusing only on campaigns in the U.S., I coded activist comments and evaluated them based on the type of institution they are supporting as well the demographic factor of gender (being the only one available to third party readers). I found that activists associated with religious institutions tend to use spiritual appeals while activists associated with universities use more identity and place appeals. I also found that male activists more often than females make appeals based on environmental wellbeing whereas female activists more often make appeals to time than their male counterparts do. The information gathered in this study can aid in grassroots environmental organizations attaining different groups of people involved in their campaigns by examining what kinds of rhetorical appeals different populations respond to best.

Name: Trutschel, Lauren
Authors with Affiliations: Rickard, Laura. Department of Environmental Studies, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Primary Department: ES
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: The Effects of the Internet and Web-based Technology on a Science Classroom
Abstract: Approximately thirty years ago, the concept of the Internet was simply an idea; computers were used as calculators and for recreational uses rather than for research. Today, networks of computers can be found across the globe and the Internet is used for communications, research, and leisure. The Internet has changed the way both students learn and educators teach. Computers, cell phones, tablets, and other web-based technologies are being used to enhance the classroom experience at all levels of education. The science classroom is becoming more innovative and advanced than ever before, as the WWW has allowed students the opportunity for more research and development; the web based classroom
has transformed the traditional learning experience, leading to increased productivity and inquiry to scientific exploration.

**Name:** Yandrich, Kerri  
**Authors with Affiliations:** Citizen's Campaign for the Environment. (2014).  
**Primary Department:** ES  
**Type of Abstract:** Class Project  
**Research Category:** Social Science  
**Level of Research:** Undergraduate  
**Title:** Environmental Studies Senior Synthesis Internship: Citizen’s Campaign for the Environment  
**Abstract:** I completed my senior synthesis project for the Fall 2013 semester under my advisor Dr. Selfa. For this project I completed an internship with Citizen’s Campaign for the Environment (CCE) in the summers of 2012 and 2013. I worked for the Long Island branch and was supervised under Jason Kulczyk. CCE is a non-profit grassroots organization founded in 1985 and was established in New York (Citizen’s Campaign for the Environment, 2014). There are five offices throughout the state (Long Island, Westchester, Syracuse, Buffalo, and Albany) and one in Connecticut (Hamden). During this internship I was a Campaign Organizer and was engaged in the process of canvassing. I went door to door all over Long Island to educate the public on a local environmental issue, how it was affecting them and what they can do to help. Ways that they were able to help included donations and letter writing to their local representatives. Issues that I worked on during my time there included passing the Sewage Right to Know Act, minimizing the effects of brown and red tide, and banning certain pesticides from Long Island’s groundwater. Over the course of ten weeks in the summer of 2013 (44 days) I raised $6,789 and had citizen’s write 136 letters. In addition to raising money and having people write letters for the cause, this internship has prepared me for my future career. I learned the importance of grassroots organizations and have acquired more knowledge on how the environmental policy process works.
Title: Tracking short rotation woody crop (SRWC) planting operations in northern New York.

Abstract: Short rotation woody crop (SRWC) production is a new and evolving system within the Northeast and Midwestern United States. The Biomass Crop Assistance Program (BCAP) provides a unique opportunity for over 350 ha of commercial scale operations to be observed and recorded so this evolving system can improve over time. Using GPS devices to track movements of two different planters (Step and Egedal), along with field observations and supply stock sampling, we determined planting rates and identified factors which contribute to planting delays. The average effective field capacity for the two models of planters combined was 1.34 ha hr⁻¹, with the Step-planter being slightly faster (1.43 ha hr⁻¹) than the Egedal (1.12 ha hr⁻¹). The median value for the two planters was much closer (Step: 1.41 ha hr⁻¹; Egedal: 1.30 ha hr⁻¹). Delay time accounts for 47% of the total study period, 79:46:47. Further analysis of diameter data collected from supply stock sampling is being conducted to develop a possible relationship between diversity group and diameter size. Observations of planting operations also concluded that site conditions, mechanical condition of planters, availability of spare parts, and planting stock quality influence effective field capacity and planting efficiency in SRWC systems.
theoretically function as a selectable marker against any non-transformed tissue. Using this system, at concentrations of 3.0mM, it was possible to select transformed American chestnut embryos that expressed the OxO gene at a moderate level. Using the OxO gene both as a selectable-marker for transformations and as the gene of Interest for pathogen resistance should simplify the regulatory review process and therefore speed up the restoration of the American chestnut.

Name: Murphy, Kaitlyn
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Co-author: O’Connor, Ryan. Department of Forest and Natural Resource Management, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Primary Department: FNRM
Type of Abstract: Research Abstract
Research Category: Social Science
Level of Research: Undergraduate
Title: The total embodied energy of imported goods from 1980 to 2010 as a comparison basis for U.S. domestic energy production
Abstract: The exchange of finished goods internationally requires additional energy for packaging, shipping, and transportation. Finished goods also contain embodied energy based on the amount of energy put into the manufacturing process as well as the efficiency of that same process. The total energy use within one country is a component of that country’s energy intensity. The total embodied energy of these goods can be compared to the amount of energy production in the U.S from 1980 to 2010. This comparison resembles the additional amount of energy needed to domestically produce imported goods from U.S. top trading partners. The United States could not domestically support the total embodied energy of its imported goods. In addition, the carbon intensity of top trading partners is comparable to the amount of carbon the United States would have to sequester under emissions accounting. Consumption of finished imports has increased over the past 30 years, making it even more challenging for domestic energy to support a self-sustaining manufacturing system. The amount of energy required to generate 1 dollar of growth domestic product can be substantially reduced if the origin of physical, finished goods were controllable.

Name: Weaknecht, Jordan
Authors with Affiliations: Weaknecht, J. Department of Forest and Natural Resource Management, State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210
Primary Department: FNRM
Type of Abstract: Research Abstract
Research Category: Field Science: Biology & Ecology
Level of Research: Undergraduate
Title: Evaluation, Alternative Management Strategies, and Proposed Rehabilitation Methods of a Selective Cut Harvest of an Oak-Dominated Stand in Southeastern Pennsylvania
Abstract: A forested area with an even-aged character was timbered in Fredericksburg, PA, a year and a half ago. The timber company in charge of operations harvested with a method
referred to as a selective cutting. They took the biggest and most valuable trees while leaving smaller trees of unacceptable character. There was no effort applied to secure any regeneration to replace the cut trees, which is vital to sustainability when so many trees of acceptable growing stock are removed from a stand. The stand is even-aged. The non-timbered stand upper canopy is dominated by red oak and white ash. Understory tree species include yellow birch, American beech, black walnut, and white oak. A stand that has been improperly managed in the past can be difficult to return to an undisturbed condition or improve post harvest conditions. I will use the Fredericksville stand to evaluate the effects of a selective cutting, and to explore some options for rehabilitation. Objectives include: compare the diameter distribution, species composition, quality of growing stock, standing volume, trees per acre, regeneration, and relative density before and after the timber harvest by sampling in the adjacent unmanaged forest and comparing it to the harvested area, suggest possible alternative strategies (such as thinning, different types of treatments, regeneration plans) that the timber company could have taken, explore some possible rehabilitation methods and management strategies for dealing with the cutover area and project the different alternative strategies into the future, indicating future stand conditions using appropriate software (OAKSIM).
**Paper and Bioprocess Engineering**

**Name:** Murphy, Andrew  
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Shaima Nahreen, Ram B. Gupta, Auburn University, Auburn, AL 36849  
**Primary Department:** PBE  
**Type of Abstract:** Research Abstract  
**Research Category:** Laboratory Sciences  
**Level of Research:** Undergraduate  
**Title:** Separation & Purification of Fermentation Products Produced from C. acetobutylicium  
**Abstract:** The US has set the goal to produce 36 billion gallons of biofuel by the year 2022.  
ABE fermentation produces a series of solvents (Acetone, Butanol, Ethanol) that can be purified or upgraded to drop-in transportation fuels. Despite significant advances in ABE fermentation, inefficient product removal and purification from the dilute fermentation broth delay commercialization of this process. Activated charcoal has been proven to be very effective at purifying ABE products, however the desorption process has not been well studied. This research looks into using Butene, a condensable gas that could be recycled from a novel process that converts ABE products into long chain hydrocarbons, to extract the ABE products off of the activated charcoal. Using different pressures, times, and concentrations of ABE products this study tries to optimize this extraction process.

**Name:** Putman, Emma  
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**Primary Department:** PBE  
**Type of Abstract:** Research Abstract  
**Research Category:** Engineering/Landscape Design  
**Level of Research:** Undergraduate  
**Title:** Production of 3-(R)-Hydroxybutyrate  
**Abstract:** As the worldwide demand for fossil fuels increases, our supply will run out and alternatives for petroleum based products will become incredibly necessary. Plastics are everywhere in our lives and are produced from petroleum. An alternative to conventional plastics are Polyhydroxyalkanoates produced intracellularly via fermentation of B. cepacia while limiting a nutrient source. Much has been studied about the polymer production. There are several obstacles during polymer production including high recovery costs. Studies show the monomer can be produced by altering the content of the fermentation medium. This study examines the production of the monomer, 3-(R)-hydroxybutyric acid in glucose, salt solutions, and nitrate ions. The monomer was found in the fermentation broth, analyzed by NMR. This monomer could be easily polymerized to create a plastic to replace petroleum based plastics.

**Name:** Brookins-Little, Tiffany  
**Authors with Affiliations:** Tiffany Brookins-Little, Michael R. Norman, Robert P. Smith and Susan E. Anagnost Department of Sustainable Construction Management and Engineering State University of New York, College of Environmental Science and Forestry, Syracuse, NY 13210; Syracuse Asbestos Laboratory Testing Services, Syracuse, NY 13210  
**Primary Department:** SCME  
**Type of Abstract:** Outreach Abstract
**Research Category:** Laboratory Sciences  
**Level of Research:** Undergraduate  
**Title:** The SALTS Lab: It's Asbestos as it Gets  
**Abstract:** Asbestos is a set of six naturally occurring silicate minerals that often contain thin fibrous crystals. These minerals are mined and used throughout manufacturing and construction due to its insulative properties and its resistance to fire, heat, electrical, and chemical damage. Asbestos can cause human illnesses in the lungs including: mesothelioma and asbestosis. The CDC and Department of Labor have implemented regulations on construction sites around asbestos and requires analysis of air samples if people and/or workers are exposed. Often times, the first test to gauge if there may be asbestos fibers present is via phase contrast microscopy, of which the SALTS lab is certified to conduct.

The SALTS lab officially opened in November 2012. The lab often processes air samples that have been delivered from construction sites, schools, and other areas in the upstate NY area. In the first six months of 2013, the lab was able to generate nearly $10,000 in revenue for the N.C. Brown Center. In the future, due to the demand of the industry, there is also support for a new Transmission Electron microscope that could be used as a tool for asbestos analysis and teaching purposes at SUNY-ESF.
Sustainable Construction Management and Engineering

Name: Steele, Samantha
Authors with Affiliations: Dr. Jennifer Smith, PE1; Dr. Mark Driscoll1; Dr. Shobha Bhatia2; Mr. Douglas Daley, PE1. 1.UV/EB Technology Center at SUNY Environmental Science and Forestry and 2. Syracuse University, Syracuse, NY
Primary Department: SCME
Type of Abstract: Research Abstract
Research Category: Engineering/Landscape Design
Level of Research: Undergraduate
Title: Sediment and Erosion Control With PAM-Coated Natural Fibers
Abstract: Downstream water quality is negatively impacted by accelerated soil erosion and sedimentation from disturbed areas. The greatest negative effects are on drinking water sources, fish and wildlife habitats, as well as recreational potential of downstream water bodies. This is critically important to areas like Syracuse, NY, that rely on unfiltered water sources for drinking water.
A variety of best management practices (BMPs) are available to minimize soil erosion and sedimentation, including temporary ground covers such as rolled erosion control products (RECPs) and chemical surface treatments like polyacrylamides (PAMs). Temporary RECPs, made of natural fibers work by providing immediate ground cover to protect against raindrop impact. PAMs are flocculants that bind small soil particles, increasing their size and mass, allowing them to settle out of solution.
This study merges the two approaches by developing innovative PAM-coated natural fibers to provide combined erosion and sediment control. The aim of this proof-of-concept research was to create a process for coating natural fibers with PAM. Results indicate that the PAM-coated natural-fiber RECPs are effective at both decreasing soil loss and turbidity.