17TH ANNUAL TEXAS A&M UNIVERSITY
ECOLOGICAL INTEGRATION SYMPOSIUM
ECOLOGICAL PERSPECTIVES IN SUSTAINABILITY

Plenary Talks

Thursday, March 31, 2016
Rudder Theater, Texas A&M University, College Station, TX

Time	Events
8:45-9:00 am	**Registration and Sign-in (2nd Floor, Rudder Tower)**
9:00-9:10 am	Opening Remarks
9:10-10:10 am	**Dr. Lisa Naughton (University of Wisconsin-Madison)** "Paying for Forest Conservation Where Land Ownership is Unclear - Lessons from Ecuador"
10:10-11:10 am	**Dr. Jayne Belnap (USGS)** "Biocrusts as the critical zone in dryland ecosystems: what does the future hold?"
11:10-11:30 am	Coffee Break
11:30-12:30 pm	**Dr. Peter Vitousek (Stanford University)** "Pacific Islands as Model Systems for Human-Environment Interactions"
12:30-2:00 pm	Lunch
2:00-3:00 pm	**Dr. Stuart Pimm (Duke University)** "What must we know about biodiversity to conserve it?"
3:00-4:00 pm	**Dr. Ruth DeFries (Columbia University)** "Humans, Nature and Ecology in an Urbanizing World"
4:00-4:10 pm	Closing Remarks

Dr. Lisa Naughton

"Paying for Forest Conservation Where Land Ownership is Unclear - Lessons from Ecuador"

Abstract:

Much of the world's most carbon-rich and biodiverse forests are found in regions where land ownership is uncertain or contested. Insecure land tenure presents a challenge for Payment for Ecosystem Service (PES) projects, namely, whom to pay? And will PES participants be able to exclude others from using their forest? Conservationists in Ecuador are working to secure tenure and promote PES around protected areas. Research at a deforestation 'hotspot' in Ecuador reveals that some newly titled landowners opt to enroll in PES projects, but others choose capital-intensive land uses to the detriment of forests. In short, securing tenure, without sufficient incentives to individuals and communities to conserve forest, can hasten deforestation in places where competing land uses undermine forest conservation motivations. Ultimately there are strong human rights arguments for promoting tenure reform in tropical countries, irrespective of the potential impacts on forest conservation.

Dr. Jayne Belnap

"Biocrusts as the critical zone in dryland ecosystems: what does the future hold?"

Abstract:

Plant cover is sparse in dryland regions, and the dominant living cover is often biological soil crusts (biocrusts). These thin, soil surface communities consist of photosynthetic cyanobacteria, lichens and mosses, as well as fungi, heterotrophic bacteria and soil microfauna and together, control many of the ecosystem processes in these settings. The concept of critical zones, defined as the "heterogeneous, near surface environment in which complex interactions involving rock, soil, water, air, and living organisms regulate the natural habitat and determine the availability of life-sustaining resources" is now commonly used. Most ecosystems are dominated by tall vascular plants with roots ramifying throughout deep soils and thus the critical zone has been defined in meters. Conversely, drylands have sparse vascular vegetation, shallow soils, and large amounts of rock cover and thus here, the critical zone may be better characterized as the top centimeter of soil covered by biocrusts. Soil surface disturbance and droughts have been dramatically increasing in these regions, profoundly altering the composition of biocrusts and thus the roles they play in dryland ecosystems.

Dr. Peter Vitousek

"Pacific Islands as Model Systems for Human-Environment Interactions"

Abstract:
Islands have been used as models for evolution and speciation for many years - but they can be equally useful for understanding ecosystem structure and functioning, and human-land interactions. With colleagues, I have evaluated multiple environmental gradients within the Hawaiian Islands - and demonstrated that variations in soil properties on these gradients exhibit distinct non-linearities and discontinuities where soil properties and processes change markedly with a small increment in environmental forcing. We term these places "pedogenic thresholds", and we term the areas between thresholds (where soil properties/processes change relatively little for large increments in forcing) "process domains". Traditional Hawaiian agriculture (before European contact) made use of a particular domain to develop intensive and long-sustained rainfed agricultural systems that supported large populations in socially and culturally complex societies - and the interactions between lands and societies are more readily understood in Hawaii (and other Pacific islands) than elsewhere.

Dr. Stuart Pimm

"What must we know about biodiversity to conserve it?"

Abstract:

The salient feature of biodiversity is how fast we are losing it. We measure extinctions much as the same way as a human death rate — deaths per thousand people per year — except with slightly different units. Extinctions currently run several hundred extinctions per million species per year. Moreover, we have a rough idea from the fossil record and from the rates at which species diversify genetically, that background rates of extinction are on the order of one extinction per ten million species per year. Such is the impact of human actions. We know much about the biogeography of extinction and its causes. On land, most plant and animal species live in the moist tropical forests of the world. The species at greatest risk of extinction fall into two broad classes. First, there are those that are large-bodied — lions and tigers and bears (and sharks in the oceans) for example. Second, are the much greater number of smaller species that have small geographical ranges. Across all taxa, there are many species small geographical ranges. The statistical distribution of range sizes is such that while the average range size of a group of species might be quite large, the median — below which 50% of species are — can be small in comparison. Half of all amphibian species have ranges smaller than ~4,000 km2 or so, for example. Recently described species tend to have still smaller ranges. These small-ranged species are highly concentrated geographically into biodiversity hotspots, places such as the northern Andes, the coastal forests of Brazil, the fynbos of South Africa, Madagascar, and the Philippines. Similar principles apply in the oceans. These results are actionable science. To reduce extinction rates, we need to concentrate on these hotspots — areas that cover only about 10% of the land surface. Practical conservation actions require

downscaling from these regions to areas measured in tens or hundreds of square kilometres for that is the size of most protected areas. In all of these hotspots, the remaining habitats are massively fragmented. Species are lost quickly from isolated fragments. This suggests re-establishing the connections between isolated fragments by acquiring the degraded land between then and restoring its natural vegetation is likely to be a cost-effective solution to reducing extinction rates. That's exactly what SavingSpecies does. Visit us at http://www.savingspecies.org.

Dr. Ruth DeFries

"Humans, Nature and Ecology in an Urbanizing World"

Abstract:
With over half of the world's population living in cities and towns, urbanization is a major force affecting the planet. Urban demand for commodities and infrastructure to connect cities is reshaping rural landscapes throughout the developing world, with both positive and negative impacts for people and nature. Integration of ecology with other disciplines is needed to provide the information base for reconciling development needs and conservation.

Speaker Biographical Information

Lisa Naughton is a Professor in the Geography Department at the University of Wisconsin-Madison. Her research interests concern the social dimensions of biodiversity conservation, with particular emphasis on protected areas and land use conflicts in the tropics. She has long-term field studies in Uganda, Ecuador and Peru, and has taught at Uganda, Chile and Ecuador as a Fulbright fellow. She served as PI (for UW Madison, WCS lead) on a USAID award focused on land tenure issues in tropical forest carbon payment programs. In addition to her work in the tropics, Dr. Naughton studies public attitudes toward wolf recovery in the upper Midwest states. She directed UW-Madison's Land Tenure Center (2009-2013), Chaired the graduate program in Conservation Biology and Sustainable Development (2007-2010) and now Chairs the Geography Department.

Jayne Belnap is a research ecologist with the U.S. Geological Service. Her work focuses on dryland and rangeland ecosystems, with a focus on how these lands can be managed sustainably while still used for grazing, recreation, and energy/mineral development and exploration. She was recognized by the Ecological Society of America as one of the most outstanding ecologists in the U.S. (2008), received the award for outstanding women in science award from the U.S. Department of the Interior (2010), and was elected a fellow of the Ecological Society of America (2015).

Peter Vitousek is a professor at Stanford University and a senior fellow at the Woods Institute for the Environment. His research interests include: evaluating the global cycles of nitrogen and phosphorus, and how they are altered by human activity; understanding how the interaction of land and culture contributed to the sustainability of Hawaiian agriculture and society before European contact; and making fertilizer applications more efficient and less environmentally damaging. He is a Fellow of the National Academy of Sciences and the American Academy of Arts and Sciences, and was awarded the 2010 Japan Prize.

Stuart Pimm is the Doris Duke Chair of Conservation Ecology at the Nicholas School of the Environment at Duke University. His research covers the reasons why species become extinct, how fast they do so, global patterns of habitat loss and species extinction and, importantly, the management consequences of this research. He was awarded the Tyler Prize for Environmental Achievement (2010), the Dr. A.H. Heineken Prize for Environmental Sciences (2006), the Edward T. LaRoe III Memorial Award (2006), and the William Proctor Prize for Scientific Achievement (2007).

Ruth DeFries is a professor of ecology and sustainable development at Columbia University. Her research examines human transformation of the landscape and its consequences for climate, biogeochemical cycling, biodiversity, and other ecosystem services that make our planet habitable. She was elected as a member of the National Academy of Sciences (2006) and a member of the American Association for the Advancement of Sciences (2006), a recipient of the MacArthur "Genius" Fellowship (2007), an Aldo Leopold Leadership Program Fellow.