EARThS Conference
April 11th, 2015

The Anthropocene: Confronting Global Environmental Change and Hazardous Worlds

Program Guide and Abstract Booklet

Conference Schedule

Time Start	*Time End*	*Event*	*Location*
8:30am	9:15am	Check In	CUE 518
9:30am	10:30am	Welcome and Keynote Address	CUE 518
10:45am	Noon	Session 1	CUE 409
		Session 2	CUE 418
Noon	1:00pm	Lunch	CUE 518
1:00pm	1:30pm	Poster Session	CUE 512
1:45pm	3:00pm	Session 3	CUE 409
		Session 4	CUE 418

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About EARThS

This organization serves as a meeting ground for graduate students, faculty and others interested in research and service related to the five tenets of the group's name. We recognize that ***environment, agriculture, resources, technology and society*** intersect in meaningful and highly impactful ways in our world today. This group strives to provide support for the professional aspirations of its members as they pursue research and service regarding these areas. The group meets regularly to discuss current research projects, themes and ideas as well as to host presentations of its members. Additionally, EARThS hopes to reach out to the broader WSU and Palouse region by hosting public events promoting a deeper understanding of the current issues regarding environment, agriculture, resources, technology and society today.

Contact us at: earths.wsu@wsu.edu

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About the Conference

Scholars have situated the current environmental crisis in the "anthropocene": the contemporary era in which human activity is a defining agent of life-threatening global climate change and a potential solution for halting such change. Climate change experts have argued the anthropocene hit "the Great Acceleration" period from 1950 to the present through a number of dramatic social, economic, and political changes throughout the world. These changes sent the concentration of greenhouse gas emissions in the atmosphere well above the 350 parts per million level that many consider to be safe for life on Earth. At the same time, we have seen the number of inorganic materials and their associated human and environmental health risks proliferate throughout the world. Thus we are presented with important questions about how best to address this context of global environmental change and environmental health hazards through human collective action.

The interdisciplinary Spring 2015 EARThS Mini-Conference titled, "The Anthropocene: Confronting Global Environmental Change and Hazardous Worlds," seeks to gather papers that address such questions from graduate students in the humanities, social sciences, and biophysical sciences at University of Idaho and Washington State University. Papers presented at this conference will focus on case studies or cross-sectional analyses of (1) human activity contributing to climate change *or* environmental health risk production or (2) collective efforts that seek to address or adapt to such problems in local, regional, national, and/or international venues.

About the Keynote Speaker

Debra Davidson, Ph.D.

University of Alberta, Director of Resilient Urban Food Systems, lead author of Work Group II for Intergovernmental Panel on Climate Change

Dr. Debra J. Davidson is Professor of Environmental Sociology at the University of Alberta, where she has taught since 1999. Her primary areas of teaching and research relate to climate change, energy and agri-food systems, with particular interest in climate change adaptation, renewable energy transitions, and urban agriculture. She is Lead Author of Working Group II of the Intergovernmental Panel for Climate Change, and Director of Prairie Urban Farm, a University of Alberta community farm. Recent publications include articles in Science; Global Environmental Change; Food Policy; Agriculture and Human Values; and British Journal of Sociology. She is co-author of Challenging Legitimacy at the Precipice of Energy Calamity with Mike Gismondi (Springer, 2011), and Consuming Sustainability, with Kierstin Hatt (Fernwood, 2005). Dr. Davidson received her Ph.D. from the Department of Sociology at the University of Wisconsin-Madison. She is originally from Los Angeles, California.

Session 1: Byproducts

Climate change is the most obvious characterizing feature of the anthropocene. However, these works examine lesser known – though, cumulatively, no less important – threats to planetary well-being.

Towards a Resource-Based Environmental Inequality: A Case Study of Coal Impoundments in Appalachia

By: Pierce Greenberg (Department of Sociology, Washington State University)

Coal impoundments hold billions of gallons of waste created through the process of coal extraction and pose numerous health and disaster risks to communities in Appalachia. This study seeks to identify community-level predictors of place proximity to coal impoundments using OLS and spatial regression.

On the Road to Disease: Susceptibility to Ranavirus Infection of Amphibian Populations Living Near Roads

By: Emily Hall, Brandon Hutzenbiler, Jesse Brunner and Erica Crespi (School of Biological Sciences, Washington State University)

Road de-icing salts are associated with chronic salinization of adjacent freshwater ecosystems throughout Northern US. Because salinity concentrations in roadside wetlands are likely an osmoregulatory stressor for freshwater organisms, we hypothesized amphibians living in roadside ponds will be more susceptible to infection and have higher mortality from disease.

Magnetic Separation Nanotechnology for Recycling Used Nuclear Fuel

By: You Qiang and Huijin Zhang (Physics Department and Environmental Science Department, University of Idaho)

In order to find a cost effective and environmentally benign technology to treat the liquid radioactive waste into a safe and stable form, magnetic separation using surface functionalized iron/iron-oxide nanoparticles conjugated with specific metal chelators, has been developed for recycling actinides and lanthanides from used nuclear fuel.

Session 2: Contexts

This session features works which push the boundaries of risk theorizing by applying these theories to the novel contexts of crime and enforcement, militarization and labor markets.

The Outcomes of Environmental Violations: Assessing the influence of Facilities, Offense Type, and Community

By: Joseph Kremer (Department of Sociology, Washington State University)

This project assesses how the presence or absence of the various demographic, facility-specific, and violation severity predictors combine to produce environmental sentencing outcomes. Using the Environmental Protection Agency's (EPA) administrative cases within the Pacific Northwest from 2007-2011 and crisp-set qualitative comparative analysis, I find that regardless of violation type multiple different pathways exist that produce the outcomes of fine and no fine. High fines were found to be associated with the presence of a high socioeconomic status community, but only among a subset of hazardous waste violations.

The Treadmill of Destruction and Carbon Emissions During Times of Recession: A Case for Risk-Transfer Militarism Within the World-System, 2000-2010

By: Michael Lengefeld (Department of Sociology, Washington State University)

It is clear that global recessions and a country's position in the world-system influence economic standing, but what is less clear is the effect of these two phenomena on environmental outcomes. Thus, we consider three environmental sociology theories – The Treadmill of Production, the Treadmill of Destruction, and World-System Research – in assessing the effects of economic prosperity and decline on carbon emissions.

Labor Market Risks and Subtle Processes:
A Call for an Application of Risk Theory to Dual-Career Hiring in Academia

By: Sarah Morton (Department of Sociology, Washington State University)

Risk theory has been extensively applied to environmental issues and broad issues of the labor market. This review of literature analyzes previous applications of risk theory to labor market risk and explores new applications to the hiring process in professional occupations, and specifically dual-career hiring in academia.

Poster Session

Methylene Blue degradation by GUITAR, a new dimensionally stable anode

By: Charles O'Nwamba, Isaiah O. Gyan, and I. Francis Cheng (Department of Chemistry, University of Idaho)

GUITAR degraded 9.3 ppm of MB (0.1 M Na_2SO_4) at rates 2 orders of magnitude faster than diamond electrodes (2.78 x 10^{-2} $cm^{-2}min^{-1}$) and with lower applied potentials (1.6 vs. 2.5 V). We will discuss the durability of GUITAR anodes and its proposed uses in energy applications and conversion.

Carbon and Nitrogen Storage in Biosolids Amended Soils

By: Lauren Port and Bill Pan (Department of Crop and Soil Sciences, Washington State University)

King County biosolids have been applied to wheat growing land in Douglas County for 20 years and analyses of soil samples from the site show resulting increases in soil carbon and nitrogen pools. Greater carbon storage, coupled with reduced fertilizer emissions, may provide an option for mitigation of greenhouse gases.

Measuring the Greenhouse Gas Footprint of Agriculture: Nitrous Oxide Emissions over Wheat-Based Cropping Systems in the Inland Pacific Northwest

By: Sarah Waldo (Laboratory for Atmospheric Research, Washington State University)

Emissions of the potent greenhouse gas and ozone depleting substance nitrous oxide (N_2O) are often a significant portion of an agricultural field's GHG budget. However, measurements of N_2O emissions for the IPNW are scarce. This study provides long-term, continuous, field scale measurements of N_2O over two fields in the region.

Ecological niche model development of the wood frog, *Lithobates sylvaticus*, including historical and future climate predictions.

By: Travis Seaborn and Erica Crespi (School of Biological Sciences, Washington State University)

Models of the range of the wood frog were created using present climate data, land use data, and a combination of both datasets. Climate models were also created to predict the range from the last interglacial period to 2080. Future models used both the 4.5 and 8.5 emissions scenarios.

Expanding The Borders Of Environmental Inequality: An Examination Of Sociodemographic Predictors Of Inequality In Ontario, Canada

By: Darcy Hauslik (Department of Sociology, Washington State University)

This project uses logistic regression to determine the extent of environmental inequality – the inequitable distribution of environmental hazards and benefits according to social hierarchies – in Ontario, Canada. Shifting the environmental inequality paradigm from its origin in the United States provides useful insights to the roots and nature of environmental inequality.

Session 3: Stakeholders

This session centers loosely around the "who" of environmental risks and concern. From the consideration of end users of carbon footprint calculators to the incorporation of gender concerns in environmental sociology this session is the most concerned with who is and is not included in discussions of environmental hazards.

The Effect of Economic Affluence and Ecological Degradation on Chinese Environmental Concern: a Multilevel Analysis

By: Feng Hao (Department of Sociology, Washington State University)

This paper discussed Chinese public's environmental concern by analyzing 2003 Chinese General Social Survey. Individual-level and provincial-level analyses indicate that ecological degradation and economic affluence influence one's overall environmental concern. The paper was published by *Journal of Environmental Studies and Sciences* and won the James F. Short, Jr. Research Award.

OFoot: A New Tool to Improve the Carbon Footprint of Organic Farming

By: Lynne Carpenter-Boggs[1], Cornelius Adewale[1], Bryan Carlson[2], David Granatstein; Stewart Higgins[1,2], David Huggins[1], Roger Nelson[2], Claudio Stockle[2], Usama Zaher[3] ([1]WSU Dept. Crop and Soil Sciences, [2]WSU Dept. Biological Systems Engineering, [3]Registered Environmental Engineer, Pullman, WA.)

This project has expanded the CropSyst model, developed a Life Cycle Analysis (LCA) for farm equipment and infrastructure, and developed a user-friendly farm carbon footprint calculator (OFoot). The tools can be used to model crops, inputs, and other options to support decision-making on diverse farms.

Locating Gender Inequality in the Theory and Practice of Environmental Sociology

By: Liz Dzialo (Department of Sociology, Washington State University)

This presentation will provide a brief overview of the state of gender-theorizing in environmental sociology. It will highlight the ways in which gender has been framed thus far in relation to the environment and will argue that a critical perspective is necessary towards informing an environmental sociology which accounts for both gender justice and ecological sustainability.

Session 4: Resilience

This session examines potential routes forward in addressing concerns associated with the anthropocene – disciplinarily, culturally, and technologically.

Of Bird's Nests and Beaver Dams: Landscape Architecture and Resilience in the Anthropocene

By: Steve Austin (School of Design and Construction, Washington State University)

The Anthropocene will demand an absolutely different way of approaching Landscape Architecture if it is to be a leader in developing social and environmental resilience. To find our way toward resilience through design, we must develop and apply metaphors from nature.

Resilience: Learning to Save among the Sidama of Southwestern Ethiopia

By: Samuel Dira (Department of Anthropology, Washington State University)

People in small-scale are culture vulnerable to variable natural environment. However, they use accumulate traditional ecological knowledge to survive the vulnerabilities

Magnetic Separation Nanotechnology for Heavy Metal Treatment in Industrial Wastewater

By: Huijin Zhang and You Qiang (Environmental Science Department, University of Idaho)

Magnetic separation nanotechnology has been recently applied for industrial wastewater treatment to separate heavy metal ions. By introducing non-magnetic metal chelators onto the surface of magnetic nanoparticles (MNPs), the magnetic nanosorbent conjugates can be easily manipulated and separated in a magnetic separation system after the metal sorption.

Poster and Presentation Abstracts

Full abstracts for each poster and presentation are found in this section in the order they are listed in the session guide.

Towards a Resource-Based Environmental Inequality: A Case Study of Coal Impoundments in Appalachia

By: Pierce Greenberg (Department of Sociology, Washington State University)

Coal waste impoundments pose numerous health and disaster risks to rural communities in Appalachia, yet few studies examine impoundments from an environmental inequality perspective. Coal companies construct impoundments to hold "slurry," the toxic, sludge-like byproduct of coal extraction. Impoundment failures have led to some of the largest human and environmental disasters in U.S. history. Further, there are significant health concerns for residents who live near impoundments. This research identifies significant predictors of a community's proximity to a coal impoundment by empirically testing hypotheses relevant to the sociological literature on environmental inequality, mining communities, and Appalachia. The empirical analyses provide support for treadmill of production theory, which posits that the logic of capitalism leads to an ecologically degrading cycle of production, technological advancement, and worker displacement. Most environmental inequality studies address the treadmill from an "end of the pipe" approach rather than examining environmental degradation at the site of extraction in rural areas. This study advances the conception of a *resource-based environmental inequality* that addresses the social impacts of hazards and risks created by resource extraction processes. The analysis utilizes both ordinary least squares regression and spatial regression in a process of model-building that reveals the importance of spatial relationships between places. Overall, the findings indicate that unemployment and mining characteristics are significant predictors of a community's proximity to a coal waste impoundments. Further, this study illustrates the need for additional resource-based environmental inequality research across different scales, units of analysis, and natural resources.

On the Road to Disease: Susceptibility to Ranavirus Infection of Amphibian Populations Living Near Roads

By: Emily Hall, Brandon Hutzenbiler, Jesse Brunner and Erica Crespi (School of Biological Sciences, Washington State University)

With environmental change occurring at an unprecedented rate, evidence of links between human activity and the emergence of infectious diseases of wildlife is accumulating. Roads are a major anthropogenic disturbance covering around 1% of the area of the US and affecting nearly one fifth. Along with numerous toxins from road run-off, de-icing salts are routinely washed into adjacent freshwater ecosystems, chronically increasing salinity concentrations. Previous research has shown detrimental effects of roadside conditions on amphibian larval survival, growth, and development, suggesting individuals are experiencing an energetic trade-off with osmoregulation in this disturbed habitat. Because salinity concentrations in roadside ponds are likely an osmoregulatory stressor for freshwater organisms, we hypothesized animals living in roadside ponds will be more susceptible to infection and have higher mortality from disease. Roads can affect disease susceptibility of amphibians in two ways, by increasing transmission of pathogens or by decreasing host resistance to infection. We examined the effects living adjacent to roads on susceptibility to a ranavirus (emerging pathogens of amphibians) infection in a dose response exposure experiment with larval and juvenile wood frogs. We found high prevalence of ranavirus infection in wood frog larvae in Yale Myers Forest, CT and ranavirus-associated die-offs were more likely to occur near roads. Infection intensity (liver ranavirus titer) was higher in larvae from roadside ponds in the control group (sham exposure) and at a low dose animals from roadside ponds had similar infection intensities but lower survival than larvae from woodland ponds, suggesting roadside animals are more susceptible to a secondary ranavirus infection. Overall, roads may contribute to population declines by decreasing size and performance of individuals and as a source of ranavirus propagation in this matrix of ponds.

Magnetic Separation Nanotechnology for Recycling Used Nuclear Fuel

By: You Qiang and Huijin Zhang (Physics Department and Environmental Science Department, University of Idaho)

Given the increasing nuclear energy needs, as well as the fact that the spent fuel pools are expected to reach their full storage capacity at US in several years, the recycling and treatment of used nuclear waste has become an urgent issue. In order to find a cost effective and environmentally benign technology to treat the liquid radioactive waste into a safe and stable form for resource recycling or ultimate disposal, investigated the separation nanotechnology for extraction of actinides and lanthanides from aqueous systems. We have attempted to use diethylenetriaminepentaacetic acid (DTPA) to separate the trivalent actinides (An(III)) and the trivalent lanthanides (Ln(III)) from aqueous solution. The high affinity of DTPA towards An(III) and Ln(III) aids in separation from the highly acidic medium of nuclear waste. The solubility and magnetization of iron/iron-oxide particles at low pH is protected by encapsulating them in silica. Surface functionalization of silica coated particles with polyamines enhances the loading capacity of the chelator on MNPs. The particles were characterized before and after surface modification using different characterizing tools. The uptake behavior of An(III) and Ln(III) was determined, respectively. The high removal efficiency and selectivity make the magnetic nanosorbents an effective method for spent nuclear fuel separation. Separation selectivity can be further improved either by attaching different metal chelators or by adjusting the oxidation states of the metal ions in aqueous solution.

The Outcomes of Environmental Violations: Assessing the influence of Facilities, Offense Type, and Community

By: Joseph Kremer (Department of Sociology, Washington State University)

Previous sociological research has only briefly explored whether communities of differing socio-economic status are being equally protected from environmental risks through the use of monetary fines in instances of noncompliance. Using the Environmental Protection Agency's (EPA) administrative environmental enforcement cases within the US Pacific Northwest from 2007-2011 and crisp-set qualitative comparative analysis, this project assesses how the presence or absence of the various demographic, facility-specific, and violation severity predictors combine to result in four distinct sentencing outcomes. The results demonstrate that regardless of violation type, multiple different pathways exist that produce the outcomes of fine and no fine but also that the same sets of predictors influence both outcomes. High fines were found to be associated with the presence of a high socio-economic status community, but only among a subset of hazardous waste violations. The results provide evidence that the EPA is adhering to its policies of environmental equality and confirms the need for scholars to expand beyond traditional regression techniques in order to uncover the multiple and conjunctural causes of an event among sub-sets of cases.

The Treadmill of Destruction and Carbon Emissions During Times of Recession: A Case for Risk-Transfer Militarism Within the World-System, 2000-2010

By: Michael Lengefeld (Department of Sociology, Washington State University)

It is clear that global recessions and a country's position in the world-system influence economic standing, but what is less clear is the effect of these two phenomena on environmental outcomes. Thus, we consider three environmental sociology theories – The Treadmill of Production, the Treadmill of Destruction, and World-System Research – in assessing the effects of economic prosperity and decline on carbon emissions. Using data from 2000-2010, we present spatial autoregressive random effects models on 126 countries and the results indicate the following: 1) both the Treadmills of Production and Destruction influence carbon emissions; 2) the Treadmill of Destruction operates in distinct ways in less developed and developed countries, thus, providing compelling evidence of the maturation of risk-transfer militarism in the developed world; 3) the Treadmill of Destruction, via risk-transfer militarism, is resilient even in times of economic recession. These findings underscore the powerful impact of world-system positioning on carbon emissions and the increasing importance of understanding the military's impact upon environmental outcomes.

Labor Market Risks and Subtle Processes:
A Call for an Application of Risk Theory to Dual-Career Hiring in Academia

By: Sarah Morton (Department of Sociology, Washington State University)

The risk theoretical framework made famous by Ulrich Beck and Anthony Giddens has addressed complicated social and environmental issues resulting from the shift to the new modernity. Risk theory has mostly been applied to environmental issues, but has also been used to examine broad issues of the labor market. However, subtle processes that perpetuate labor market inequality and the uneven distribution of risk, such as the hiring process, have yet to be examined through this highly appropriate theoretical lens. In this review of literature, I analyze the broad application of risk theory to working conditions and the precariousness of employment due to individualization in order to build a foundation for applying risk theory to the hiring process, and specifically dual-career hiring in academia. This review of literature will ultimately be used to explore the following research question in a future study: to what extent does the formality of dual-career policies determine the risks people are willing to take in seeking a dual-career hire in academia, and what role does gender play?

Methylene Blue degradation by GUITAR, a new dimensionally stable anode

By: Charles O'Nwamba, Isaiah O. Gyan, and I. Francis Cheng (Department of Chemistry, University of Idaho)

Current water treatment protocols such as ozonation and chlorination are problematic. These methods produce toxic intermediates and may not address endocrine disruptors, carcinogenic and/or teratogenic agents. Oxidation through anodic processes are being explored, however only expensive synthetic diamond electrodes have enough corrosion resistance for this use. We report on a new carbon allotrope discover in our labs. GUITAR exhibits similar corrosion resistance but with superior electron transfer kinetics and much lower expected costs. The anodic oxidation of the xenobiotic surrogate, methylene blue (MB) is reported. Due to GUITAR's superior chemical properties, 9.3 ppm of MB (0.1 M Na_2SO_4) was degraded at rates 2 orders of magnitude faster than diamond electrodes (2.78×10^{-2} $cm^{-2}min^{-1}$) and with lower applied potentials (1.6 vs. 2.5 V). We will discuss the durability of GUITAR anodes and its proposed uses in energy applications and conversion.

Carbon and Nitrogen Storage in Biosolids Amended Soils

By: Lauren Port and Bill Pan (Department of Crop and Soil Sciences, Washington State University)

Anaerobically digested and dewatered biosolids can be an effective source of nutrients in a cropping system. In a long-term study at Waterville, WA, biosolids have been used as a crop nutrient source on winter wheat-fallow every four years since 1994. Carbon fraction analysis funded by USDA AFRI REACCH has recently been conducted on historical soil samples from this site, and shows that acid resistant and light fraction carbon pools in the soil increase with applications of biosolids. Parallel analyses have been conducted on soil nitrogen, resulting in an understanding of carbon and nitrogen interactions in the bulk soil and the two identified fractions. The trend is for soil carbon and nitrogen levels to increase as biosolid C and N are added, and C at a greater magnitude than N due to N removal in grain harvested from the system. This research demonstrates that soil carbon pools cannot be increased without increasing soil nitrogen pools, and that application of biosolids to wheat growing ground increases C and N sequestration above and beyond what wheat straw alone returns. Using biosolids for crop fertilization shifts the emission balance of a farming system by reducing the fossil fuels needed for nitrogen fertilizer production and transport, which in conjunction with increased sequestration can have implications for mitigation of greenhouse gases.

Measuring the Greenhouse Gas Footprint of Agriculture: Nitrous Oxide Emissions over Wheat-Based Cropping Systems in the Inland Pacific Northwest

By: Sarah Waldo (Laboratory for Atmospheric Research, Washington State University)

Nitrous oxide (N_2O) is a potent greenhouse gas and ozone depleting substance. Agricultural soils are the primary source of N_2O, which is created as a by-product of soil microbial processes. The production and emission of N_2O is characterized by high spatial and temporal variability, or "hot spots" and "hot moments". These behaviors, along with limitations in instrument sensitivity to N_2O, are challenges in characterizing emissions. Without adequate measurements of N_2O emissions it will not be possible to formulate best management practices to mitigate them. Many studies have monitored N_2O emissions using static chambers and micrometeorological measurements either by themselves or in tandem. The two techniques are complementary: chambers have a lower detection limit and are more reliable as their operation does not depend on atmospheric conditions, but may not capture spatial variability even with multiple chambers. Tower-based methods are subject to relatively high data loss due to non-ideal conditions, but have a larger measurement footprint and can characterize field-scale emissions.

This study aims to characterize a long-term, field-scale N_2O budget over two winter wheat fields located in the Inland Pacific Northwest of the United States, both in terms of an annual emission budget and in terms of understanding what causes hot moments. We combined continuous measurements of N_2O emissions from a system of sixteen automated, static chambers with tower-based measurements of N_2O fluxes. We used the flux gradient technique. Preliminary results indicate that freeze-thaw cycles in the winter make up a higher percentage of annual emissions than previously thought. Furthermore, comparison of the chamber results to the tower-based measurements imply that the chambers may be underestimating field-scale N_2O fluxes because they are not adequately capturing hot spots of emissions. We are conducting ongoing work on how to integrate the two measurement techniques, as well as how the empirical measurements compare with other measures of N_2O emissions for the region.

Ecological niche model development of the wood frog, *Lithobates sylvaticus*, including historical and future climate predictions.

By: Travis Seaborn and Erica Crespi (School of Biological Sciences, Washington State University)

Maximum entropy (Maxent) spatial modeling can be used to characterize habitat parameters and predict species occurrence based upon presence-only data. The objectives of this study were to use Maxent to create ecological niche models to determine the historical, present, and future species distribution and environmental suitability across the range of the wood frog, *Lithobates sylvaticus*. Historical range used was mid-Holocene (6,000 bp), last glacial maximum (LGM) (~21,000 bp), and the last interglacial period (LIG (~120,000- 140,000 bp) and future range used was 2030, 2050, 2070, and 2080 using the 4.5 and 8.5 climate emission scenarios. 26 environmental layers were used, all extracted at 30 arc seconds resolution. 19 of these were forms of temperature and precipitation from the WorldClim database and 7 were land use layers. Three models were created: a climate only model, a land use only model, and a combination model of the two using the layers with at least 5% contribution to their respective models. The final combination model was determined by calculating AIC values of all possible combinations of the environmental layers that made the 5% minimum. The final combination model and climate only model for present day aligned closely with estimates of the natural range with the final combination model performing the best. Predicted range contraction and expansion before and after the LGM was observed indicating potential resilience to climate change. Future predictions showed northward shifts of range with both the 4.5 and 8.5 climate emission scenarios, with the 8.5 scenario showing an increased shift at a faster rate. These shifts may be detrimental to the species as they are at a faster rate than historically experienced by the wood frog before and after the LGM period.

Expanding The Borders Of Environmental Inequality: An Examination Of Sociodemographic Predictors Of Inequality In Ontario, Canada

By: Darcy Hauslik (Department of Sociology, Washington State University)

Quantitative research documenting the presence of environmental inequality in the United States is well established. While there is rising evidence that issues of environmental inequality do not respect national boundaries and spread far beyond the United States, quantitative analyses in different national contexts are limited. This project discusses and addresses this gap by applying theories of environmental inequality and justice popularized in the United States to explain the distribution of environmental burdens in Ontario, Canada.

This research tests the extent to which socioeconomic class and race - the main indicators known to be associated with environmentally unequal outcomes in the United States –are associated with environmentally unequal outcomes in the Canadian context. The results show clear support for the importance of socioeconomic status in predicting environmental hazards and mixed support for racial and ethnic indicators. These results are consistent with previous research in both the United States and Canada, and suggest that valuable insights about the nature and extent of environmental inequality can be found through future international and comparative works. This project also provides insight to the role that scale plays in studying environmental inequality.

The Effect of Economic Affluence and Ecological Degradation on Chinese Environmental Concern: a Multilevel Analysis

By: Feng Hao (Department of Sociology, Washington State University)

Despite being the world's second largest economy and the single largest producer of carbon dioxide, few studies have analyzed the nature of the Chinese general public's concern over environmental quality. This paper engages in the longstanding discussion of the postmaterialist values theory and the objective problems subjective values (OPSV) theory that might explain that concern. Specifically, I assess the impacts of economic affluence and ecologic degradation on the likelihood of environmental concern for over 3,000 individuals across 26 provinces in China. I initially use principal component factor analysis to identify three distinct dimensions of general environmental concern. I then employ correlation and regression methods to analyze the associations between these aspects of environmental concern and potential explanatory variables. Individual-level analysis and provincial-level analysis indicate that ecological degradation and economic affluence influence one's overall environmental concern. By using empirical evidence in China to test theoretical frameworks that were originally proposed in the Western world, this paper contributes to the ongoing study of environmental concern. In addition, the formation of public environmental concern can serve as an important prerequisite to initiate collective protests and promote policy changes to improve the deteriorating environment.

OFoot: A New Tool to Improve the Carbon Footprint of Organic Farming

By: Lynne Carpenter-Boggs[1], Cornelius Adewale[1], Bryan Carlson[2], David Granatstein; Stewart Higgins[1,2], David Huggins[1], Roger Nelson[2], Claudio Stockle[2], Usama Zaher[3] ([1]WSU Dept. Crop and Soil Sciences, [2]WSU Dept. Biological Systems Engineering, [3]Registered Environmental Engineer, Pullman, WA.)

Producers, agencies, and the carbon trading industry need a scientifically sound, yet simple estimation of the net greenhouse gas (GHG) balance likely in a given farm. A small number of farm carbon footprint calculators exist, but fall short of ideal tools. One significant shortcoming has been a dearth of crop rotation options, fertilizers, and small scale equipment used on many small and/or organic farms. Managers of organic farms are often keen to improve their environmental and social impacts, yet lack tools to aid decision-making. By focusing this project on organic (both small and large) production systems and producers, we have greatly diversified the cropping systems and farm types that can be effectively modeled and assessed. This project has expanded an established model (CropSyst) used for crop and soil research, and developed a Life Cycle Analysis (LCA) tool for farm equipment and infrastructure, which is now a user-friendly farm carbon footprint calculator (OFoot). These new and improved tools can now model crops, inputs, and options that are relevant for small or large organic farms in the PNW. The OFoot calculator is useable by the public, to evaluate current practices and potential changes to farms and farming methods. By assessing different options virtually, producers can identify those options likely to maximize soil carbon storage, minimize greenhouse gas emission, and thereby contribute further to critical ecosystem services including global temperature moderation.

Locating Gender Inequality in the Theory and Practice of Environmental Sociology

By: Liz Dzialo (Department of Sociology, Washington State University)

Environmental sociology is premised on the inseparability of human and non-human natures and an analytical focus on the place of power and social inequality in shaping human/nonhuman interactions. To date, critical gender theorizing in the subdiscipline is relatively undeveloped, a shortcoming that should be addressed by future scholarship. It is likely that theorizing at the intersection of gender and the environment will become more prevalent given a growing consensus that social justice and equity are precursors to ecological sustainability. We review gender-relevant scholarship related to the impact of environmental problems on women and how women are implicated in solutions to ecological problems. To better position future researchers to account for the role of power and inequality in shaping both gender and environmental outcomes, we highlight literature that is informing an environmental sociology that accounts for both gender justice *and* ecological sustainability.

Of Bird's Nests and Beaver Dams: Landscape Architecture and Resilience in the Anthropocene

By: Steve Austin (School of Design and Construction, Washington State University)

In this session, I will explore what it means to be a designer seeking resilience in the Anthropocene. Cascading environmental destruction and resource depletion mark this emerging geological era. Coincident with this, our society is witnessing massive social and economic inequality, which will be exacerbated by the era's physical impacts. Helping our society achieve resilience in the Anthropocene will require that landscape architects immerse themselves in systems understanding, eliminate the harmful fiction of site boundaries, and become advocates for a new vision of humanity's relationship to our one planet and its life support networks. Nature provides us with two metaphors of how to approach design in the Anthropocene: bird nests and beaver dams.

After illuminating our challenges, I will present contemporary work that emphasizes Landscape Architecture's role in creating a new definition of beauty for this age: design that protects vulnerable places and people, renews ecological balance, and fosters community.

Resilience: Learning to Save among the Sidama of Southwestern Ethiopia

By: Samuel Dira (Department of Anthropology, Washington State University)

Sidama farmers rely on rain-fed agriculture and experience a highly variable natural environment. Recurrent drought, erratic rainfall, and crop and livestock loss are common in mid and lowland areas, but local people are not passive victims of the changing environment: they use accumulated knowledge and skills to respond to and buffer ecological changes. Based on free-lists and in-depth interviews with 70 adults and 50 adolescents during 2012 and 2013, this paper describes how the Sidama conceive of ecological risks, survive difficult times, and transmit knowledge about resiliency to the next generation. Drawing on a social science perspective of resilience as 'the ability of individuals, groups or a community to cope with external stresses and disturbances', I demonstrate that people view the future as unpredictable and that diverse and complex knowledge about 'saving' is a critical cultural resilience strategy. The paper examines debates within the anthropology of learning and argues that farmers use explicit teaching as an essential process to transmit knowledge and skills about resiliency to their children.

Magnetic Separation Nanotechnology for Heavy Metal Treatment in Industrial Wastewater

By: Huijin Zhang and You Qiang (Environmental Science Department, University of Idaho)

Nowadays, the greater quantities of wastewater generation and the more stringent regulations for wastewater discharge call for a simple, fast, clean, and cost-effective heavy metal treatment process to overcome the drawbacks existing in the traditional methods. Under such guidance, an alternative magnetic separation nanotechnology has been investigated and developed in our laboratory recently. The concept is to introduce non-magnetic metal chelators onto the surface of magnetic nanoparticles (MNPs), so that the magnetic nanosorbents with a magnetic core and a functionalized shell can be manipulated and recovered in a magnetic field produced by the separation system. Our current study focuses on novel magnetic nanosorbents by attaching diethylenetriaminepentaacetic acid (DTPA) molecules onto the surface of double coated magnetic nanoparticles (dMNPs). The batch sorption experiments have demonstrated that the dMNP-DTPA conjugates are an effective and excellent sorbents for cadmium (Cd) and lead (Pb) extraction from wastewater. The sorption of Cd or Pb onto the dMNP-DTPA conjugates was fast which reached the equilibrium in 30 min. The calculated sorption capacities were 8.06 mg/g for Cd and 12.09 mg/g for Pb. Desorption of metal ions and regeneration of the sorbents was achieved by 0.1 M HCl stripping, which showed that the dMNP-DTPA conjugates can be reused more than 15 sorption/desorption cycles without significant decrease in sorption efficiency. With a magnetic device, the conjugates can be easily manipulated and separated from solution in less than 1 min by applying an external magnetic field with a field gradient of above 300 G/mm.

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