

14TH ANNUAL

Graduate Multidisciplinary Conference

An annual conference to showcase the research and projects of the Clark University graduate student community.

WEDNESDAY, APRIL 6, 2016, 12-8 P.M.
HIGGINS UNIVERSITY CENTER



Schedule Overview

The Graduate Multidisciplinary Conference is an annual tradition meant to emphasize the important research produced by Clark University's graduate community. Sixty-nine graduate students are representing twelve graduate departments, including the Graduate School of Management, through oral and poster presentations.

- 12-1 p.m. Welcome Luncheon**
Higgins University Center, Tilton Hall
- 12:45 p.m. Opening Remarks: President David Angel**
- 1-5:45 p.m. Oral Presentations**
Higgins University Center; Lurie, Grace, and Rosenblatt conference rooms

Session start	Themes
1 p.m.	Dimensions of Human Health; Learning and Change; Ecological Flows
2:15 p.m.	Borders and Boundaries; Environment and Growth; Markets and Outreach
3:30 p.m.	Movement and Exchange; Energy and Infrastructure
4:45 p.m.	Identity and Relationships; Networks and Layers; Sustainable Connections

Oral presentations are arranged intentionally, so that each section is a multidisciplinary experience. Themes were chosen, when applicable, for each session. An index of presenters can be found on the last two pages of the program.

Poster Presentations

- 1:30-2:15 p.m. Poster Session
4-4:45 p.m. Poster Session
Higgins University Center; Tilton Hall

Posters will be on display throughout the entire conference and are organized by the presenter's last name. An index of presenters can be found on the last two pages of the program.

- 6-8 p.m. Reception and Awards Ceremony**
Higgins University Center; Tilton Hall
- 6:30 p.m. Travel and Skills Awards Ceremony**
- 6:45 p.m. Closing Remarks:**
Francy Magee, Dean of Students

Graduate Student Association (GSA)

The Clark Graduate Student Council serves the Graduate Student Association by planning student events, appropriating budgeted funds, sitting on university committees, and providing graduate student input to the administration. All students are welcome to participate in the activities of the council — meetings and events are announced periodically via email (gsc@clarku.edu).

In addition to officers, each department has a representative. There is no formal process to become a member; if your department needs a representative, simply start coming to the meetings and voice your opinion. Agenda items frequently include events planning, appropriation requests, health insurance, stipends, University policy, and campus services.

Current departmental representatives include: Casey Trimble (Physics), Linshu Wang (Chemistry), Matthew Law (History), Jacqueline Schnieber (English), Kaitlin Black (Psychology), Melissa Graham (Biology), Alex Moulton (Geography), Kate Markham (IDCE), and John Richards (GSOM).

Graduate Student Council

The 14th Annual Multidisciplinary Conference (MDC) was organized by the 2015-2016 members of the Graduate Student Council.

- Co-President Ph.D.:** Laura Sauls
Co-President (Master's): Lauren Mawe
Events Planning: Alicia Knudson
Treasurer: John Soghigian
Communications Officer: Samantha Coccia

Graduate Student Association Travel and Skills Awards

The purpose of the Graduate Student Travel Award program is to provide opportunities for Clark graduate students to attend conferences where they can present their original research and/or improve their skills. Evaluation of applications for these awards is based on the relevance of the research topic, rigor of methodological approach, and/or the degree to which a skill would benefit the student or project.

Oral Presentations

Session 1: 1 – 2 p.m.

Group A: Dimensions of Human Health

Grace Conference Room, Higgins University Center

1 p.m.

An in vivo screen for novel small molecule inhibitors of PLC-gamma.

Presenter: Chitra Naidu

Co-authors: Michelle Latino, Todd Rosenberg, Claire Rosenwasser, Justin Thackeray

Department: Biology

Adviser: Justin Thackeray

Abstract: PLC-gamma is a conserved regulator of signaling pathways that are required for the proper growth and proliferation of many cell types. Overexpression of PLC-gamma is found in many common human malignancies, suggesting that inhibitors may have an important role to play in the fight against cancer. However, there are no molecules that specifically inhibit this phospholipase. This study aims to find a PLC-gamma inhibitor using *Drosophila melanogaster* as the model system.

1:15 p.m.

In silico studies of neutral drift for functional protein interaction network

Presenter: Md Zufikar Ali

Department: Physics

Adviser: Ranjan Mukhopadhyay

Abstract: In the hierarchy of interesting dynamical behavior in biology, oscillations have always attracted the modeling community. As biochemistry and molecular biology progressed we learned about many biochemical systems that oscillate: glycolytic oscillation, circadian rhythm, cell cycle, oscillation in protein concentration, etc. We have developed a minimal physically motivated model of protein protein interaction networks and have applied this model to study neutral drift in functional networks that yield oscillatory dynamics, where we start, for example, with a relatively simple network and allow it to evolve by adding nodes and connections while requiring that dynamics be conserved. Our system consists of two classes of enzymes, activators (e.g., kinases) and deactivators (e.g., phosphatases), and the enzyme mediated activation/deactivation rates are determined by sequence-

dependent binding strengths between enzymes and their targets. The network is evolved by introducing random point mutations in the binding sequences where we assume that each new mutation is either fixed or entirely lost (valid for sufficiently small populations). Our studies demonstrate both the importance of employing a sequence based evolutionary scheme and the relative rapidity (in evolutionary time) for the redistribution of function over new nodes via neutral drift.

1:30 p.m.

The Bridge: Doulas could improve foreign-born women's perinatal and postpartum satisfaction and increase health providers' cultural competence in a multicultural urban area of the United States.

Presenter: Crystal Kazik

Department: International Development, Community and Environment

Adviser: Marianne Sarkis

Abstract: While in the U.S. childbirth has become increasingly medicalized, doulas, a term for birth workers who support and help prepare women for motherhood, continue to play this role in some communities. The benefits of implementing doula interventions on the birthing industry and on women's perinatal experience is becoming more obvious as research on the subject is conducted and published. Overall, recognition of doulas in U.S. mainstream culture is on the rise; however foreign-born women may be at a disadvantage for accessing or benefiting from their services due to predisposed ideas of health care based on experiences in native countries, language barriers, lower health literacy, and poor cultural competency on behalf of biomedical providers. The purpose of this research was to highlight aspects of the doula's role which could improve foreign-born women's perinatal and postpartum satisfaction, as well as highlight collaborative, culturally competent, and effective best practices in a diverse urban area.

1:45 p.m.

Population Structure and Copy Number Variation in the Primary Pathogen *Cryptococcus gattii*

Presenter: Jacob Steenwyk

Co-authors: John S. Soghigian, John R. Perfect, and John G. Gibbons

Department: Biology

Adviser: John Gibbons

Abstract: Copy number variation (CNV) can take the form of deletions, duplications and complex multi-loci variants. Genomic characterization of CNV has been studied to a much lesser degree than other mutations such as single nucleotide polymorphisms (SNPs). Nonetheless, CNV has been shown to influence host specificity, gene expression, fungicide resistance and virulence in several pathogenic fungi. In response, we use 212 publicly available next-generation whole genome sequences to characterize CNV profiles of an emerging primary pathogen in the Pacific Northwest of the United States, *Cryptococcus gattii*. Population structure analysis revealed the presence of 8 subpopulations among 212 *Cryptococcus gattii* samples. 81,901 copy number variable regions (CNVRs) ranging from 100 basepairs to >3.65 kilobase (Kb) across all samples were identified and quantified. Gene ontology enrichment analysis of duplicated genes present in all VGII subgroups revealed concerted duplication of genes with functions related to metabolism, biosynthetic pathways, membrane and transport. Assessment of divergent CNV loci in subgroups belonging to the VGII lineage revealed 67 highly divergent CNVRs harboring 58 unique genes. Enrichment analysis of PFam domains located within divergent CNVRs showed lineage-specific stratification in proteins associated with catabolism, metabolism, transport and both cell wall composition, organization, cellular amino acid metabolism and external encapsulating structure, the latter two being well-characterized contributors of virulence in *C. gattii* and other pathogens. CNVRs identified in this study may contribute to virulence, gene expression, fungicide resistance, host specificity and a recent niche habitat expansion of *C. gattii*.

Group B: Learning and Change

Lurie Conference Room, Higgins University Center

1 p.m.

More than Just Substitutes: Human/Non-Human Relationships in Ted Chiang's *The Lifecycle of Software Objects*

Presenter: Jessica Thelen

Department: English

Advisers: Betsy Huang, Scott Hendricks

Abstract: What constitutes a “real” or “authentic” relationship and what does not? Who has the power to define relationships as such? Ted Chiang's novella “*The Lifecycle of Software Objects*” (2010) explores the possibility of platonic or romantic human/

non-human relationships, and what it means to be in such relationships. These relationships are often stigmatized and misunderstood. The question of whether human/non-human relationships are seen as “real,” as taboo, or as a combination of the two is one of the novella's central themes. I argue that this text portrays how human/non-human relationships, just like human/human relationships, are incredibly complex and influenced by a wide variety of socioeconomic, emotional, and moral factors. The human/non-human relationships in “*Lifecycle*” gesture toward a more nuanced understanding of what it means to be in a relationship with another being: that AIs, although they are not “living” subjects, deserve compassion and respect. In an increasingly technological society, we need to be prepared to consider the possibility and authenticity of such relationships, and this text provides an avenue for doing so.

1:15 p.m.

How Endogeneity Matters: A Case Study of Urban Self Help Groups in Ethiopia

Presenter: Bisrat Kabeta

Department: International Development, Community and Environment

Adviser: Cynthia Caron

Abstract: The future of an estimated 20,000 Self Help Groups (SHGs) in Ethiopia is uncertain because they lack legal personalities and are, therefore, unable to access essential services for their development. The Government is offering to register the SHGs as MSEs or cooperative societies, which are exclusively economic institutions and cannot fully serve the diverse interests of the SHGs. Unfortunately, there has not been any coherent explanation for why the SHGs need a formal status, but should not register as anything but SHGs. In this thesis, I provide this missing explanation by arguing that SHGs are endogenous development groups, which need a suitable legal recognition that enables them to negotiate access to resources without compromising their ability to address their members' holistic needs through their own leadership. Between the months of May and August 2015, I undertook a study of 181 SHGs organized by the Ethiopian Kale Heywet Church in Jimma, Hawassa, and Adama towns. My mixed research method approach finds that the SHG approach is an endogenous development model. As endogenous development groups, the SHGs need a legal status in order to mobilize resources towards their development. However, they could also lose their endogeneity if they registered as MSEs or cooperatives, whose provisions are in contradiction with the endogenous

development principles. Therefore, Ethiopian policymakers should enact a new policy framework that recognizes the SHGs' endogeneity and permits them to operate without compromising their endogenous features. This study also has implications for SHG-related research and implementation by establishing the SHG approach in a coherent theoretical framework for the first time.

1:30 p.m.

A study that critically engages secondary language acquisition and how it relates to immigrants developing cultural competence

Presenter: Susan Nelson

Department: International Development, Community and Environment

Adviser: David Bell

Abstract: This study seeks to critically engage in the topic of secondary language acquisition to explore the role it plays in immigration, particularly as this relates to developing cultural competence. Further, the research examines the barriers to second language acquisition, and also makes recommendations for reducing those barriers. This will be done by examining literature that analyzes the role that secondary language learning plays in immigrants becoming culturally competent within the United States, and will look at this more in depth by focusing on Mexican immigrants who have come to the United States.

1:45 p.m.

**You won't last, so leave a legacy :
Young 'Qurbojoog' (foreign raised) Somalis' experiences in Somaliland**

Presenter: Amina Musa

Department: International Development, Community and Environment

Adviser: Anita Fabos

Abstract: This assignment centers the experiences of young Somalis raised abroad — outside the region, settling in Somaliland. This demographic has grown up in the shadows of the civil war and feel a collective responsibility to contribute to development. To capture their experiences, I carried out ethnographic fieldwork in Hargeisa, Somaliland over the summer of 2015. Through social media analysis, interviews and participant observation I was able to deconstruct their experiences, explore notions of belonging and claims to 'home'.

Group C: Ecological Flows

Rosenblatt Conference Room, Higgins University Center

1 p.m.

Depth resolved sediment transport driven by a steady fluid flow

Presenter: Benjamin Allen

Department: Physics

Adviser: Arshad Kudrolli

Abstract: We discuss an experimental investigation of motion of a granular bed driven by a laminar fluid flow as a function of applied shear rate. This is a model system to investigate a variety of examples where such a situation arises including wind blowing over sand, sediment transport in rivers, slurries, and turbidity currents. We have developed an experimental apparatus which allows examination of the fluid as well as the grain dynamics both at the surface as well as deep into the bed under steady state conditions with refractive index matching technique. This allows us to obtain both the applied local shear stress by the fluid as well as the local strain rate inside the bed. We find that the granular flux as a function of depth decays exponentially into the bed. Further, the velocity profile is observed to exhibit a crossover from a regime where particles are fully suspended to where there is bed load transport. We will discuss the observed velocity and density profiles in light of various models of granular suspensions.

1:15 p.m.

Field evidence that a gregarine parasite regulates its invasive host's population size

Presenter: John Soghigian

Co-author: Todd Livdahl

Department: Biology

Adviser: Todd Livdahl

Abstract: Although parasites are by definition costly to their host, demonstrating that a parasite is regulating its host in the field can be difficult. Here we present an example of a gregarine parasite, *Ascogregarina taiwanensis*, regulating its mosquito hosts, *Aedes albopictus*, in Bermuda. We sampled larvae from container habitats over two years, assessed parasite prevalence, and estimated host abundance from egg counts obtained in neighboring ovitraps. We regressed change in average egg count from one year to the next on parasite prevalence and found a significant negative effect of parasite prevalence. We found

no evidence of host density effecting parasite prevalence. Our results demonstrate that even for a parasite with moderate virulence, host regulation can occur in the field.

1:30 p.m.

Symbiont population uniformity across a depth gradient and during coral development

Presenter: Hannah Reich

Co-authors: Deborah L. Robertson & Gretchen Goodbody-Gringley

Department: Biology

Adviser: Deborah L. Robertson

Abstract: Shallow water coral abundances are declining globally as a result of anthropogenic stressors, which has not been observed in mesophotic reefs (30-150m). The Deep Reef Refugia Hypothesis postulates that mesophotic taxa may provide a source of larvae to repopulate shallow communities. Comparing Symbiodinium population structure on reefs at different depths will provide insight into the connectivity between shallow and mesophotic reefs. This study examined whether Symbiodinium communities associated with shallow (10m) and upper mesophotic (30m) *Porites astreoides* (1) differ, (2) change during coral development and (3) influence survivorship and growth of mesophotic juveniles on shallow reefs. Symbiodinium ITS2 sequences were amplified and sequenced from *P. astreoides* adults, planulae, and juveniles to determine symbiont diversity. Initial results revealed that adults, planulae, and juveniles from both depths harbor primarily clade A Symbiodinium. In addition, there was no evidence that symbiont populations changed during coral development and there were no differences in survivorship and growth. Although further fine-scale analyses of Symbiodinium genetic structure is ongoing, the conservative relationship between symbiont genotype and *P. astreoides* across its bathymetric distribution and throughout development may enable the recruitment of mesophotic *P. astreoides* planulae to shallow reefs.

1:45 p.m.

Burn Analysis of 2015 California Valley Fire

Presenters: Henry Mros and Tiancheng Ouyang

Department: International Development, Community and Environment

Adviser: Florencia Sangermano

Abstract: The 2015 California Valley Fire spread across many different land surfaces and through populated areas very quickly. Determining what types of land cover the wild fire traversed and destroyed is a question that can be answered thoroughly with remote sensing technologies and methods. Not only are burnt areas easily detected with remotely sensed images, but the burn severity can also be calculated if appropriate images are obtained before and after the fire.

Session 2: 2:15-3:15 p.m.

Group A: Borders and Boundaries

Grace Conference Room, Higgins University Center

2:15 p.m.

Transnational Migration and Environmental Governance at the Moroccan-Spanish Border

Presenter: Leslie Gross Wyrzten

Department: Geography

Adviser: Gil Pontius

Abstract: In March 2014, Spanish Interior Minister Jorge Fernandez estimated that 40,000 sub-Saharan migrants were encamped in forests along the Moroccan-Spanish border. That same year, 588 people, mostly from Africa, drowned in the Mediterranean crossing. As a result, the European Union and Spain have intensified pressure on Morocco to secure its borders, resulting in thousands of sub-Saharan migrants being suspended in a state of fixed mobility. This case, building on Michael Collyer's theorization of the spatiality of transnationalism (2015), exemplifies the multiple ontologies of transnational space as a point of contact among Spain/Morocco, sub-Saharan Africa/North Africa/Europe, Schengen/non-Schengen countries, forest agents and international conservation agencies/migrants, and border police/non-documented people. This paper focuses on how the Moroccan state, with EU nongovernmental partners, employs the logic of international biodiversity conservation to reterritorialize the border between Morocco and the Spanish enclave of Melilla. It also analyzes how, at the same time, migrants retreat to areas of preservation adjacent to the border wall as a means of deterritorializing space, thereby escaping the disciplinary mechanisms of legibility that constitute bordering (Scott 1998).

2:30 p.m.

“They do trust me... but they keep their boundaries” — Subjective parenting practices as perceived by Indian American emerging adults

Presenter: Achu Johnson Alexander

Department: Psychology

Adviser: Jeffrey Jensen Arnett

Abstract: Parenting practices in emerging adulthood are directly related to specific attitudes and behaviors of their children, such as their establishment of autonomy, identity development, and adult-oriented decisions. However, descriptions of these practices may likely be different depending on whether the informants are emerging adults (who provide their perceptions of parenting, i.e., subjective parenting practices) or parents (who actually state what they do, i.e., objective parenting practices). The purpose of this study was to qualitatively investigate the perceived parenting practices of emerging adults from a specific ethnic minority group, Indian Americans. Two generations of Indian Americans were studied — 1.5th (born in India but entered U.S. with Asian Indian parents before the age of 12) and 2nd generation (born in the U.S. to Asian Indian immigrants). Individual interviews were conducted with 17 emerging adults to understand their perceptions of practices that parents adopted as these participants were coming of age. Using thematic analysis, two themes were identified in emerging adults’ lives — rejection of parents’ worldviews in specific areas, and independence-interdependence in socialization. Implications of this research includes recommendations to ethnic-based organizations working with young Indian Americans in educating their immigrant parents to provide a supportive role during their emerging adults’ preparation towards adulthood.

2:45 p.m.

The Effects of the Presence of Rebel Groups on Education: Evidence from Colombia

Presenter: Alejandro Mina Calvo

Department: Economics

Adviser: Marc Rockmore

Abstract: I use a rich dataset of Colombian households and individuals to estimate the impact on schooling accumulation of the presence of rebel groups. I regress years of education on the duration of the presence of non-state armed groups. I find a negative effect for the presence of non-state armed groups when

it is relatively short (more than three years, but less than seven) but a positive one when it relatively long (more than seven years). This result suggests that people learn to cope with such groups when their presence becomes a permanent shock.

3 p.m.

Memorialization, Justice, and the Social Psychology of Survivors of the 1994 Genocide in Rwanda

Presenter: Samantha Lakin

Department: History

Adviser: Ken MacLean

Abstract: After mass atrocities and genocide occur, transitional justice theory notes that state institutions are destroyed during conflict, and justice cannot take place unless there is political will and institutions are rebuilt. Transitional justice mechanisms are divided between juridical justice, which focuses on perpetrators, and symbolic justice, which focuses on victims and survivors. This paper will explore aspects of symbolic justice in response to the 1994 genocide in Rwanda, which include memorialization and burial of victims. According to social psychological theory, after transgressions occur a victim’s sense of normalcy is altered, their faith in the regular functioning of social and political systems is harmed, and they seek methods to address the harm they have experienced. This paper will analyze oral history testimonies conducted with survivors of the 1994 genocide in Rwanda, collected by the USC Shoah Foundation and the Kigali Genocide Memorial’s Genocide Archive of Rwanda. I will also engage with a series of key informant and local interviews, which I conducted with Rwandan survivors in July 2015. These interviews specifically engage with questions of memory, justice, and memorialization. I aim to analyze the testimonies in order to understand how different aspects of memorial culture in Rwanda have helped or hindered survivors’ abilities to cope with their experiences of genocide and to develop a positive view of post-genocide life in Rwanda. In these interviews, survivors spoke about the closure and comfort provided by these memorial sites, spaces, and processes, but also touched on the difficulties of having many memorial sites and many commemorative days in Rwanda, which has caused retraumatization for many of the survivors who were interviewed.

Group B: Environment and Growth

Lurie Conference Room, Higgins University Center

2:15 p.m.

Phenotypic responses to an invasive aquatic predator

Presenter: Max Nyquist

Co-authors: John Baker, Susan Foster

Department: Biology

Adviser: Susan Foster

Abstract: The introduction of invasive species is considered one of the major threats to biodiversity and ecology, comparable to climate change and habitat destruction, fragmentation and degradation. Among invasive species, introductions of top fish predators to freshwater environments are especially disruptive to ecosystem health and function. In addition to ecosystem disruption, top fish predators threaten the persistence of unique prey populations, as novel selective pressure may result in phenotypic change or local extinction of native prey species. In this study, populations from the Threespine stickleback (*Gasterosteus aculeatus*) adaptive radiation are used to investigate phenotypic shifts in behavior and morphology following invasion by a top piscine predator, the Northern Pike (*Esox lucius*). To study behavioral shifts, simulated attacks in the natural environment are used to observe differential anti-predator behaviors between pike-sympatric and pike-naïve ecotypes. Meanwhile, long-term field collections are utilized as a tool for measuring shifts in defensive trait morphologies before and after an invasion event by pike. Armor traits include dorsal and pelvic spine lengths, body depth, and standard length as a covariate. Results of the behavioral tests do not show common responses among the pike ecotypes, although differential behaviors were observed between different populations. Preliminary analysis of armor morphology traits shows directional shifts in individual traits from pre-pike and post-pike years. More persistent and continued monitoring on behavioral and morphological shifts is required to highlight potentially vulnerable populations of Threespine stickleback that currently or may one day face invasion by Northern Pike.

2:30 p.m.

The Maternal Stress Response and Consequences for Offspring Phenotypes

Presenter: Melissa Graham

Co-authors: Briana Cooney, Ryan Earley, John Baker, Susan Foster

Department: Biology

Adviser: Susan Foster

Abstract: The stress response system allows individuals to cope with environmental challenges via hormone regulation. Even in fishes with external fertilization, maternal stress hormones have shown positive and negative effects on offspring phenotype. In this study, we investigate evolution of the stress response system using derived freshwater populations of Threespine stickleback (*Gasterosteus aculeatus*) with divergent social environments (enhanced or reduced frequency of stressors during reproduction compared to their ancestral population). We ask how evolutionary history has shaped maternal cortisol levels during clutch production, hormonal response to a relevant social stressor (prolonged egg retention), and effects of maternal cortisol on offspring. Populations showed different levels of whole body cortisol. While the stressor had no effect on maternal cortisol level, there was a significant interaction of stress treatment and maternal cortisol on egg cortisol levels. Further, egg cortisol had a significant effect on offspring stress-reactive, but not baseline levels of fry cortisol. Thus, we show evidence of evolved differences in circulating maternal hormones, and divergent plastic strategies of hormone allocation to eggs, with effects that influence offspring physiology until at least 2 months of age. Additional testing will elucidate the degree of parallelism in independent populations under similar environmental conditions and how maternal response to stressors might have meaningful fitness consequences for offspring due to epigenetic effects.

2:45 p.m.

Environmental law implementation in the oil and gas sector in Ecuador after the 2008 constitutional change.

Presenter: Teresa Bornschlegl

Department: Geography

Adviser: Anthony Bebbington

Abstract: This presentation presents results from an empirical study on the conditions for successful environmental law

enforcement in the oil and gas sector taking Ecuador as a case study. In 2008, the Ecuadorian state went through a substantial restructuring in the process of developing a new national constitution: the oil industry was nationalized while the Rights of Nature became legally integrated into its text. Since then, the budget as well as the regulatory competence of the Ecuadorian Ministry of Environment increased significantly. The overall question of this presentation asks how far these institutional changes have reached the actual enforcement of environmental laws in the oil and gas sector. More specifically, it asks: a) how and why (or why not) have these changes influenced the ability of the responsible environmental agencies to detect environmental damages and environmental breaches?; and b) how and why (or why not) did these changes influence their ability to react to potential detections in terms of the reparation of damage and sanctioning of environmental breaches? The presentation's methodological approach consists in a comparative analysis of the operations of the Ecuadorian Ministry of the Environment at the national and sub-national levels between the years 2005 and 2015. It combines an ethnographic research approach with spatially sensitive analysis of statistical data and official documents. The purpose of this presentation is to assess the consequences of recent institutional changes in environmental governance in Ecuador in order to determine ways to reduce negative impacts of oil and gas extraction.

3 p.m.

Not in the Toilet: The effect of Sanitation on Stunting in Children

Presenter: Mochamad Pasha

Department: Economics

Adviser: Marc Rockmore

Abstract: I investigate the linkage between sanitation and stunting. Stunting is a public health concern in the developing world, damaging both the physical and cognitive potential of children. As such, stunting has long-term repercussions on the quality of human capital in developing countries. The pervasiveness of stunting despite nutrition campaigns led to researchers examining other potential causes besides malnutrition. Recent work in this field has found poor sanitation lead to stunting in children. However, those projects use cross-section and experimental approaches, which might not capture variations within the households or changes in sanitation behavior. I use a panel data approach to investigate the relationship between sanitation and stunting by utilizing a

rich panel data set from Indonesia. I find sanitation does impact stunting, however the linkage between them is more nuanced. While the degree of the impact of sanitation on stunting is far from conclusive, I demonstrate sanitation is one of the keys to understanding and averting the stunting pandemic in low- and middle-income countries.

Group C: Markets and Outreach

Rosenblatt Conference Room, Higgins University Center

2:15 p.m.

Marketization of agricultural land use rights and agrarian transformation in contemporary China

Presenter: Wenjing Jiang

Department: Geography

Adviser: James McCarthy

Abstract: Rights to agricultural land in China are changing hands rapidly. Informal practices of agricultural land (re)distribution in place since the Communist Collectivization Campaign of the 1950s are being superseded by formal laws and regulations. Under current rules, local authorities formally subcontract collective-owned agricultural land ("contract land" below) to individuals or households, and only the use rights to such contract land can be transferred. My project aims to examine the contemporary agrarian transformation in China through the lens of the transfer of agricultural land use rights ("agricultural land transfer" below), and this paper presents two observations based on my preliminary research reading laws and policy documents at national level and a few second-hand cases. First, although the recent marketization of agricultural land use rights was led by the state, historical trajectory of both formal and informal practices at the national level has indicated that it was the informal practices that led the direction of formalization. Second, both the legal framework and many of the state policies have left open a series of questions. As a result, what happened on the ground varies from place to place. The state reform policies supposedly address peasants' depressed incomes and growing inequalities, yet they often seem to exacerbate those problems, through classic agricultural land expropriation and through superficially voluntary participation in market exchanges. Preliminary research indicates heterogeneous implementation of reform policies across sites and regions, calling for an in-depth investigation into practices, politics, and dynamics of the contemporary agrarian transformation in China.

2:30 p.m.

GSOM Career Center Database

Presenters: Dhvani Badwaik and Alex Turgeon
Department: Graduate School of Management
Adviser: Becky Frieden

Abstract: This purpose of this database is to store data modeled after Clark University's GSOM Career Center, enforce integrity and consistency of that data, and ultimately serve as a proof of concept for a decision support system. By building up this data set and subsequently tracking the data modeled by our Entity Relationship Diagram via SQL queries, the end user will be able to identify areas of improvement and make well-informed, strategic decisions.

2:45 p.m.

Rural Communities Weather Waves of Sugar Cane Agribusiness in Coastal El Salvador

Presenter: James Lochhead
Department: International Development and Social Change
Adviser: Denise Humphreys Bebbington

Abstract: In the last fifty years, sugar cane production in El Salvador has increased from a miniscule 1,428 tons to 1,560,000 tons in the 2013/2014 growing season. This trend continued in 2015, with the government securing an additional \$15-20 million deal to export to China, making the export one of the few bright spots in a struggling economy. With the implementation of such trade agreements as CAFTA-DR, El Salvador has aggressively embraced American policies of free trade, strengthening markets and improving the opportunities for foreign investment, often at the expense of strong legislation on human rights and environmental protection. Rural communities find themselves bearing the negative costs of large scale sugar cane production including sub-poverty wages, disease and illness, soil depletion, greater exposure to chemicals, and diminishing agricultural and fishing production from environmental degradation. An indicator of the devastating effect on communities is the high prevalence of Chronic Kidney Disease, which is the second leading killer of men in the country and coincidentally has a high incidence among workers who harvest sugar cane on the Pacific Coast in Central America. The expansion of sugar cane production in the Bajo Lempa region becomes a case study demonstrating the challenges rural communities face and successes they achieve in maintaining sovereignty over their livelihoods in the era of the Washington Consensus.

3 p.m.

Just a Game? The Impact of Super Bowl Participation on Local Economy

Presenter: Rui Du
Department: Economics
Adviser: Junfu Zhang

Abstract: This paper is an attempt to assess the impact of the participation in a major sporting event — the Super Bowl — on the local economies. The identification strategy is to compare the winning and losing cities at the National Football League (NFL) conference finals under the assumption of similar pre-treatment trends. The stock market performances of firms headquartered in these cities are used to capture the sudden changes in local economic activities during a short time span. The exogenous variations in the football game outcome allow a straightforward difference-in-differences approach to identify the causal effect. This study finds that the post-event trends in winning and losing cities diverge despite the fact that both cities have economically and statistically similar trends before the event. An empirical analysis provides suggestive evidence of a positive, significant local economic impact of conference final wins, possibly through city image enhancement. Further empirical evidence implies the presence of heterogeneous effects across industrial sectors, suggesting that city image enhancing effect might be empirically relevant for the changes in the composition of local industries. Furthermore, we also adopt a similar strategy to examine the local economic impact of the Super Bowl successes; however, we find no statistically significant effect.

Session 3 – 3:30 – 4:15 p.m.

Group A: Movement and Exchange

Grace Conference Room, Higgins University Center

3:30 p.m.

It's No Spring Break in Cancun: The Effects of Exposure to Violence on Risk Preferences, Pro-Social Behavior, and Mental Health

Presenter: Muhammad Nasir
Co-authors: Marc Rockmore & Chih Ming Tan, Department of Economics, University of North Dakota
Department: Economics
Adviser: Marc Rockmore

Abstract: Exposure to violence has been found to affect behavioral parameters, mental health and social interactions. The literature focuses on large scale political violence. The effects of high levels of criminal violence — a common phenomenon in Latin America and the Caribbean — are largely unknown. We examine drug violence in Mexico and, in particular, the effects of exposure to high municipal levels of homicides on risk aversion, mental health and pro-social behavior. Using a nonlinear difference-in-differences (DID) model and data from the 2005-06 and 2009-12 waves of the Mexican Family Life Survey, we find that the surge in violence in Mexico after 2006 significantly increased risk aversion and reduced trust in civic institutions while simultaneously strengthening kinship relationships. Although the deterioration of mental health due to violence exposure has been hypothesized to explain changes in risk aversion, we find no such effect. This suggests that the literature may be potentially missing out on other relevant channels.

3:45 p.m.

A Perspective on Stock Buyback

Presenters: Patricia De Carvalho, Ruijuan Xie, and Windi Prima Saputra
Department: Graduate School of Management
Adviser: Steve Ng

Abstract: Companies with healthy cash flows can reward stock investors by paying a dividend or initiating a stock buyback program to boost its stock price. Financial textbooks suggest that investors should be indifferent between company stock buyback and dividends. This presentation will show which option may provide a better return to investors.

4 p.m.

Mental Health NGOs in Haiti: a comparative organizational assessment

Presenter: Lauren Mawe
Department: International Development and Social Change
Adviser: Nigel Brisett

Abstract: For 3 months in 2015 I interned with two small non governmental organizations (NGOs) in Port-Au-Prince Haiti. My task for the three months was to lend my capabilities to two deceptively simple questions: what does each of these organizations need to do in order to be successful and stable, and, wouldn't they be better served by undergoing the process

of growth together? I engaged with two small mental health NGOs — SLM and Espere. My primary objective was to facilitate the partnership between SLM and Espere because of their perceived complementary strengths and weaknesses. I tried to facilitate this collaboration, while being very attentive to the true priorities of each organization. I did not want to use my outsider role to impose something that neither organization really wanted. While both organizations verbalized that they were interested in partnering, actions suggested that the opposite was actually true.

Group B: Energy and Infrastructure

Lurie Conference Room, Higgins University Center

3:30 p.m.

Oil Reserves and Comparative Development

Presenter: Joshua Bernard
Department: Economics
Adviser: Wayne Gray

Abstract: This is an attempt to investigate the effect of a natural supply of oil (indirectly through the discovered portion of it) on economic growth across countries, inspired by the approaches developed by such economists as Daron Acemoglu, Robert Barro, and Xavier Sala-i-Martin. Results should, under ideal circumstances, help to indirectly answer questions regarding the role nonrenewable energy source extraction plays in sustaining global and national economic growth (and thus better-than-Malthusian standards of living); in addition to the long-run welfare concerns, results could also yield insight regarding the hypothesized “natural resource curse,” wherein some countries rich in a natural resource (in this case, oil) are governed by despotic regimes designed to make extraction and export more efficient for the global markets, at the cost of their countries' residents. The data sets used include: the Penn World Table, a readily available panel of standard macroeconomic indices reported by country from 1950 to 2011; and a synthesis of data, compiled by Kevin Tsui, from sources including (among others) Polity IV, which includes an index of how “democratic” a country's regime is, and a cross-section of oil-reserve-related estimates published by the Association for the Study of Peak Oil (ASPO). The use of ASPO data is unusual in the economics literature because the ASPO measurements are based on geologists' expertise, rather than the sort often more readily available to economists and more prone to optimistic reporting biases.

3:45 p.m.

Social entrepreneurship as a response to the energy crisis and climate change in developing countries: Women managed solar cooker production business in Rural Haiti.

Presenter: Lelani Williams

Departments: Graduate School of Management/International Development, Community and Environment

Advisers: Jude Fernando, Lin Boldt

Abstract: This project addresses three primary areas: deforestation, gender inequality and dirty fuel by the use of alternative energy for cooking. Haiti is one of the many countries that rely on unclean fuels that have depleted the forest by 97%. Deforestation has impacted the ability to find once readily available cooking fuel sources. A simple activity such as cooking has become time-consuming and dangerous. Because cooking is largely the responsibility of women, this shrinking fuel resource further contributes to the inequality faced by women. Solar cookers will not solve the gender inequality or deforestation issues in Haiti, but they are an opportunity to help lessen the problem. Solar cooking is simple to use, safe, and a convenient way to cook food without consuming unclean fuels. Our goal is to open a facility run by women that will assemble solar cookers and sell them in Haiti. Producing solar cookers locally and relying on a Haitian sales force will create jobs for women, and keep production and labor cost low. Providing an alternative cooking fuel for such a fuel-scarce region, will empower women to have jobs, contribute to their households, reduce the cost of food, and reduce the exposure women have to violence. We also hope to reveal that this method of cooking will contribute in some degree to the preservation of local environments.

4 p.m.

For the sake of Progress: Infrastructure Development as a Process of Exclusion Contributing to Environmental Degradation in Southern Peru

Presenter: Kimberly Farias

Department: International Development, Community and Environment

Adviser: Jude Fernando

Abstract: This paper considers the case of “IIRSA Sur,” also known as the Southern Interoceanic Highway through Southern Peru, and explores how a lack of mitigation planning

on the part of the Peruvian government and exclusion of civil society from voicing social and environmental concerns has exacerbated those concerns, most notably the issue of unprecedented migration into the region. Subsequent increases in illegal livelihood strategies such as gold mining and logging have, in turn, resulted from the increase of new citizens living in this region that was previously very rural and difficult to access. Consequently, these social issues have led to an increase in environmental degradation as rivers become polluted from mercury due to gold mining and deforestation depletes soil and stresses fragile ecosystems. Furthermore, this paper shows that areas designated as protected, including Bahuaja-Sonene National Park and Tambopata National Reserve, have done little to slow the incursion of these environmental issues. Finally, this paper closes with a discussion of how various NGOs and civil society initiatives have attempted to correct the oversight of an effective mitigation plan for these issues, and offers hope for how processes of inclusion and transparency can mitigate these issues during future infrastructure projects through the creation of “environmental citizenship” in order to establish a more just distribution of costs and benefits of development in Peru.

Session 4: 4:45 – 5:45 p.m.

Group A: Identity and Relationships

Grace Conference Room, Higgins University Center

4:45

Couples That Sit Together Stay Together: An Overview of Meditation and Mindfulness as it Relates to Intimate Relationships

Presenter: Justin Laplante

Department: Psychology

Adviser: James Cordova

Abstract: Meditation and mindfulness are associated with many positive outcomes, including reductions in stress, anxiety, and depression (Khoury, Lecomte, Fortin, Masse, Therien, Bouchard & Chapleau, 2013), increased well-being (Branstrom, Duncan, & Moskowitz, 2011), and increases in self-regulated behavior and positive emotional states (Brown & Ryan, 2003). Most relevant to the current paper, a small but growing body of literature suggests a link between mindfulness and positive relationship outcomes (Kozlowski, 2013). This paper investigates the intersection of these two

bodies of literature, analyzing and synthesizing the research examining meditation and mindfulness in the context of intimate relationships. Since the publication of the last review of the literature examining meditation and mindfulness in the context of relationship satisfaction (Kozlowski, 2013), research in this area has expanded greatly. This growth of research, which spans a variety of contexts and theoretical orientations, necessitates a step back to take stock of where the field is, what has been recently added, and how research from different theoretical orientations can productively converse with one another. The present paper firstly provides an overview of the literature in meditation/mindfulness and intimate relationships, highlighting the key research findings and theoretical orientations. Secondly, we organize and thematize the various disparate approaches, variables, and findings into overarching categories to help better organize and conceptualize the current status of the field. Finally, we highlight gaps in the literature and propose new, generative directions and topics for the field as it moves forward.

5 p.m.
**Adopting Improved Banana Varieties in Uganda:
the Influence of Gender and Marital Status**

Presenter: Emily Albertson
Department: International Development, Community and Environment
Adviser: Cynthia Caron

Abstract: Recognizing the gender gap that exists in the adoption of improved agricultural technology is crucial in increasing agricultural productivity. A gender-disaggregated framework is used to examine key variables that guide different genders and women with different marital statuses in the decision to adopt improved agricultural technologies. Disaggregating the data by gender and marital status allows for differences in variables to be thoroughly examined and analyzed. Drawing on household data collected in two districts in Uganda, Luwero and Mbarara, and constructing a probability model, the different variables will be analyzed as to their significance in the adoption decision for improved banana cultivars. The analysis shows that gender is insufficient in fully understanding the adoption decision but other factors are significant. Using a thorough examination of the literature and data, the significant variables will be analyzed to determine the constraints that limit the adoption decisions of female farmers. Determining the significant variables in adoption of improved

agricultural technologies has policy implications. It suggests that research studies need to have a focus of equitable resource availability to reduce the gender gap in agricultural technology adoption, which will in turn improve agricultural productivity.

5:15 p.m.
**The Mask That Does Not Fit: Nick Adams's Struggle
with Masculinities in "The Three-Day Blow"**

Presenter: Jacqueline Schnieber
Department: English
Adviser: James Elliott

Abstract: Becoming a 'proper' man remains one of society's most demanding expectations regarding teenage boys, patched with anxieties many adult men still encounter when facing the challenge of the almost unreachable standards of hegemonic masculinities. These challenges are in many ways present in Ernest Hemingway's short stories, whose works have traditionally been understood as reinforcing hegemonic ideals. However, scholars now recognize that Hemingway's narratives present manifold critiques of dominant concepts of masculinity. In my paper, I will show that Hemingway demonstrates the limitations of hegemonic constructions of masculinity in his short story "The Three-Day Blow." To the young Nick Adams, hegemonic masculinities become a mask that he refuses to put on without modifications. My focus will be on elements of Bill and Nick's conversation, which can be read as a game of discursively reaffirming masculinity. The two boys engage in superficial discussions in which their excessive imitations of codes of masculinity highlight the limitations as well as the boys' struggle with these codes. For example, it exposes Nick's regrets concerning the breakup with Marjorie, regrets that he has to uncomfortably hide under the mask of masculinity, while Bill frames the breakup as Nick's only option as a man. Nick's struggle with the mask, however, is apparent throughout the conversation. Ultimately, the limits and contradictions of these are skillfully shown in the relationship between Nick and Bill as well as Nick's reinterpretation of Bill's normative remarks. Although Nick does not challenge the mask itself, the necessity to modify it lays bare its insufficiency but also its potential to be changed according to the needs of its bearer.

Group B: Networks and Layers

Lurie Conference Room, Higgins University Center

4:45 p.m.

Exfoliation of Layered Perovskites through Microwave Assisted Grafting with n-Alcohols

Presenter: Joshua Boykin

Department: Chemistry

Adviser: Luis Smith

Abstract: Dion-Jacobson layered niobates have been extensively researched in recent years due to a variety of useful properties such as dielectric behavior, proton conduction, and solid acid catalysis. The behavior of these materials is strongly dependent on the interlayer surface environment, and use as a solid acid catalyst requires exfoliation into two-dimensional nanosheets. In this work, a novel method of partial grafting of n-alcohols into the layer interface of H₂Sr₂Nb₃O₁₀ with approximately 40% conversion has been developed using microwave irradiation to generate high temperature and pressure. This method has reduced the grafting reaction time by more than 97% while maintaining conversion rates consistent with conventional heating methods. Varying chemical shifts in the ¹H NMR spectra of these compounds indicates changes in the remaining protonated environments. Mixing the grafted materials with appropriate organic solvents, combined with microwave heating and sonication, generates a colloidal suspension of niobate nanosheets, as supported by XRD, SEM, TGA, and EDX data. This method of exfoliation should provide new routes to nanosheet synthesis and modification, and should be applicable to a variety of layered systems.

5 p.m.

Socio-ecological Resilience and REDD+: Re-examining Ecology in Light of Equity

Presenter: Laura Sauls

Department: Geography

Adviser: Anthony J. Bebbington

Abstract: International efforts to promote programs for Reducing Emissions from Deforestation and Forest Degradation (REDD+), including through the United Nations and international conservation organizations, have generally focused on the technical aspects of setting baselines, estimating carbon stocks, and defining benefit-sharing models. These programmatic aspects may further marginalize indigenous

and traditional forest users, who are significantly co-located with extant tropical forests and in many cases have historically managed landscapes to include mosaics of forest and other land covers. Further, technical definitions of forest and forest loss in REDD+ often do not sufficiently take into account more dynamic approaches to ecosystem resilience or the landscape approaches incorporating longer time scales. This paper integrates concerns over equity in REDD+ and ecological literature on ecosystem dynamism to suggest an alternate model of socio-ecological resilience for long-term forest conservation and inclusive development.

5:15 p.m.

Assessment of the Environmental Sector and Climate Change in Malawi: Relationships between Environmental Policy, Scientific Literature, and Development Projects

Presenter: Esther Baumann

Department: International Development, Community and Environment — Environmental Science and Policy

Adviser: Greg Trencher

Abstract: As funding increases for climate change related issues in Sub-Saharan Africa there should also be an increase in research to understand how scientific literature in the environmental sector can assist in developing policy and implementing development projects. Using secondary research, this presentation centers on Malawi to develop an understanding of what is occurring in sub Saharan Africa as a whole by means of quantifying what key areas and recommendations are being discussed in policy documents and development projects. The forestry and land-use sector is used as a point of examination, which displayed overlap among all three disciplines of science, policy, and practice was minimal. Gaps in afforestation, payment for ecosystem services, and climate change related to forestry were found using the forestry and land-use sector lens. This led to a discussion on the overlaps and gaps discovered between the three sectors: science, policy, and practice. The resulting analysis compares cross sector communication and framing of issues, with final recommendations aimed at the development of sustainable projects to include a wide variety of stakeholders, leading to effectively used funds allocated to climate change projects.

5:30 p.m.

Caste, Social Networks and micro-enterprise performance: The importance of Social Capital in rural India

Presenter: Richard Ramsawak

Department: Economics

Adviser: Sang Ho Bae

Abstract: Social capital can be viewed as another form of capital which can be leveraged to generate positive returns to individuals and communities. This paper examines the relative importance of individual and community level social capital among microenterprises operating in rural India. We find higher levels of individual social capital are positively associated with higher returns, greater access to credit, more business development and greater adoption of innovation. Increases in community level social capital create positive “spill over effects” by increasing access to credit, but can generate negative “competitive” impacts by limiting access to innovation and new business opportunities. Lastly, the study traces the impact of other social structures such as caste and kinship ties, which continue to have disproportionate impacts in terms of returns, particularly to minorities, which operate in communities dominated by larger higher caste groupings.

Group C: Sustainable Connections

Rosenblatt Conference Room, Higgins University Center

4:45 p.m.

The Landscape Mullet Hypotheses: The American Residential Macrosystem and what you should know about landscaping

Presenter: Dexter Locke

Co-authors: Rinku Roy Chowdhury, J. Morgan Grove, Jarlath J.P.M O’Neil-Dunne, Peter Groffman, Meghan Avolio, Kelli Larson, Deborah Martin, Kristen Nelson, Laura Ogden, Diane Pataki, Colin Polsky, John Rogan, Meghan Avolio, Megan Wheeler

Department: Geography

Adviser: Rinku Roy Chowdhury

Abstract: Does the ecological structure of private residential front yards differ from back yards across the American Macrosystem? Social theories suggest how one maintains their front yard — which is visible — depends in part on self-presentation and local social norms. We argue that priorities

for less-visible back yards are guided by different principles that do not include fitting into a particular neighborhood aesthetic, or establishing an outward display perceived as desirable. The lack of visibility associated with back yards may impact management decisions. In this paper we introduce and test the Landscape Mullet Hypotheses (LMH): 1) that the variation among private back yards will be greater than visible front yards, and 2) the relative variation in visible front yards will be lower within a given neighborhood than the front to back variation in that same neighborhood. We evaluate the variation in front and back yards using sub-meter remotely sensed vegetation cover estimates for six US cities (Miami, Baltimore, Boston, Minneapolis, Phoenix, Los Angeles). While a growing body of research investigates the neighborhood- and parcel-level variation in vegetation cover, less attention has been paid to the potential intra-parcel-level differences between the front and back yards, despite the abundant social theory that indicates there could be stark differences. This paper therefore aims to fill a knowledge gap in the possible ecological differences in front and back yards, and builds a theory of residential land management based on the seen and unseen, between publicly visible and private spaces in the urban forest.

5 p.m.

Conservation as an Economic Mechanism: How livelihoods, culture and territorial rights of the Emberá of Panama have been shaped by conservation policy

Presenter: Sara Taylor

Department: International Development, Community and Environment

Adviser: Denise Humphreys Bebbington

Abstract: This paper argues that areas of environmental conservation in the Panama Canal Watershed Zone were originally designed to fit an economic utility rather than to protect habitat, and as a result excluded forest-based communities in policy design and implementation, creating lasting impacts on indigenous Emberá territorial rights, livelihood opportunities, and traditional cultural practices. Based on recent ethnographic fieldwork and a review of relevant secondary literature, this paper discusses how Emberá communities in Chagres National Park have adapted their culture and livelihoods to accommodate environmental regulation, and explores what prospects the Emberá see for future generations if they do not mobilize for territorial rights.

This paper concludes by recommending that the Panamanian government look towards community based conservation management in order to effectively achieve the preservation of the Canal Zones' valuable natural and cultural resources.

5:15 p.m.

Impact of European Union Regulations on Hybrid Vehicle Sales

Presenter: Deniz Ozdiktas

Department: Economics

Adviser: Junfu Zhang

Abstract: The automotive industry is one the primary employers in Europe, so any inconsistency in that sector causes a considerable change in the economic and social environment. Unfortunately, vehicle sales decreased staggeringly during the last global crisis so the European Commission adopted the European Economic Recovery Plan. The plan, which was a response to financial and economic crisis, included ten actions, and one of them was the support for clean technologies for cars. Later in 2013, new guidelines on financial incentives were created by the Commission. The aim was not only to promote energy efficient vehicles but also to increase the demand for low emission vehicles. As a result, every member country developed its own particular regulations. The purpose of this paper is to analyze the determinants of hybrid vehicle demand, focusing on gasoline prices, financial incentives and economic disincentives. The data for this research is sourced from several European Union organizations, many of which are currently engaged in "green car" research. The factors that influence the demand for hybrid vehicles include household income level, fuel prices, population, government regulations, education level, and household travel habits. In this research paper, the demand for hybrid vehicles in the European Union (26 countries) is assessed based on these factors. Additionally, multidimensional fixed effects models were used to investigate the demand. This study shows that the existence of government regulations is important, as is the type of regulations in place.

5:30 p.m.

Integrated Land-Sea Planning in Puerto Rico's Northeast Ecological Corridor

Presenter: Samantha Coccia

Department: International Development, Community and Environment

Adviser: Yelena Ogneva-Himmelberger

Abstract: Coastal development in the watersheds of the Caribbean islands is widely considered to be negatively impacting the health and viability of nearshore coral reefs. This research, a collaboration of NatureServe and NOAA, sought to improve management of coastal ecosystems by developing extensive information on land-based and direct threats to coral reef ecosystems, including identification of watersheds which contribute elevated levels of sediment and pollution to coastal waters. NatureServe's Vista tool was used to conduct cumulative effects assessment of direct and indirect threats and work with Marxan to prioritize land and sea conservation zones. Specifically, we addressed sources of land based threats to coral reefs in Puerto Rico's Northeast Ecological Corridor. The final product is a decision support toolkit for integrated land-sea planning.

Poster Presentations

1. Childhood Trauma, a Cycle of Violence: Worcester, MA

Presenter: Samantha Arsenault

Department: International Development, Community and Environment — Community Development and Planning

Adviser: Laurie Ross

Abstract: A quantitative analysis of the effects of childhood trauma on violence, criminal activity, and gang involvement.

2. Characterizing Vulnerability of the Bogastow Brook Aquifer and Town of Holliston, Massachusetts Municipal Drinking Water Supply to Contamination

Presenters: Brian Caccavale, Kevin Longo, Ariel Maiorano

Department: International Development, Community and Environment

Adviser: Dr. Timothy Downs

Abstract: The project's purpose and objectives are to describe the vulnerability of the Bogastow Brook Aquifer to contamination by industrial and naturally-occurring substances based on its hydrogeological characteristics, proximity to natural and anthropogenic sources of contamination and historical pumping data from municipal supply wells.

3. Isolated blastomeres reveal scenarios for neural specification in annelids

Presenter: Allan Carrillo-Baltodano

Department: Biology

Adviser: Néva P. Meyer

Abstract: Early neural fate specification is relatively well-understood in vertebrate and insect model organisms, where a region of ectoderm receives extrinsic signals to become neural ectoderm. By studying the annelid *Capitella teleta* we can elucidate to what extent extrinsic versus intrinsic signals are involved in early neural fate specification in other metazoans. So far, only ascidians had been shown to require intrinsic and extrinsic signals to specify neural fate. We hypothesize that in *C. teleta* the potential to generate brain neural ectoderm is autonomously specified by factors that are asymmetrically segregated to the daughters of the first quartet micromeres (1q), while ventral nerve cord (VNC) neural ectoderm is conditionally specified in daughters of the 2d micromere by extrinsic signaling from surrounding blastomeres. Using mechanical and chemical protocols, we have successfully isolated blastomeres from 2- to 8-cell *C. teleta* embryos. Isolated blastomeres continue dividing for more than 3 days, enough time to assess neural fate via expression of homologs of proneural and pan-neuronal genes, and by immunohistochemistry. Daughters of isolated C blastomeres (fated to generate the right eye, right brain lobe, and cilia) generate an eye, an adjacent clearing in the tissue that resembles a brain lobe, and cilia. Preliminary results also suggest that daughters of isolated 1q cells express the pan-neuronal gene *Ct-elav1*, indicating a possible role for neural determinants in *C. teleta* brain formation. These and future experiments to examine the transcriptomic profile of isolated blastomeres should enable us to identify the type of signaling (intrinsic versus extrinsic) and putative genes involved in early neural specification in spiralian.

4. Attitudes and Perspectives on Soil Erosion and Vegetation Planting in Iceland

Presenter: Danielle Desmarais

Icelandic survey translations by: Elvar Bragi Bjarkason

Department: International Development, Community and Environment

Adviser: Cynthia Caron

Abstract: Iceland is a small, subarctic island nation (103,000 sq. km) with a population of 329,000, a large humid desert, and economically dependent on its natural resources. The disturbance regime in Iceland includes volcanic eruptions every three to five years with strong and frequent winds. The pre-settlement land originally covered with forest witnessed great changes as Viking settlement arrived circa 870 AD. The Viking settlers cut the native birch for lumber, charcoal and clear-cut land to graze the introduced livestock. 95% of the original tree cover was lost within 60 years of human settlement. The topsoil, called tephra, is a powdery volcanic ash prone to wind dispersal and erosion, common in the center of the country, called the highlands where the greatest soil erosion has taken place. Planting native birch trees and non-native trees is a method to mitigate soil erosion. The social science scholarship indicates that Icelanders do not like trees because they make them “feel claustrophobic” and they “prefer open spaces.” There is a ‘social element’ missing in soil conservation and forestry research. An anonymous online survey conducted with both open-ended and closed responses to understand current attitudes about trees, soil erosion and tree planting programs. This poster presents the analysis of answers provided by over 260 Icelandic residents. The findings indicate polarizing views. Some respondents noted that planting trees could hurt tourism while others stated that vegetative options should have consideration, such as moss and ground cover shrubs for soil erosion control.

5. Just a Game? The Impact of Super Bowl Participation on Local Economy

Presenter: Rui Du

Department: Economics

Adviser: Junfu Zhang

Abstract: This paper is an attempt to assess the impact of the participation in a major sporting event — the Super Bowl — on the local economies. The identification strategy is to compare the winning and losing cities at the National Football League (NFL) conference finals under the assumption of similar

pre-treatment trends. The stock market performances of firms headquartered in these cities are used to capture the sudden changes in local economic activities during a short time span. The exogenous variations in the football game outcome allow a straightforward difference-in-differences approach to identify the causal effect. This study finds that the post-event trends in winning and losing cities diverge despite the fact that both cities have economically and statistically similar trends before the event. An empirical analysis provides suggestive evidence of a positive, significant local economic impact of conference final wins, possibly through city image enhancement. Further empirical evidence implies the presence of heterogeneous effects across industrial sectors, suggesting that city image enhancing effect might be empirically relevant for the changes in the composition of local industries. Furthermore, we also adopt a similar strategy to examine the local economic impact of the Super Bowl successes; however, we find no statistically significant effect.

6. Characterizing the Anthropogenic and Environmental Contributions to H5N1 Occurrences in The Mekong Delta Region in Southern Vietnam from 2003 and 2007

Presenters: Jennifer Duong and Zhilan Deng
Department: International Development, Community and Environment/Geography
Adviser: Dr. John Rogan

Abstract: This research study looks at H5N1 Avian Influenza outbreak occurrences in animals and its associated anthropogenic and environmental drivers in the Mekong Delta Region in Southern Vietnam from 2003 to 2007. A dataset of 172 H5N1 presence points and variables in the form of raster datasets (duck density, chicken density, distance to rivers, distance to roads, mean temperature, and mean precipitation) were applied to this study. In addition to this, we applied a cropland binary layer since this is the land cover type that makes up most of this delta region. We then ran our model both with and without cropland to see whether there were areas of disagreements between the two maps. Our results were obtained from extracting value points using the Spatial Analyst toolset in ArcMap 10.3, conducting an analysis of the histograms of all the continuous variables that were used, and from running a Species Distribution Model called Mahalanobis Typicality in TerrSet, using the H5N1 presence data. Our findings indicate that, overall, the variables used in this study

do have a positive relationship with the H5N1 presence points. Among the strongest relationships between the points and the seven variables are: distance to rivers, distance to roads, and precipitation. Further analysis is suggested for a more complete and accurate study of these findings.

7. Ecosystem impacts of ENSO: Characterizing a typical El Nino year

Presenter: Erin Glennie
Co-author: Ronald J. Eastman
Department: Geography
Adviser: Ronald J. Eastman

Abstract: The objectives of my research are: 1) Define a typical El Nino year, 2) Identify the location and magnitude of effects on vegetation during an El Nino year and, 3) Explore the relationship between vegetation, precipitation, and temperature.

8. "Buying" politicians: How much money is really required?

Presenter: Seth Katzman
Department: Graduate School of Management
Adviser: Zhenyang Tang

Abstract: The research will analyze campaign contributions and voting patterns. It will be aimed at quantifying how much \$1 in campaign donations will yield, in votes, for a donor. In other words, if a politician's vote could be bought, what would the price tag be? Additionally, it will identify and analyze conditions that will increase or decrease the dollar/vote ratio, and in what scenarios these conditions need to be met in order for it to have an effect.

9. Fruiting body plasticity in *Lentinus tigrinus* and light signaling pathways in *Agaricomycetes*

Presenter: Alicia Knudson
Co-authors: Sam Kovaka, David Hibbett
Department: Biology
Adviser: David Hibbett

Abstract: A normally agaricoid species, *Lentinus tigrinus*, was discovered to produce a coralloid fruiting body when grown in darkness. Similar morphological plasticity has been noted in other basidiomycetes (*Panus* and *Lentinellus* spp.) and several species (*Coprinus* spp., *Coprinopsis* spp., and *Flammulina velutipes*) have been historically used to explore the effect

of environmental conditions upon fruiting development, specifically an ultraviolet–blue light requirement for primordial or pileal development. A dikaryotic strain of *L. tigrinus* was used to investigate the wavelength of light, intensity, and exposure time that would produce an agaricoid or coralloid morphology. After primordia formation in darkness, *L. tigrinus* cultures were responsive to blue and ultraviolet light and required as little as ten minutes of exposure for the production of a normal pileus. Exposure to blue-ultraviolet wavelengths at any time during fruiting body development would result in an agaricoid form. The genomes of *L. tigrinus* and additional Agaricomycetes were examined for genes known to be involved in photoreception and downstream signaling during fruiting body development including *wc1* and *wc2* of the White Collar complex (WCC), *dst2*, and *cryA*. Almost all members of Dikarya, with the exception of Saccharomycotina, have at least a single copy of the WCC genes and *dst2* appears to be confined to Basidiomycota. The red light receptor gene *cryA* is conserved throughout most of Dikarya with more variation than the WCC genes. The plasticity of *Lentinus tigrinus* allows the species to be a useful model system for fungal evo-devo.

10. Experiential Learning Laboratories for Student-Run Enterprises: A Case Study of The Local Root

Presenter: Georgia Lawrence
Department: Graduate School of Management/ International Development, Community and Environment
Advisers: Ramon Borges-Mendez, John Dobson

Abstract: This research explores the purpose of learning laboratories to develop entrepreneurial skills among university students. It uses The Local Root, a student-run business venture at Clark University, as a case study of an entrepreneurial learning laboratory. I analyze and define the learning objectives of The Local Root. I conclude with recommendations on how to further enhance the organization's role as a learning laboratory on campus.

11. Profound Usability in the Computer Lab: A Cyber Security Focused Feasibility Study for Technocopia

Presenter: Chris Markman
Co-author: David Thompson
Department: College of Professional and Continuing Education — Master of Science in Information Technology
Adviser: Germinal Isern

Abstract: We're doing a feasibility study for the Makerspace in downtown Worcester as an independent study this semester.

12. Dehumanization as Mediation in Other's Perception of IPV Victims

Presenter: Adriana Medina
Department: Psychology
Adviser: Dr. Nicole Overstreet

Abstract: The aim of this study is to explore whether dehumanization mediates the relationship between stereotypes about black women and the level of empathy and blame others have towards them when they are victims of intimate partner violence (IPV). We are looking for a link between stereotypes, two forms of dehumanization (super-humanized and infra-humanized) and how others perceive women in intimate partner violence situations (i.e., level of blame assigned to the victim; how much empathy is felt for these women).

13. The Use of Video to Understand a Local Agora: A Case of the IDCE Strategic Initiative on Public Education around the International Development Goals

Presenter: Toma Mengebier
Department: International Development, Community and Environment
Adviser: Professor Nigel Brissett

Abstract: The International Development, Community and Environment Department (IDCE) at Clark University is a physical, communal space where I have recorded public education around international development goals with video technology for educational and promotional use on the Internet and social media platforms. This institution of higher education is being considered as such, as well as a public place of learning and practice, referred to here as the 'local agora.' This research will consider how the 'agora' is represented at Clark University, and, more specifically, at the IDCE Department. For example, it is a central meeting place for actors who teach, learn and work in physical spaces where ideas, knowledge, and critical thought interface. In other words, the IDCE community is participating in public education. This research will focus on IDCE as a place for public education in the context of international development goals, and the ways in which video has been used to record and represent this place and its actors.

14. Changes in Forest Diversity of State Forest in Worcester County, Massachusetts, over a Thirty Year Period

Presenter: Flor Monroe

Co-author: David Thompson

Department: International Development, Community and Environment

Advisers: John Rogan, Florencia Sangermano

Abstract: This study investigates the potential change in the floristic composition over thirty years in Worcester County State Forests, through the evaluation of records from permanent plots established by the Department of Conservation and Recreation. Shannon, richness and evenness indices were calculated for two time periods (1966-1969, 1971 and 1998-2000) to determine if biodiversity changed across time, and the Jaccard index was used to analyze the species composition similarity between the time periods. The possible influence of severe weather events was also analyzed, by comparing indices from plots close to the path of two tornados (occurred on August 21 of 1988 and September 7 of 1999), to plots further way. It was found there were changes in the floristic composition, but the magnitude of the changes was not statistically significant over the time period analyzed. The Jaccard similarity index showed statistically significant differences between plots located at the north with those located at the south. There were also significant differences between plots that experienced insect attack or snow/ice damage and plots with no pest/ice damage. Plots affected for snow/ice presented medium values of diversity that did not change between periods of time while the lower values of plots that suffered insect attack increased for the second period. The implications of the research findings indicate that diversity of the forest did not have significant change in the thirty years period; the northern area of the county presents more diversity, which is shown in both richness as well as in evenness; and similarity of the forest did not change through the time, but there is significant difference between the north and the south. The high values of Jaccard index for the plots close to the tornado paths indicate that there was no change between periods; therefore, there is no indication of influence of the weather events in diversity changes. The State Forest with the highest diversity index was Petersham while North Brookfield presented the lowest value.

15. Customer Response to Smart Energy Solutions Project by National Grid

Presenter: Josephine Munene

Departments: International Development, Community and Environment/Graduate School of Management

Advisers: Gregory Trencher and Jing Zhang

Abstract: America's electric grid was built in the 1890s when electricity needs were simple and demand for power was much lower. Smart grid, composed of an advanced electrical grid, utilizes technology to communicate between a utility and its customers. Smart grid has the potential of improving resiliency in the electric power system and alertness to solve emergencies. National Grid, an international electric transmission and distribution company, is at the heart of one of the greatest challenges facing our society — to create new, sustainable energy solutions for the future and developing an energy system that underpins economic prosperity in the 21st century. National Grid started a pilot smart grid project called Smart Energy Solutions (SES) in January 2015. In this program, National Grid installed 15,000 smart meters on the homes and businesses of customers who are residents of Worcester, and also added technological upgrades to the grid. This project studied the customer responses to the SES program in 2015 particularly during the summer months. Secondary data from Navigant Consulting Company was utilized to conduct the study. Analysis of the data revealed that customers are changing their behavior towards embracing energy conservation by integrating smart grid technology, taking action to conserve energy during conservation days and utilizing household appliances. Research showed that SES customers also conserved energy and together saved a total of 2,300 MWh in 2015. This is enough to power a local library in Worcester, MA for nearly a year.

16. Multi-Criteria Analysis for Habitat Suitability of a Potential Wildlife Corridor in Zambia

Presenter: Monica Noon

Co-authors: Steven Chiavaroli, Cathleen Torres-Parisian
Department: International Development, Community and Environment — GIS for Development and Environment

Adviser: Florencia Sangermano

Abstract: The fragmentation of protected areas and poaching of wild game threatens animal populations in central Zambia. Kasanka Trust Limited, a non-profit organization, is proposing

a wildlife corridor to ensure the safe passage of species between Kasanka and Lavushi Manda National Parks. In this study, we identify the areas with high suitability for the potential placement of a wildlife corridor using multi-criteria analysis. We classify six Landsat 5 and 7 images in wet and dry season from 2000 to 2008 into five land cover classes. This creates a continuous map that identifies areas with water throughout the year using tasseled cap transformation of Normalized Difference Vegetation Index (NDVI) images. The areas that contain forested or grassland habitats have the highest suitability for forage and cover for migrating species. Developed areas containing roads, urban settlements and agricultural fields are unsuitable as animals risk exposure by areas opened by deforestation and hunting. The findings of our study identifies several suitable areas for wildlife corridor pathways in between the two national parks: one is a direct route through medium to high suitable areas and the other passes through the protected Mulembo Local Forest. The study highlights areas of increasing threats from encroachment by slash-and-burn agriculture and human development. This work contributes to the conservation planning and prioritization of land acquisition in corridor development between the protected national parks.

17. Experimental Studies of 1D and 2D $S = 1/2$ Heisenberg Antiferromagnets.

Presenter: Khary Richardson

Department: Physics

Adviser: Christopher Landee

18. Spatio-temporal expression pattern of neurogenic homologs reveals a possible role in early neurogenesis in *Capitella teleta*

Presenter: Abhinav Sur

Department: Biology

Adviser: Néva P. Meyer

Abstract: How centralized nervous systems (CNSs) evolved remains an unresolved question. Previous studies in vertebrates and arthropods have revealed that similar neurogenic homologs regulate their CNS development. Such genes regulate important cellular processes like cell proliferation and differentiation. Here, we have isolated and studied the spatio-temporal expression patterns of neurogenic homologs in the annelid *Capitella teleta*, which belongs to a separate bilaterian clade (Spiralia) as compared to arthropods (Ecdysozoa) and vertebrates (Deuterostomia). This will help identify which

aspects of bilaterian neurogenesis may have been ancestral or were derived within Spiralia. During *C. teleta* brain neurogenesis, neural precursor cells (NPCs) in the surface ectoderm proliferate and generate daughter cells that begin to exit the cell cycle, ingress inward, and generate neural subtypes. Using whole mount in-situ hybridization Ct-SoxB1 was detected in surface cells in the neuroectoderm whereas Ct-SoxB was detected in overlapping domains of Ct-SoxB1 expression, which indicates a possible interaction between the two classes of soxB factors similar to vertebrates. Ct-msi is expressed in a similar pattern as Ct-Notch and Ct-Delta, which might indicate involvement with the Notch pathway. Ct-pros expression suggests a possible role in specification of neural fate in early development of *C. teleta*. Ct-ngn is expressed in superficial cells, similar to Ct-ash1 and Ct-SoxB1, whereas, Ct-neuroD is expressed in more internalized cells. Functional studies will help understand the role of these homologs during *C. teleta* neurogenesis.

19. Use of Landsat Data to Monitor Change in Landcover and SAVI values for use of Examining Displacement in Iraqi Kurdistan

Presenter: William Thoman

Department: International Development, Community and Environment — GIS for Development and Environment

Adviser: John Rogan

Abstract: Satellite imagery is a vital tool in monitoring armed conflict and is used by government intelligence agencies, nonprofit humanitarian groups, and human rights advocates to gain information about complex and dangerous situations. While very high resolution sensors, such as Worldview 2, are most commonly used to gauge destruction within cities and around battlefields, coarser resolution sensors can comprehensively appraise devastation occurring at a larger scale. Ongoing warfare in Iraq and Syria has led to massive human displacement and the destruction of crops across large agricultural areas. This project seeks to better observe and analyze this large scale loss of farmland by using time series analysis of Landsat scenes taken during periods of peak vegetation. Image differencing of past and contemporary Soil Adjusted Vegetation Index images is used to identify areas with concentrated and intense loss of agricultural land. Ancillary vector data is used to look at a number of conflict-based risk factors coinciding with relatively high levels of agricultural loss. The most visually apparent losses of agriculture occur

in regions that were inhabited by minority groups and were subsequently occupied or threatened by the Islamic State terrorist group. This project provides a more thorough understanding of human-environmental interactions caused by warfare. It also uses remote sensing coupled with ancillary data to better assess a complex situation where comprehensive and reliable on-the-ground reporting is not feasible.

20. Effect of boundary conditions on the buckling instabilities of a ribbon under twist

Presenter: Casey Trimble

Department: Physics

Adviser: Arshad Kudrolli

Abstract: We investigate the buckling instabilities of a thin flat sheet in the shape of a ribbon which is held at its ends and twisted under tension. Recently it was shown that such a system with clamped boundary conditions exhibited a rich variety of buckled shapes with longitudinal and transverse wrinkles as a function of applied twist and tension for a given ribbon aspect ratio and elastic modulus [1], which could be described by a far from threshold analysis of the covariant form of the Föppl-von Kármán equations [2]. Here, we focus on the effect of the boundary conditions on the observed buckling patterns by constraining the ends only at the midpoint towards imposing free boundary conditions normal to the ribbon. In particular, we compare and contrast the observed phase diagram and the shape of the longitudinal and transverse buckled modes as a function of applied constraints. [1] J. Chopin and A. Kudrolli, Phys. Rev. Lett. 111, 174302 (2013). [2] J. Chopin, V. D'emery, and B. Davidovitch J. Elast. 119, 137 (2015).

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