



### Journal Publications

#### **Can Non-State Certification Systems Bolster State-Centered Efforts to Promote Sustainable Development through the Clean Development Mechanism (CDM)?**

**Authors:** Kelly Levin, Benjamin Cashore and Jonathan Koppell

**Draft Paper Revised:** 2009, Wake Forest Law Review 44(3), 777-798

Over the past two decades an array of practitioners and scholars have found traditional forms of global environmental governance to be inadequate for addressing key environmental challenges. In response, environmental advocates have backed certification programs that bypass state authority by turning to the market to generate responsible behavior. Owing to their emerging status, scholarship on these “nonstate market-driven” (NSMD) global governance systems has focused on understanding the evolutionary future of this form of private authority, especially regarding its potential to gain authority, or “political legitimacy,” to govern.

Our paper identifies, theorizes about, and empirically illustrates, a hybrid form of private authority in which NSMD governance acts in a symbiotic relationship with governmental institutions. While the role of the state has always been a central question in understanding the conditions through which NSMD may gain authority, our paper focuses on those cases in which public and private authority are mutually self reinforcing, versus being seen as zero sum games in which authority granted to private arenas may take away authority, or agendas, from public processes. Drawing on Gunningham’s conception of policy intersection or “policy baskets,” we focus our paper on a particular alignment in which NSMD addresses externalities that intergovernmental or domestic agreements have failed to consider.

Given the costs of revisiting intergovernmental or governmental agreements, the opportunities offered by NSMD systems to address unintended consequences without revisiting the public policy process seems worthy of scholarly and practitioner attention. We illustrate the existing and future potential of such a relationship by focusing on the Gold Standard certification scheme for carbon offset projects. The Gold Standard is designed to complement the Clean Development Mechanism element of the Kyoto Protocol by addressing fears that an exclusive focus on carbon might create negative externalities for other environmental and social values. The Gold Standard accomplishes this by offering a more comprehensive certification of a CDM project's environmental and social impacts. We argue that these types of symbiotic relationship between public and private authority, heretofore unexamined either theoretically or empirically, could have great promise in global environmental governance and other arenas of transnational and domestic regulation. Doing so requires that careful attention be paid to assessing the legitimacy requirements for such symbiotic relationships, which cannot be assumed to be exactly the same as those that research on pure NSMD systems have uncovered.

## **Experimental Warming Transforms Multiple Predator Effects in a Grassland Food Web**

**Authors:** Brandon Barton and Oswald Schmitz

**Published:** 2009, Ecology Letters, 12, 1-9

This experimental study tests new theory for multiple predator effects on communities by using warming to alter predator habitat use and hence direct and indirect interactions in a grassland food web containing two dominant spider predator species, a dominant grasshopper herbivore and grass and herb plants. Experimental warming further offers insight into how climate change might alter direct and indirect effects. Under ambient environmental conditions, spiders used habitat in spatially complementary locations. Consistent with predictions, the multiple predator effect on grasshoppers and on plants was the average of the individual predator effects. Warming strengthened the single predator effects. It also caused the spider species to overlap lower in the vegetation canopy. Consistent with predictions, the system was transformed into an intraguild predation system with the consequent extinction of one spider species. The results portend climate caused loss of predator diversity with important consequences for food web structure and function.

## **Newly Funded Research Grant**

### **Human-Nature Interactions in a Urbanized Island Setting: Hilo and Kailua-Kona, Hawai'i as Model Socio Ecological System**

**Sponsors:** NSF Ultra-Ex Grant

**PI:** Marian Chertow

**Co PIs:** Karen Seto, Kamana Beamer, Christian Giardina

**Total Amount:** \$145,346

The pervasive and growing influence of humans on ecosystem functioning and the concurrent decrease in the extent of 'natural' areas have prompted a reconceptualization of the long-term study of ecosystems to include a human dimension. Human systems interact with 'natural' systems directly through the extraction and disposal of material, water, and energy resources and indirectly through changes in land use and land cover. These interactions are concentrated and magnified in urban areas. Here, human-dominated socio-ecological systems are often characterized by complex patterns of resource flows and landscape alteration, processes which are often difficult to track, quantify, and link to ecological impacts as a result of the multiple entry and exit points through which resources may pass, the rapid pace of growth in many urban areas, and the general difficulty in obtaining representative data. In this light, Hawai'i Island provides a model setting to test theories about human impacts on the earth system and about resource constraints on urban growth. Resource management issues are of critical concern for Hawai'i Island, which holds only a ten-day reserve of food supplies and maintains the highest electricity rates in the country. By focusing on the island's two major urban areas, Hilo and Kailua-Kona, this project will provide a comparative analysis of the structure and function of two socio-ecological systems related through resource exchanges, geographic proximity, and historical and contemporary cultural configurations. Although similar in population and area, these areas have markedly different socio-economic and biophysical characteristics. In recent years, Hilo has struggled with the demise of the sugarcane

industry and the transition from a plantation economy to a more diversified base, while Kailua-Kona has experienced explosive growth fueled by its attractiveness as an international tourist and second-home destination. Based on Hawai'i Island's clear physical boundaries, limited number of entry points, relatively small geographic area, biological wealth and fragility, and relative isolation, the research sites provide a comprehensible living laboratory for the two principal objectives of this research: (1) to analyze the material, water, and energy throughput of these two urban areas quantitatively over the past 200 years; and (2) to analyze past, present, and potential human-induced landscape change in these areas geospatially. Material and energy flow analysis, a tool drawn from industrial ecology, will be used to track the input, output, conversion, and accumulation of materials, energy, and selected substances through each urban system. Land-use and land-cover dynamics will be analyzed by coupling remote satellite imagery, statistical demographic data, and biophysical data for both cities. Information and data for these objectives will be collected from historical archives, statistical databases, and a number of stakeholders including county agencies, local businesses, and community members.

An understanding of resource flows and landscape modification has the potential to transform the ways in which society interacts with the 'natural' world by explicitly measuring the ways in which the activities of human society affect ecosystems and the ways in which ecosystem changes produce feedback in the human system. Essential to this process is the linkage of scientific findings with local communities and their particular sustainability challenges. With two locally embedded partners devoted to science education in Hawai'i, this project will be a platform for developing awareness of the issues faced on Hawai'i Island by providing cross-disciplinary and multi-cultural educational initiatives for a diverse group of local and national students, teachers, and decision-makers. In addition to informing policies that encourage ecological and socio-economic prosperity, this project will also contribute to the advancement of socio-ecological and land change science theories by applying a novel, comparative approach to the quantitative analysis of human-nature interactions.

## **Vertebrates on the Move: Managing Cascadia Wildlife in the Face of Climate Change**

**Sponsors:** National Park Service

**PI:** Oswald Schmitz

**Total Amount:** \$6,800

Os Schmitz has just entered into a 5-year Master Agreement with the National Park Service (North Cascades Park Complex primarily) for education, technical assistance, and research projects. The first award under the Agreement is to conduct research on how climate change will impact mammals in the North Cascades National Park.

The impact of climate change on wildlife resources is perhaps the greatest challenge facing wildlife managers today. The IPCC has predicted that 20-30% of all species will be at increased risk of extinction with more than 1.5-2.5°C warming, and poleward and upward range shifting is already being observed across a number of taxa and regions of the world. The goal of this project is to utilize computer models, GIS habitat maps and ecological information to produce these types of applied, usable predictions about how

high priority native and non-native species will react to future warming, and to better predict the fate of mammal populations within the national parks and across adjacent lands. These predictions will assist land managers in the development of adaptive management strategies to ecosystems in the face of climate change.

## Research Spotlight

### Upcoming F&ES Seminar

The F&ES seminar will be held weekly on Wednesdays from 12pm to 1pm in Burke Auditorium, Kroon Hall. Presenters for the next two weeks include **Michael Webster** from the Moore Foundation who will present "*Investing in Science and Advocacy to Protect Salmon: A Foundation Perspective*" (October 14<sup>th</sup>) and **Daniela Rus** from MIT who will present "*Building Robots in Support of Taking the Pulse of the Plane*" (October 21<sup>st</sup>). Faculty, staff, and students are encouraged to come! Cookies and coffee will be served.

The list of upcoming seminar speakers can be viewed at:

<http://environment.research.yale.edu/calendar/events/series/2478/>