Is Conservation Conservative?
How Ideology Influences Natural Resource Management and Research

Cornell’s Department of Natural Resources
Graduate Student Association’s Annual Symposium
January 17 & 18, 2013
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**Thursday, January 17, 2013**

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<td>Marianne Krasny and Steven Wolf</td>
<td>Civic Ecology Practices: Radicalism, Uncritical Political Correctness, or Conservatism?</td>
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<td>Deer and Invasive Earthworms: Drivers of Forest Plant Community Transformations?</td>
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<td>Are Pastoral Systems Reaching Their Upper Limit? Vegetation, Herder Mobility, Community Cooperation in Borana, Ethiopia</td>
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<td>Combining Social Marketing with Improved Law Enforcement to Conserve Tigers and Their Prey in Nam Et Phou Louey National Protected Area, Lao PDR</td>
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<td>Matt Hare, Bob Inglis, Steven Wolf, Caren Cooper, and Laura Martin</td>
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<td>Darrick Evensen</td>
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<td>Jeffrey Wall</td>
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Abstracts
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Civic Ecology Practices: Radicalism, Uncritical Political Correctness, or Conservatism?
_by: Marianne E Krasny and Steven A Wolf_

Faced with the intractability of environmental problems, a number of prominent ecologists have called for including local knowledge alongside scientific knowledge in the search for solutions. In this context, small-scale civic ecology practices, such as initiatives to restore oyster populations along the eastern seaboard and urban community gardening, have been identified as positive approaches. These efforts privilege local knowledge about resource management -- encompassing both environmental stewardship and community revitalization goals – thereby ostensibly contributing to the suite of tools for addressing the sustainability crisis. Although often characterized as local, participatory approaches consistent with a theory of change anchored in grassroots dynamics, civic ecology practices may actually be a form of conservatism. To the extent that they represent an abdication of responsibility by the state for addressing socio-ecological problems, they are open to criticism as a reflection of neoliberal ideology. To the extent that they can be characterized as an institutionalized response to socio-ecological problems supported by investments by the state and science, they are open to criticism as distracting attention from structural explanations of unsustainability and inequality. Through a dialogue between a scholar and proponent of civic ecology practices (Krasny) and a scholar of governance and structural dimensions of sustainability transitions (Wolf), we seek to stimulate discussion of a critical analysis of civic ecology practices, conservatism, “blended approaches,” and the sustainability crisis.

Deer and Invasive Earthworms: Drivers of Forest Plant Community Transformations?
_by: Annise Dobson_

It is easy to recognize the effects of dramatic, single disturbance events, such as a pathogen outbreaks or severe storms on forest ecosystems. But are these the most important and influential events in the life of a forest? My research seeks to address the reasons for the observed shift from a complex and diverse understory plant community to ones dominated by few generalist species, a multitude of introduced plant invaders, or no forest understory at all. Two increasingly recognized drivers of the apparent collapse of forest communities in northeastern North America are earthworm invasions and increased deer abundance. Earthworms alter forest floors by removing the characteristic decomposing humic layers and their associated fauna, and these effects may dramatically alter herbaceous plant communities by favoring invasive plants and graminoids (Bohlen 2004, Hale 2005). Selective increased deer browse pressure favors unpalatable species and over time may fundamentally alter forest tree communities (Rooney and Waller 2003). Although deer and earthworms are independently credited as two of the most influential causes of the ongoing transformations of forest communities, this is the first investigation that I am aware of investigating these structuring forces within a unified experimental context (and in the field). My research employs a factorial design represented by a network of paired 50 x 50m fenced and open plots (N=10) along a gradient of deer browse intensity and presence/absence of earthworms to tease apart distinct and synergistic impacts of deer and earthworms on native understory plant communities. I will present first year survivorship of 12 plant species, and relate these
data to earthworm species distributions and densities and deer browse. Mechanisms structuring relationships between plants, earthworms and deer are likely nuanced and indirect, but my experiment seeks to determine the relative contribution of these forces to the transformation of forest communities that happen in front of our eyes.

Are Pastoral Systems Reaching Their Upper Limit? Vegetation, Herder Mobility, Community Cooperation in Borana, Ethiopia

By: Chuan Liao

Are the pastoral systems in the arid and semi-arid areas reaching the upper limits given the socio-ecological challenges? Although some scholars believe that nomadic pastoralism is doomed, it is the dominant livelihood strategy on about 45% of the world’s land surface area, which directly supports the livelihoods of 600 million poor households in the developing countries. Given the dramatic spatial-temporal variability in resource distribution, mobility, flexibility, and reciprocity have allowed pastoralists to survive for centuries while sustaining their resource base. However, changes in climate, population, land tenure, and institutions are fracturing large-scale pastures into spatially isolated systems and driving them into more vulnerable conditions. In order to contribute to long-term sustainability and livelihoods, it is necessary to investigate the system supporting capacity given certain resource-use patterns. Under such an overall objective, this proposed research will focus on vegetation dynamics, herder mobility, community cooperation, and pastoralism impact monitoring. Fieldwork will be conducted in different seasons in Borana, Ethiopia, where mixed methods will be used, including plant quadrat, spectral digital charting, remote sensing, GPS collar tracking, semi-structured interview, and household survey. We hope that results from this proposed research can advance our understanding of the supporting capacity of the Earth in a given context, and guide future policy intervention to ensure sustainability.

Institutional Hybridity and Accountability: Assessing the Governance of Working Forests in the U.S.

By: Brandon Kraft

The United States has experienced a great shift in forestry ownership over the last 30 years as forest product companies sold much of their land holdings. Much scholarly attention has been paid to 1) new classes of owners like Timber Investment Management Organizations and 2) the division of ownership in the form of parcelization. These current foci, however, do not adequately characterize new forms of governance arising out of this transition, specifically institutionally hybridized working forests. Institutional hybridity arises when actors from market, state, and civil society institutional domains share either management and/or ownership rights. In working forests, this type of decentralization is further complicated by the division and sale of differential property rights. Working forests with their complexity of ownership and property rights have been touted as “win-win-win” arrangements by industry, conservations, and governments. Critical analysis of these arrangements is currently lacking. To assess the resilience and strength of these arrangements, I explore the legitimacy of these interorganizational arrangements. I specifically pursue accountability as a vector of building legitimacy. The structure and content of accountability mechanisms is complicated in institutionally hybridized working forest arrangements. In this presentation, I develop a theoretical typology of the structure of accountability in institutionally hybridized working forest arrangements and apply it to a specific case, the Finch Pruyn Working Forest in the Adirondacks. To reconstruct the structure of accountability
these arrangements, I researched legal and organizational documents. I find that the structure of accountability is complex in these arrangements, but the overall content of accountability mechanisms is relatively lacking.

**Assessment of Lower Trophic Levels across the North American Great Lakes – New Program for DNR and CBFS**

*Presented by: Lars Rudstam*

*Collaborators: James Watkins*

DNR and the Cornell Biological Field Station are expanding the Cornell presence in the Great Lake Basin by being selected as the institution working with EPA Great Lakes National Program Office and their monitoring program in all five of the Laurentian Great Lakes. Together with Buffalo State’s Center for Great Lakes Studies, we will conduct surveys from Lake Superior to Lake Ontario twice a year for the next five years. This is coupled with analysis of trends, ecological mechanisms and technology development. We will briefly present this new program and the plans for the intensive field year of 2013 in Lake Ontario in light of new information on the vertical restructuring of the food web of Lake Ontario from the last 5 years of surveys including intensive field years in 2003 and 2008. Lake Ontario is rapidly becoming more similar to Lakes Michigan and Huron in the early 2000s, but with interesting differences due to its location downstream the more productive Lake Erie.

**Gendered Mobility: Impacts of Expanding Rural Road Networks on Livelihoods in the Solu Khumbu and Adjacent Districts, Nepal**

*By: Robert Beazley*

Gender cannot be studied independent of context as the perception of gender is constructed through enacted reiteration within specific cultural temporal-spatial geographies. Mobility defined as ‘the movement of people from one place to another in the course of everyday life … the daily rounds of activities such as paid and unpaid work, leisure, socializing and shopping’ (Hanson 2010:7) is embedded in gender and is intimately connected to an individual’s empowerment. Gendered mobility is a field of study that recognizes that gender access and use of transport systems is not equal and is influenced by a complex matrix of cultural, economic, political, geographic, and ecological factors. Hence, gendered mobility should be studied within a framework that addresses the complex connectivity of environmental, economic, and cultural contexts. In the mountains of Nepal, where rural roads are just beginning to encroach, this complex matrix is influenced by many different factors. Some of these factors include gendered out-migration to seek wage labor in other countries, the resultant shift in gendered workloads, the need to access transport to ease this burden, the diversity of ethnic and Hindu caste groups in Nepal, and their different cultural attitudes toward gendered use of transport. Consequently, in Nepal gendered mobility has a powerful influence on livelihoods. This doctoral research proposal addresses the complex matrix of these factors in the Solu Khumbu and adjacent districts of Nepal using a gendered analysis within the framework human and ecological systems.

**Combining Social Marketing With Improved Law Enforcement To Conserve Tigers And Their Prey In Nam Et Phou Louey National Protected Area, Lao PDR**

*By: Santi Saypanya*

Nam Et – Phou Louey (NEPL) National Protected Area (NPA) the second largest NPA in Lao People’s Democratic Republic (Lao PDR) is considered to be among the best tiger habitats in South-East Asia
(WCS/WWF/SI, 2006) and is home to the most viable tiger population in Indochina. Furthermore, it is identified as a critical landscape for tigers. Therefore, it is designated as a priority Tiger Conservation Landscape (WCS/WWF/SI, 2006). Significantly, it supports a tiger population of international importance. Moreover, the NEPL NPA represents significant survival of last population of tigers in Indochina. Additionally, it provides source of protein for the stakeholders who live in and around the NPA that rely on managed species for their livelihood. Sadly, the way they consume wildlife is unsustainable which leads to large-scale destruction throughout the entire biodiversity reserve, which leads to a high potential of losing key species forever. Two main threats to the species are direct killing of tigers for trade and hunting tiger prey for trade (Johnson and etc 2008). These two threats are at such a high rate that it will be unsustainable for tigers and their prey species. The NEPL NPA and Wildlife Conservation Society obviously envisioned that we needed to act immediately, unless these threats will lead to extinction of significant global species. Thus, NEPL NPA and Wildlife Conservation Society collaborated with Rare Conservation organization to apply Social Marketing Campaign to address the harmful threats. The campaign aimed to convince general villagers to put peer pressures on illegal hunter by reporting illegal hunting and wildlife trade, illegal hunters to hunt legally and government officers to respond to the reports throughout campaign’s materials: print and mass medias, which led to 82 calls were to report illegal hunting and wildlife trade which led to 22 perpetrators who were arrested and cases were closed.

Free Enterprise: The Answer to the Energy and Climate Challenge?
By Bob Inglis, Executive Director, Energy and Enterprise Initiative

Biography: Bob Inglis was elected to the U.S. Congress in 1992, having never run for office before. He represented Greenville-Spartanburg, South Carolina, from 1993-1998, unsuccessfully challenged U.S. Senator Fritz Hollings in 1998, and returned to Congress in 2004. In Tea Party turmoil in June of 2010 he lost his bid for re-election in the South Carolina Republican primary. Inglis grew up in the Low Country of South Carolina, went to Duke University for college, met and married his college sweetheart, graduated from the University of Virginia School of Law and practiced commercial real estate law in Greenville, South Carolina, before and between his years in Congress. Bob and Mary Anne Inglis have five children (a son, 27, and four daughters, 25, 22, 18 and 16). They live on a small farm in northern Greenville County, South Carolina.

Representations of Natural Gas Development Via Hydraulic Fracturing
By: Darrick Evensen

What major impacts come to mind when you think of natural gas development in the Marcellus Shale? The information and ideas that we hold about natural gas development can strongly influence how we discuss this issue and the types of regulation we view as appropriate. Our beliefs are based in part on social representations – common sense understandings of complex, often scientific, phenomena, generated in the public sphere and reliant on the history, culture, and social structure of the context in which they emerge. In this presentation, I shall examine social representations of environmental, economic, and social impacts (positive, negative, and neutral) of natural gas development in the Marcellus Shale, as reported by major regional newspapers. I conducted a content analysis of newspaper coverage of gas development in two newspapers in the northern tier of Pennsylvania and two in the southern tier of New York from 2010-2011, with a total sample of 759 articles. Effects on water quality were by far the most prevalent environmental
representation. Economic representations varied substantially across geographical contexts. Representations of social impacts were rare. I conducted interviews with the journalists who wrote the most articles on gas development in the Marcellus Shale at each newspaper. The journalists provide some explanations for why certain impacts were mentioned more frequently than others. I shall conclude with implications for communicating about natural gas development in the Marcellus Shale, and for regulation of this resource.

Social Learning in Korean Village Groves Restoration: A Source of Social-Ecological Resilience?

Presented by: Eunju Lee
Collaborators: Marianne Krasny

In Korea, villagers traditionally planted “village groves” (Maeul-sup) when they founded a new community, following special guidelines in Korean culture (e.g. feng-shui, traditional ecological knowledge). Village groves were cooperatively owned, managed, and conserved by villagers and played an important role in a village’s social activities. Although many village groves have been degraded and even destroyed during the past several decades of industrialization, more than a thousand village groves remain in South Korea today providing ecosystem services to the nearby community.

However, village groves’ ecological resilience is constantly tested by recurring disturbances in the forms of floods or fires, and more seriously by increased human pressure. Considering the little information available on the links between social systems and ecological resilience, it is important to understand how the social components of social-ecological systems of village groves have responded to ecological state changes.

In this study, the role of social learning was explored to understand social systems’ response to village groves decline and more broadly, its implications for social-ecological systems resilience of Korean village groves mainly to industrialization. A multiple case study was carried out in four purposefully selected villages. Data were collected using semi-structured interviews, document review and field visits, and analyzed with the help of QSR Nvivo 10 software. The evidence of social learning processes and outcomes along with broader impacts of restoration projects in selected village groves will be presented. Finally, the role of social learning relative to multiple-loop changes will be discussed through the lens of social-ecological resilience.

Conserving Chestnut Populations in Azerbaijan in the Face of Blight, Cryptophylocestria parasitica

By: Jeffrey Wall

The presence of chestnut blight, Cryptophylocestria parasitica, in Azerbaijan was verified in 2007 by the Azerbaijan State Institute of Botany and Iowa State University (Aghayeva and Harrington 2008). The following research documents the first investigation of the disease’s impact on the northern communities for whom it is a crop of tremendous importance and antiquity.

Community and household economic importance of chestnut were evaluated through interview and questionnaire in two sites. Chestnut proves to be an indispensable economic asset for the remote highland communities where it is grown. Results demonstrate the importance of kinship obligations in
production patterns and in the conservation of overall community well-being in the face of declining production due to blight.

Additionally, the first ever sampling and characterization of the C. parasitica fungus in Azerbaijan was accomplished towards the future pursuit of applying hypovirulence as a measure of blight control in Azerbaijan. Results show C. parasitica in Azerbaijan as having an extremely low vegetative-compatibility type diversity, which suggests that the use of applied hypovirulence for biological control is advisable. Implications for the application of hypovirulence on the genetic diversity of European chestnut and on the food sovereignty of chestnut producers and consumers in Azerbaijan are discussed.

**Interactive Learning in an Online Urban Environmental Education Course**

*Presented By: Yue Li*

*Collaborators: Marianne Krasny, Alex Kudryavtsev*

Abstract: We examined the impact of interactions among participants, instructors and content on participants’ intention to use ideas and information learned in an online course in their practice and in developing professional networks. We used content analysis to characterize participants’ and instructors’ weekly posts and comments. We coded and analyzed three types of interactions as resources for participants’ learning 1) Participant-content interaction, which included learning from materials like videos, narratives and research articles; 2) Participant-participant interaction, such as sharing and discussing ideas and experiences; 3) Participant-instructor interaction, such as communication with instructors and receiving instructors’ feedback. To find how the participants are learning, we also coded learning activities: reflections on course materials, debating opinions, relating new ideas to their own experience, referring to external information, raising critical questions, and motivation to learn more. In addition, we looked for participants’ learning outcomes: intention to adapt ideas from different interactions and developing professional networks. We used frequency of co-occurrence codes to explore correlations between leaning sources, activities and outcomes. The results show that idea exchange and network development were encouraged mainly by participant-participant interactions. Yet participant-content interactions were the main source of ideas to be adapted for environmental education practice. Participant-instructor interactions encouraged participants to explore additional learning sources and reflect on their own practice. The results of this study can be used to improve other professional development online courses for environmental educators.

**Stakeholder Influences on Approaches to Marine Fisheries Management by Regional Fishery Management Councils**

*By: Ingrid Biedron*

*Collaborators: Barbara Knuth*

A central objective of my dissertation research is to explain how interests, representation, power, and communication of regional fishery management council members, staff, and scientists, commercial and recreational fishermen, and environmental nongovernmental organization leaders in the New England and Mid-Atlantic regions influence council decisions about ecosystem-based fisheries management (EBFM). I will discuss several perspectives of marine fisheries management and the degree of conservation conservatism within the different types of management perspectives in the New England and Mid-Atlantic regions. The actions of the regional fishery management councils are strictly regulated by the Magnuson-Stevens Fishery Conservation and Management Act (MSA) (NMFS, 2011a). The MSA
charges the councils and the National Marine Fisheries Service with the shared responsibility for developing and implementing fisheries management plans for individual fish stocks within the U.S. exclusive economic zone (McLeod & Leslie, 2009; NMFS, 2011a). Therefore, legislative mandates are one of the strongest influences in natural resource management by the regional fishery management councils. However, the roles of other stakeholder groups, including commercial and recreational fishers, as well as environmental nongovernmental organization leaders, are less driven by legislative mandates than by the ideological views held by their groups, which include economic concerns, cultural influences, and conservation priorities.

**Research Trends in Ecosystem Based Management from 1993 to 2012: A Content Analysis of Publications in Select Environmental and Natural Resource Journals**

*By: Carrie Simon*

*Collaborators: Barbara Knuth*

Ecosystem based management (EBM) continues to be a buzzword among state and federal agencies alike as a means to approach environmental management. Yet, little attention has been paid to the trends in the peer-reviewed published literature on EBM. The purpose of this content analysis is to gain a better understating of the research trends and attitudes towards EBM over the last 20 years. The term “ecosystem based management” was searched for in the abstracts of articles in three environmental and natural resource databases for years 1993-2012. A total of 854 articles were found and included in the analysis. The majority (72%) of the articles were published in the last five years (2008-2012). Further analysis of the articles will include type of journal; impact factor of journal; article type (empirical, theory, policy); location of research; type of research methods; natural resource(s) studied; and attitude towards EBM as an environmental management method.

**Management Strategies for the Hemlock Woolly Adelgid, Adelges tsugae Annand, in New York**

*By: Mark Whitmore*

The Hemlock Woolly Adelgid (HWA) is a devastating non-native pest of hemlocks on east coast of North America. Since its’ introduction near Richmond, VA from Japan in the mid 1950’s HWA has spread north, arriving in the Hudson Valley in the 1980’s and the Finger Lakes in 2007. Management with classical biocontrol was initiated in the 1990’s and again in 2008 in the Finger Lakes. Early introductions in the Hudson Valley with predators from Japan did not become established. Two biotypes of a predator from the Pacific Northwest, Laricobius nigrinus (Coleoptera: Derodontidae), were subsequently introduced in the Finger Lakes. One from the Puget Sound and another thought to be more cold tolerant from Idaho. Recent sampling has found both biotypes to be established for 3 generations, but at low population levels. At the same time HWA populations have grown at an unexpectedly fast rate and hemlock mortality has just this year become apparent. Management trials are now planned to integrate pesticide treatment in conjunction with biocontrol.
Stabilization of Soil Organic Matter in Sugar Maple Forest with Non-Native Earthworms

Presented by: Joseph B. Yavitt
Collaborator: Timothy J. Fahey

Invasion of non-native earthworms into northern forests impacts soil carbon (C), but whether soil C level decreases or not is unclear. To help understand earthworm impacts, we labeled sugar maple saplings with 13C and 15N and followed the isotope label from leaf and root litter into soils and soil-aggregate fractions. We applied leaf litter to soils dominated by Lumbricus terrestris (T), L. rubellus (R), or no-worm (NW) controls. We also examined flow of the label from roots of the labeled trees to soil in the presence of earthworms. Briefly, after one year 16% to 35% of 13C released from leaf litter was recovered in soil with significantly greater values for R and T than NW plots. In earthworm plots, enrichment of 13C and 15N derived from leaf litter was highest in the macroaggregate fraction, especially in fine particulate organic matter and microaggregates held within macroaggregates. In contrast, in the no-worm plots highest isotope enrichment was associated with the free silt and clay fraction, reflecting adsorption of dissolved C. Two years after roots were labeled; the distribution of isotope among aggregate fractions was similar to that with leaf litter, i.e. high enrichment of the fine particulate organic matter within macroaggregates. These results indicate that feeding and mixing activity of earthworms facilitates conversion of C and N from leaf and root litter into stabilized fractions in mineral soils of northern hardwood forests.

Hydrologic Impact of Roadside Ditches in an Agricultural Watershed in Central New York: Implications for Non-Point Source Pollutant Transport

Presented by: Brian Buchanan
Collaborators: Kim Falbo, Rebecca Schneider, Todd Walter

Nonpoint source pollution and hydromodification are the leading causes of impairment to our nation’s rivers and streams. Roadside ditch networks, ubiquitous in both rural and urban landscapes, intercept and shunt substantial quantities of overland runoff and shallow groundwater to stream systems. By altering natural flowpaths, road ditches contribute not only to hydromodification but also potentially to nonpoint-source (NPS) pollution by acting as hydrologic links between agricultural fields and natural streams. Unfortunately, the impacts of these alterations on watershed hydrology and water quality are not well understood. Through a series of field measurements, including field surveys and discharge monitoring, this study examined the effect of road ditch networks on basin morphometry, field- and watershed-scale hydrology, and pollutant transport in a 38 km2 agricultural watershed in south-central NY. Salient findings include: (i) 94% of road ditches discharged directly to natural streams, effectively doubling the drainage density, (ii) on average, road ditches increased peak and total event flows in their receiving streams by 78% and 57%, respectively, but displayed significant variation across ditches, (iii) ditches intercepted large quantities of surface and subsurface runoff from agricultural fields and therefore represent efficient conduits for the transport of agricultural NPS pollutants to sensitive receiving water bodies. Our results provide useful information for hydrologists who wish to further understand how artificial drainage may be affecting watershed hydrology and for managers and engineers tasked with designing appropriate flood and NPS pollution control measures.
A Rapid Assessment Tool to Prioritize the Management of NY Species of Greatest Conservation Need in a Changing Climate

Presented by: Christopher P. Nadeau
Collaborator: Angela K. Fuller

By the end of the century the northeastern United States is expected to get approximately 10°F hotter, receive 30% more winter precipitation, experience stronger rain events, and experience annual late-summer droughts due to climate change. These climatic changes are expected to cause large-scale ecological change. It is logistically impossible for wildlife management agencies, tasked with managing numerous species, to conduct the studies necessary to predict how each species will respond to climate change. Hence, rapid assessment tools are needed to determine which species and areas of the landscape might be most vulnerable to climate change. I am developing a rapid assessment tool to (1) assess the relative vulnerability of New York Species of Greatest Conservation Need to climate change, and (2) determine which parts of the landscape might be most vulnerable to climate change. This tool has many advantages over existing rapid assessment tools. I will present a conceptual model of this tool and discuss how I intend to test this tool using estimates of recent avian range shifts.

The Effects of Outreach on Residents’ Street Tree Watering Behavior in Ithaca, NY

Presented by: Christine Moskell
Collaborators: Shorna Broussard Allred, Nina Bassuk, Delia Bolster, Diane Luebs

Trees planted along city streets (street trees) provide numerous environmental and health services, but local government often lacks the resources to adequately maintain trees post-planting. Watering trees in the initial years following planting is especially crucial for street tree survival. Local government often relies on residents to help water young street trees, but many residents may not recognize themselves as responsible for watering trees planted by the city. The goal of this study was to test the effect of educational interventions on the watering behavior of residents that had a new tree planted by the city near their property, and to examine how residents’ perceptions of the tree planting process and their views toward urban forest governance may influence their tree watering behavior.

This research employed a quasi-experimental design to investigate the watering behavior of Ithaca residents for 90 newly planted trees in the community (June-October 2012). Treatment group members received an educational intervention (signage attached to the tree and bi-weekly reminder postcards with instructions for watering), while the control group received no intervention. This presentation will focus on our preliminary evaluation of the impact of the educational intervention on watering behavior. We will also present the results of a survey that was distributed using the drop-off method to both treatment and control group members in November 2012. Survey questions were designed using concepts from procedural justice theory and environmental governance. Results will highlight how residents’ a) perceptions of the fairness of the tree planting process, and b) urban forest governance beliefs influences watering behavior.

Energy Sovereignty in Rural Communities of Tajikistan

By: Murodbek Laldjebaev

This presentation outlines a research proposal that seeks to define the concept of ‘energy sovereignty’ at the level of village communities in Tajikistan. Rural households experience chronic energy shortage...
during the cold season every year. Hydropower produced electricity substantially decreases due low water levels in the rivers. Production of conventional energy resources (oil, gas and coal) is less than 5% of primary energy; imports are not always affordable. Consequently, households predominantly use biomass (wood and crop and animal residue) to meet their basic needs for heating, lighting and cooking. This livelihood strategy, however, is very costly and unsustainable in the long run. Removing crop and animal residue from the fields leads to lower productivity of land. Many hours are spent (primary by women and children) in sourcing biomass from distant locations as the more accessible trees and shrubs have already been cut down. Thus, deforestation and desertification threaten the communities’ long-term survival.

This research proposal sets out to investigate the possibility of achieving energy sovereignty at the village level through deployment of small-scale technologies, including micro-hydro, solar and wind power generating systems. The primary research question is: How can rural people source energy in sufficient quantity and quality to meet their needs and thereby improve their livelihoods? The supporting questions include: How much and in what form is energy needed? What are the impacts of current energy use and energy shortage on people’s livelihood? How can people’s livelihoods be improved through satisfying their energy needs?

A Structured Decision Making Approach to White-Tailed Deer (Odocoileus virginianus) Harvest Management in New York State

Presented by: Kelly F. Robinson
Collaborator: Angela K. Fuller

The 2012 Deer Management Plan for the New York State Department of Environmental Conservation (DEC) states that the agency should “encourage various strategies to reduce harvest of young bucks in accordance with hunter desires.” Based on this directive, we have engaged the DEC in using structured decision making as a framework to guide their decision process. Structured decision making is a defensible, transparent, objective way to make complex decisions by breaking decisions into component parts. We are developing a decision framework that evaluates optimal management strategies for reducing harvest of yearling (1.5-year-old) bucks while considering both ecological and social objectives. We used a Bayesian belief network as a formal, quantitative framework that incorporated the output of our white-tailed deer population model, structural uncertainty in the system, and stakeholder values. This network will be used to evaluate seven harvest alternatives, and will result in the management strategy that best achieves the multiple objectives. The results of this project will provide the DEC with an optimal harvest decision and a framework for evaluation of harvest alternatives in the future.

Contributions of Plant Diversity and Ecological Knowledge to Food Sovereignty: A Case Study From Debark, Ethiopia

By: Morgan Ruelle

In the highlands of northern Ethiopia, plant diversity and associated ecological knowledge contribute to the food sovereignty of smallholder farmers. Food sovereignty is both the right and ability of individuals, households, communities and nations to determine their own food systems, and therefore relies on local knowledge to realize the ecological possibilities within a landscape. We conducted 140 interviews with farming families in 28 villages around the town of Debark in northern Ethiopia to understand the roles of plants in food systems. We employed a number of ethnobotanical techniques to understand farmers’ knowledge, use, and conservation of plant diversity, including free-listing, pile
sorting, preference ranking, and human ecological mapping. In addition to plants that are consumed as food, many other plants are used during food production, preparation, and storage, and are therefore critical for food sovereignty. An analysis of the uses of plants demonstrates how the functional diversity of plants contributes to the adaptability of farming systems. Our interviews also indicate that as a result of population growth, declining soil fertility, and new linkages to regional markets, farmers are devoting an increasing portion of their limited space to plants with high productivity and market values, particularly *Eucalyptus* sp. and triticale. The resultant homogenization of agricultural landscapes may reduce the range of options to sustain local food systems. Food sovereignty will demand innovative strategies to conserve a rich heritage of culturally-meaningful and ecologically-significant plants.

**Applying Recently Developed Capture-Recapture Methods to Estimate Population Size of Black Bears in South-Western New York**

*Presented by: Catherine Sun*

*Collaborators: Angela Fuller, J. Andy Royle, Matthew Hare*

American black bear (*Ursus americanus*) populations in the southern tier of New York have recently experienced density increases and range expansions. The population has expanded northward into areas of greater agriculture and human densities, resulting in an increase in the frequency and intensity of human-bear interactions. To help inform harvest management decisions and to inform a sampling framework for monitoring the population, we conducted a non-invasive, genetic, mark-recapture study of black bears to estimate population abundance and density in a 2,624 km² portion of the expanding range. Hair samples were collected during two sampling seasons (summers 2011, 2012) at approximately 120 barbed wire sites, and genetically analyzed to assign genotypes and encounter histories to individuals. To estimate population abundance and density, we applied a spatially-explicit capture-recapture (SECR) model in a hierarchical framework. SECR methods are a recent development in the suite of methods for estimating population abundance and other parameters. They provide an advantage over traditional, non-spatial methods by directly addressing the often violated assumption of population closure. However, as the application of SECR methods in mark-recapture studies increases, research continues to explore the spatial capabilities of these methods as well as to understand the implications of model assumptions. As with any method, SECR approaches should be implemented with consideration towards the research question, model appropriateness, and data availability.

**Local Adaptation and its Relationship to Connectivity in the Eastern Oyster, *Crassostrea virginica***

*Presented by: Matthew Hare*

*Collaborators: Laura Eierman, Martha Burford Reiskind*

The degree to which a population becomes locally adapted depends on a balance between immigration from other habitats and the strength of selection. Understanding the interaction between these two processes is necessary for predicting biotic responses to environmental change. The eastern oyster is a keystone habitat-forming species in western North Atlantic estuaries. Oysters have a life history typical of many benthic marine invertebrates wherein adults are sedentary but their larvae confer a high potential for long-distance dispersal. We tested for local adaptation of oyster populations at two spatial scales. First, we used reciprocal transplants across a latitudinal ecotone (~300 km) and found significant genotype (population source) by environment interactions for postsettlement survivorship and rate of reproductive maturation, two important fitness-related traits. Assignment tests indicated very low
dispersal across the ecotone during the reciprocal transplant. Second, within a single estuary we tested for functional genetic differentiation among adults at low and high salinity by experimentally testing their larvae for differential salinity tolerances. In this case our hypothesis was motivated by a model of diversifying selection in which spatially heterogeneous postsettlement viability selection recurrently generates functional genetic differences at genes controlling osmoregulation. Larval survivorship across salinity treatments was best explained by interactions between broodstock acclimation, broodstock source population and treatment salinity, consistent with functional genetic differentiation in response to environmental selection gradients. These two results will be discussed in terms of gene flow constraints on local adaptation.