

Upcoming Events

FES Seminar Lecture Series: Steven Bernstein: “Tinkering or Fundamental Reform in Sustainable Development Governance?”

12:00-1:00, Wednesday, Jan 25, 2012. Burke Auditorium, Kroon Hall.

Steven Bernstein is an Associate Professor in the Department of Political Science and Director of the Munk School’s Master of Global Affairs program at the University of Toronto. He also is Co-director of the Global Environmental Governance Program at the Munk School. He was recently a convening lead author and member of the Global Forest Expert Panel on the International Forest Regime and a consultant for the “Rio +20” UN Conference on Sustainable Development. His research and teaching span the areas of global governance, global environmental politics, non-state forms of governance, international political economy, internationalization of public policy, and international institutions. Publications include *Unsettled Legitimacy: Political Community, Power, and Authority in a Global Era* (2009); *Political Liberalism and Global Order: Toward a New Grand Compromise?* (2007); *A Globally Integrated Climate Policy for Canada* (2007); *The Compromise of Liberal Environmentalism* (2001); as well as a variety of articles in refereed academic journals.

2012 ISTF (International Society of Tropical Foresters) Conference

January 26-28, 2012. Burke Auditorium, Kroon Hall.

The 18th annual conference of the Yale Chapter of the International Society of Tropical Foresters will gather practitioners and researchers from government, academia, and environmental and development institutions to take stock of existing reforestation and restoration strategies in the tropics, and options for scaling-up project level successes to the larger landscape while promoting sustainable livelihoods for smallholders.

Conference website: <http://environment.yale.edu/sigs/istf/conference/>

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Journal Publications

Metal lost and found: Dissipative uses and releases of copper in the United States, 1975–2000

Authors: Reid J. Lifset, Matthew J. Eckelman, E.M. Harper, Zeke Hausfather, Gonzalo Urbina

Published: 2012, *Science of the Total Environment*, DOI: 10.1016/j.scitotenv.2011.09.075

Abstract: Metals are used in a variety of ways, many of which lead to dissipative releases to the environment. Such releases are relevant from both a resource use and an environmental impact perspective. We present a historical analysis of copper dissipative releases in the United States from 1975 to 2000. We situate all dissipative releases in copper’s life cycle and introduce a conceptual framework by which copper dissipative releases may be categorized in terms of intentionality of use and release. We interpret our results in the context of larger trends in production and consumption and government policies that have served as drivers of intentional copper releases from the relevant sources. Intentional copper releases are found to be both significant in quantity and highly variable. In 1975, for example, the largest source of intentional releases was from the application of copper-based pesticides, and this decreased more than 50% over the next 25 years; all other sources of intentional releases increased during that period. Overall, intentional copper releases decreased by approximately 15% from 1975 to 2000. Intentional uses that are unintentionally released such as copper from roofing, increased by the same percentage. Trace contaminant sources such as fossil fuel combustion, i.e., sources where both the use and the release are unintended, increased by nearly 50%. Intentional dissipative uses are equivalent to 60% of unintentional copper dissipative releases and more than five times that from trace sources. Dissipative copper releases are revealed to be modest when compared to bulk copper flows in the economy, and we introduce a metric, the dissipation index, which may be considered an economy-wide measure of resource efficiency for a particular substance. We assess the importance of dissipative releases in the calculation of recycling rates, concluding that the inclusion of dissipation in recycling rate calculations has a small, but discernible, influence, and should be included in such calculations.

Environmental gradients and the structure of freshwater snail communities

Authors: Hoverman, J. T., C. J. Davis, E. E. Werner, D. K. Skelly, R. A. Relyea, and K. L. Yurewicz.

Published: 2011. *Ecography* 34:1049-1058. <http://dx.doi.org/10.1111/j.1600-0587.2011.06856.x>

Abstract: A fundamental goal of ecology is to understand the factors that influence community structure and, consequently, generate heterogeneity in species richness across habitats. While niche-assembly (e.g. species-sorting) and dispersal-assembly mechanisms are widely recognized as factors structuring communities, there remains substantial debate concerning the relative importance of each of these mechanisms. Using freshwater snails as a model system, we explore how abiotic and biotic factors interact with dispersal to structure local communities and generate regional patterns in species richness. Our data set consisted of 24 snail species from 43 ponds and lakes surveyed for seven years on the Univ. of Michigan's E. S. George Reserve and Pinckney State Recreation Area near Ann Arbor, Michigan. We found that heterogeneity in habitat conditions mediated species-sorting mechanism to drive patterns in snail species richness across sites. In particular, physical environmental variables (i.e. habitat area, hydroperiod, and canopy cover), pH, and fish presence accounted for the majority of variation in the species richness across sites. We also found evidence of Gleasonian structure (i.e. significant species turnover with stochastic species loss) in the metacommunity. Turnover in snail species distributions was driven by the replacement of several pulmonate species with prosobranch species at the pond permanence transition. Turnover appeared to be driven by physiological constraints associated with differences in respiration mode between the snail orders and shell characteristics that deter molluscivorous fish. In contrast to these niche-assembly mechanisms, there was no evidence that dispersal-assembly mechanisms were structuring the communities. This suggests that niche-assembly mechanisms are more important than dispersal-assembly mechanisms for structuring local snail communities.

Perspectives on Urban Forest Ecosystem Services and Stabilities: The Case Study of Dapeng Peninsula in Shenzhen, China

Authors: Yajie Song, Haibao Yu, Lihua Tian

Published: 2011. *Proceedings of International Conference on Alishan Centenary Forestry, Chiayi, Taiwan*, Pp 63-74

Abstract: Forests serve as an important part of the urban ecosystems. This paper is to find the importance of urban forests to the ecosystem stability and sustainability, based on Yale's Collaborative Urban Environmental Crisis Management (UECM) Research at Dapeng Peninsula of the Pearl River Delta in southern China. Dapeng boasts the city's 47% entire biomass and is known as the "ecological kidney" with wide ranges of social value from energy saving, carbon sequestration, air quality, storm water control, aesthetic improvement and others in Shenzhen, China. The forests in this region have been investigated as a part of interdisciplinary ecosystems along with water and industrial ecosystems. Three descriptive and casual accounts relevant to forests are studied for maintaining the ecosystems safety and sustainability: endangered rare forestry species, invasive forest species as well as forest fire.

Spatial and temporal modeling of daily pollen concentrations

Authors: DellaValle CT, EW Triche, ML Bell

Published: 2012. *International Journal of Biometeorology* 56(1), p. 183-194.

Abstract: Accurate assessments of pollen counts are valuable to allergy sufferers, the medical industry, and health researchers; however, monitoring stations do not exist in most areas. In addition, the degree of spatial reliability provided by the limited number of monitoring stations is poorly understood. We developed and compared spatial models to estimate pollen concentrations in locations without monitoring stations. Daily Acer, Quercus, and overall tree, grass, and weed pollen counts, in grains/m³, were obtained from 14 aeroallergen monitoring stations located in the northeastern and mid-Atlantic region of the United States from 2003 to 2006. Pollen counts were spatially interpolated using ordinary kriging. Mixed effects and generalized estimating equations incorporating daily and seasonal weather characteristics, pollen season characteristics and land-cover information were also developed to estimate daily pollen concentrations. We then compared observed values from a monitoring station to model estimates for that location. Observed counts and kriging estimates for tree pollen differed ($p = 0.04$), but not when peak periods were removed ($p = 0.29$). No differences between observed and kriging estimates of Acer ($p = 0.46$), Quercus ($p = 0.24$), grass ($p = 0.31$) or weed pollen ($p = 0.29$) were found. Estimates from longitudinal models also demonstrated good agreement with observed counts, except for the extremes of pollen distributions. Our results demonstrate that spatial interpolation techniques as well as regression methods incorporating both weather and land-cover characteristics can provide reliable estimates of daily pollen concentrations in areas where monitors do not exist for all but periods of extremely high pollen.

RS & GIS-based Spatiotemporal Analysis of Ecological Footprint and Biocapacity Pattern of Jinghe River Watershed in China: Does Supply Meet Demand?

Authors: Dongxia Yue, Jinhui Ma, Jianjun Guo, Jiajing Zhang, Jun Du, **Yajie Song**, Cang Hui

Published: 2012. *Advanced Materials Research Vols. 356-360*, p 2820-2832

doi:10.4028/www.scientific.net/AMR.356-360.2820

Abstract: The Ecological Footprint methodology is a framework that tracks Ecological Footprint (humanity's demands on the biosphere) by comparing human demand against the regenerative capacity (Biocapacity) of the planet (WWF, 2010) to advance the science of sustainability. As such, the spatiotemporal dynamics of the Ecological Footprint (EF) and Biocapacity (BC) in a given watershed are important topics in the field of sustainability research based on remote sensing (RS) data and geographic information system (GIS) techniques. This paper reports on a case study of the Jinghe River Watershed using improved EF methodology with the help of GIS and high resolution remote sensing data, to quantitatively estimate the relationship between EF demand and BC supply and analyze their spatial distribution patterns at multiple spatial scales for four periods (1986, 1995, 2000 and 2008). We predict the future BC both overall, and of six categories of biological productivity area for the next four decades using the Markov Chain Method. The results showed that the spatial distribution of EF demand and BC supply were significantly uneven in the region, in which the per-capita EF of all counties located in the watershed increased continually from 1986 to 2008, and the EF per person of counties in the middle and lower reaches area was markedly greater than that in the upper reaches over time. On the supply side, the per-capita BC of all counties decreased gradually from 1986 to 2008, and the per-capita BC of counties in the upper reaches area was greater than that in the middle and lower reaches during the period, causing the uneven spatial distribution of Ecological budget-the gap between supply and demand, showed that the Jinghe River Watershed on the whole has begun to be unsustainable since 2008, with each county exhibiting differential temporal patterns. The prediction results showed that the total BC will increase continually from 2020 to 2050, and the BC of six categories will reduce, indicating that unsustainability in the region will escalate. As a whole, The EF demand has exceeded the BC supply, and the gap was widening in the Jinghe Watershed. This paper provided an in-depth portrait of the spatiotemporal dynamics of EF and BC, as well as their interactions with humanity and ecosystems.

Foliar herbivory and leaf traits of five native tree species in a young plantation of Central Panama

Authors: Gillian S. Paul, Florencia Montagnini, Graeme P. Berlyn, Dylan J. Craven, Michiel van Breugel and **Jefferson S. Hall**

Published: *New Forests*, Volume 43, Number 1, 69-87, DOI: 10.1007/s11056-011-9267-7

Abstract: This study examined foliar herbivory on 1 year-old tree saplings planted in previously abandoned fields in central Panama. Plots (15 × 15 trees) of *Anacardium excelsum* (Anacardiaceae), *Dalbergia retusa* (Fabaceae), *Pachira quinata* (Malvaceae), *Tabebuia rosea* (Bignoniaceae), and *Terminalia amazonia* (Combretaceae) were tested for herbivory using leaf counts and digital image analysis. Values of foliar carbon, foliar nitrogen, specific leaf area (SLA), and leaf toughness were analyzed to describe mechanical defenses and leaf nutrients on young and mature leaves of each of these species. For all five species, less than 10% of total leaf area was found to be damaged by arthropods. Significant (P -value < 0.001) differences in herbivory were found among both the tree species and the insect feeding guilds considered: chewing, skeletonizing, mining, and leaf-rolling. On mature leaves, *Anacardium excelsum* had the highest amount of leaf damage (3.53%) while *Dalbergia retusa* exhibited the lowest herbivore damage (1.72%). *Tabebuia rosea* had statistically significantly higher damage than other species for young leaves caused by leaf-rolling insects (4.21% rolling of 5.55% total damage). Leaf toughness was negatively correlated with SLA and foliar N. Linear regressions showed that herbivory was positively correlated with foliar N for young leaves and negatively correlated with foliar N for mature leaves. No statistically significant relationships were found between herbivory and the mechanical properties of toughness and SLA. Overall, results from this study indicate that, as young saplings, the species evaluated did not suffer high amounts of foliar herbivory in the plantation environment.

Research Spotlight

Fishing for the Future of Fish, By Angela Orthmeyer, FES '11

Angela Orthmeyer, FES '11, reports from fisheries in Charleston, OR, Newport, OR, Port Clyde, ME, Port Orford, OR, and Ilwaco, WA, offering an on-the-ground perspective on current industry practices in resource management and conservation.

Please read the full story in Sage Magazine, <http://sagemagazine.org/?p=1251>



Fulton Fish Market, NYC (photo by Rich Press)

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Upon arriving at the southernmost tip of the state of Washington, I stopped at a fish market in the small port town of Ilwaco. Cloaked in sheaths of mist, fishermen unloaded their catch of the day onto the dock behind the Ilwaco Fish Company. Inside the fish market, the floors were slick with seawater, and the fish in the display case looked as if they jumped out of the ocean and landed directly onto the piles of crushed, white ice. A whiteboard was scrawled with the words "Fresh Albacore tuna, caught today." This was the freshest fish that I'd had access to since hooking a small bass in northern Minnesota ten years ago. The albacore was flavored by the stories of the fishermen I'd met during my travels: tales of persistence amidst challenge and an honest desire to protect the very species that they depend on for their livelihoods, not just for themselves but for future fishermen.

Counter to the popular public perception of the fishing industry as one that exploits with an intensity that cannot be sustained, many fishermen and members of fishing communities are actively working to preserve the future of fish and the fishing trade. They're conducting research alongside scientists, inventing selective nets, setting aside parts of the ocean as protected areas free from fishing, and educating the public about which fish are the best to consume. During travels that extended from the East to West coasts of the United States, I met with members of preservation-oriented fishing communities, including four innovators who are playing leading roles in the effort to protect fish and the world's oceans.

The success of sustainability initiatives taken by fishermen and members of fishing communities will help preserve the future of fish, allowing fishermen to keep fishing a part of their livelihoods and fishing communities to maintain their identities. The success of these initiatives will depend on consumers that recognize the long-term value of buying fish from sustainable sources. I decided to sample some fish caught by local fishermen at the end of my trip up the coast of the Pacific Northwest.