# Spatial Structures in the Social Sciences
# 2014 Summer GIS Institute

## Final Presentation Program

June 13, 2014 Petteruti Lounge, Student Center

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| **9:30–9:45 am** | **Welcome** |
| **9:45–11:30 am** | **Session I:**<br>Using GIS to Explore Inequality and Development |
| **11:30 am–12:00 pm** | **Session II:**<br>GIS: Historical Applications |
| **12:00–1:00 pm** | **Lunch** |
| **1:00–2:00 pm** | **Session III:**<br>GIS and Spatial Analysis: Local Applications |
| **2:00–3:00 pm** | **Session IV:**<br>Spatial Analysis of Health |
| **3:00–3:45 pm** | **Session V:**<br>Ecology and Environment |
| **3:45–4:00 pm** | Certificate Presentation |
| **4:00 pm** | Close of Conference |

# PARTICIPANTS

**Cassidy Bennett** (Environmental Studies)

**Adia Benton** (Anthropology)

**Chenxi Cai** (Economics)

**Sam Caldis** (History)

**Mario Francesco Carillo** (Economics)

**Ricarda Hammer** (Sociology)

**Morgan Hargraves** (Public Health)

**Michael Hoffmann** (International Relations)

**Heinke Jäger** (Ecology and Evolutionary Biology)

**Akhil Lohia** (Visiting Student)

**Simon Mariwah** (Watson Institute for International Studies)

**Michael Murphy** (Sociology)

**Wenchi Pan** (Epidemiology)

**Maura Pavalow** (Third World Center)

**Kara Pellowe-Wagstaff** (Ecology and Evolutionary Biology)

**Keisha-Khan Perry** (Africana Studies)

**Adrian Rubli** (Economics)

**Milan Satcher** (Public Health)

**Kelsey Sherman** (Taubman Center for Public Policy)

**Christina Williamson** (Joukowsky Institute for Archaeology and the Ancient World)

# PROGRAM

## SESSION I:
## USING GIS TO EXPLORE INEQUALITY AND DEVELOPMENT

**Chenxi Cai,** *The Spatial Distribution of Federal Funds*

**Mario F. Carillo,** *An Empirical Inquiry into the Determinants of Trust toward Institutions*

**Adrian Rubli,** *Bike Sharing and Public Transportation in Mexico City*

**Akhil Lohia,** *Gender Paradox in South India – Mapping to Analyse the Differences in Sex Ratios by Region and their Causes in Vellore, Tamil Nadu*

**Simon Mariwah,** *What Has Geography Got to Do with It? Determinants of Socio-Economic Development of Ghana*

**Ricarda Hammer,** *London, Londra, Londres - Mapping Multiculturalism and Inequality*

**Keisha-Khan Y. Perry,** *Stop, Frisk, and Gentrify: The Carceral Layers of Black Dispossession in New York City*

## SESSION II:
## GIS: HISTORICAL APPLICATIONS

**Christina Williamson,** *From Mountain to Coast: Teuthrania as Territorial Landmark in the Landscape of Pergamon (Northwest Turkey)*

**Sam Caldis,** *Through Many Peoples and Many Seas: Migration and Human Networks in the Roman Balkans*

## LUNCH BREAK, 12:00–1:00

## SESSION III:
## GIS AND SPATIAL ANALYSIS: LOCAL APPLICATIONS

**Milan Satcher,** *Environmental Contributors to the Rising Body Mass Index of Refugee Children Resettled to the Elmwood Neighborhood of Providence, Rhode Island*

**Michael Murphy,** *Exploring Environmental Inequality and Privilege in Rhode Island*

**Kelsey Sherman,** *Omni Development Corporation: Affordable Housing in Providence and the Surrounding Areas*

**Maura Pavalow,** *Locating Transit Deserts: A Spatial Analysis of Transit Access in Rhode Island*

## SESSION IV:
## SPATIAL ANALYSIS OF HEALTH

**Morgan Hargraves,** *Translating Spatial Research to Clinical Practice: Developing a Tool to Describe and Visualize Features of the Built and Social Environment for Primary Health Care Providers*

**Michael Hoffmann,** *Spatial Analysis of Chlamydia and Gonorrhea in Rhode Island: Identifying Clustering, Service Accessibility, and Other Spatial Characteristics*

**Adia Benton,** *Mapping Access to Surgical Care in Rural Mozambique*

**Wenchi Pan,** *Association between Long-term Exposure to Air Pollution and Liver Cancer in Taiwan*

## SESSION V:
## ECOLOGY AND ENVIRONMENT

**Cassidy Bennett,** *Climate Change Vulnerability of Ugandan Smallholder Farmers*

**Kara Pellowe-Wagstaff,** *Habitat Mapping in Coastal Baja California Sur, Mexico*

**Heinke Jäger,** *Restoring a Unique Forest in the Galapagos Islands*

# PRESENTATION ABSTRACTS

**Cassidy Bennett – Climate Change Vulnerability of Ugandan Smallholder Farmers**
As climate change continues to cause drastic changes throughout the world, the most vulnerable countries tend to be those that are least prepared economically to adapt to changes. Within those countries, certain people are even more susceptible to changes that will affect their lifestyle and local economies. Smallholder farmers in Uganda are one of these very susceptible groups. Uganda has already seen changes in the wet and dry seasons and the farmers are trying to slowly adapt to quickly changing planting seasons. Even as Uganda's urban population increases, the economy remains led by agricultural production, and many of these farmers are smallholders. Using data from ten years apart, we will look at changes in soil, climate, rural communities, and the lives of farmers. Exploring this data will allow us to look at how much the lives and circumstances of smallholder farmers have changed in those ten years and how they could continue to change in the future. It will also allow for insight on where the most change is occurring in the country, if certain communities have better been able to respond to changes, how access to roads and cities effects farming and income, and if Uganda's farmers are decreasing in number as urbanization increases.

**Adia Benton – Mapping Access to Surgical Care in Rural Mozambique**
Global health interventions, for the past two decades, have typically prioritized prevention over treatment; in cases where treatment has been supported as a public health intervention, it has generally been for certain infectious diseases. For this reason, surgery has been especially marginalized from global health conversations about access, quality and equity. Only recently have global health advocates acknowledged this marginalization and its relationship to equity and access. Their corrective has been to collect quantitative data on the surgical burden of disease (BOD), health facility capacity, and skill levels of surgical professionals. This project uses a population-based survey dataset with household-level point data from a BOD study to map access to surgical professionals at district level hospitals and visualize severity of surgical conditions by location (relative to district hospitals).

**Chenxi Cai – The Spatial Distribution of Federal Funds**
I'm interested in examining the impact of Congressional re-districting on the allocation of federal funds. It will shed light on how the political process affect the distribution of public funds. Existing literature suggest that re-districting that increase media coverage of the representative may increase federal funds through an increase of voter knowledge, but no such study has done on other dimensions affected by re-districting. I will map the data on annual spending in Consolidated Federal Funds Report available to Places or Counties and interpolate the per capita spending in each geographical block that is re-districted across years. I will look at whether these areas see an increase or decrease in federal funds and how it relates to the observables characteristics of the districts that it is coming from and going to. Furthermore, I plan to carry on the analysis in stata and identify the reduced form effect of redistricting by restricting my attention to only districts with the same representatives across years. This may help create a "value-added" performance measure of Congressional representatives.

**Sam Caldis – Through Many Peoples and Many Seas: Migration and Human Networks in the Roman Balkans**

The lands of Pannonia and Dalmatia stretch from the middle of the eastern Adriatic coast to the Danube River. They were added to the Roman Empire in the first century CE and were permanently sundered from it in the seventh century. Standing as the unofficial buffer between the eastern and western sections of the Empire, this area was of great political significance and was intimately linked with the making and breaking of many Roman emperors. This area was also of great concern for the Empire as it was the site of frequent conflict between Rome and the Germanic and Eurasian nomadic peoples who would ultimately see the undoing of much of the Empire. Yet, despite this significance, little attention has been paid to Dalmatia and Pannonia's role in the wider Roman world and their integration into domestic trade and migratory networks. This project examines the role of key cities in Dalmatia and Pannonia in migration patterns and human networks within the Roman Empire from the first to seventh centuries CE. By utilizing inscriptional evidence, mainly epitaphs with some supplemental information from votives and honorary inscriptions, it is possible to identify migrants to and from these major centers. Qualitative analysis of the characteristics of mobile individuals present in the epigraphic record can demonstrate the dynamic relationships between these sites and other key cities in the Empire. The picture which ultimately emerges is of a region involved in significant local and long distance networks which stretched across the Empire, from Britain to Arabia, and continued to increase in complexity even in times of crisis, abating only when the region passes out of Roman hands.

**Mario F. Carillo – An Empirical Inquiry into the Determinants of Trust toward Institutions**

This project advances an empirical strategy that aims to disentangle the effect of institutions on trust from the complex bilateral relationship between the two. Institutions can affect trust throughout several channels. Law enforcement, property rights protection and policies aimed to foster development and cooperation can make people safer, more collaborative and then more trustful toward other individuals and institutions. On the other hand, trust can have an effect on institutions per se. For instance, distrust in institutions can reduce voting participation implying that elections won't reflect preferences of citizens, which translates in a failure of democracy. In this context, the proposed empirical analysis exploits changes in historical institutions of Europe in the last century as explanatory variation of trust as measured by survey data. The preliminary results show that change in institutions is a strong and statistically significant predictor of trust.

**Ricarda Hammer – London, Londra, Londres - Mapping Multiculturalism and Inequality**

London is the prototypical global city. It is a city with great ethnic diversity and the capital of "multiculturalism" within Europe, but it is also grappling with a legacy of imperialism. Similarly, London is the command center of global flows of trade, which, as Sassen (2001) argues leads to polarization and a widening of the gap between rich and poor. The city is thus at the center of globalization, and the focal point of cross-border flows of people and capital. In this project, I seek to map how both, capital and people, distribute across the city: Is London increasingly segregating according to income, ethnicity, country of origin and religion? The purpose of this project is to get an overview of London's class and racial composition to then situate my fieldsite for ethnographic fieldwork in the larger context of the city. For example, the literature suggests that Tottenham, a small area in the council of Haringey, is one of the most

"multicultural" areas of London, where more than 300 languages are spoken within the census tract. Is this multicultural make-up polarized? Can we identify ethnic patterns in spatial distribution, i.e. according to rents and housing prices? How does this multiculturalism interact with class variables? If time permits, I have two ideas for extending this project: (1) It would be interesting to map crime occurrences, with a particular focus on knife crimes in public spaces. (2) I aim to get a sense of change in racial and class composition, using census data from previous decades.

**Morgan Hargraves – Translating Spatial Research to Clinical Practice: Developing a Tool to Describe and Visualize Features of the Built and Social Environment for Primary Health Care Providers**

Characteristics of the environment in which individuals are located directly and indirectly influence individual health and well-being. Exposure to lead paint in the home environment can directly influence a child's cognitive development, for example; and features of his or her neighborhood, such as 'walkability' of sidewalks and road connectivity, proximity to and quality of green spaces and recreational facilities, and perceived safety can act as barriers or facilitators to physical activity, indirectly influencing physical indicators such as BMI. Incorporating these environmental contexts into health assessments, decision making and treatment of patients allows physicians and primary care providers to better understand the health of and respond to the health needs of patients, and this is the conceptual framework guiding the development of this tool.

More broadly, this project aims to create a landscape of built and social features for a region such that at a given location, descriptive information about the neighborhood (aggregated) environment, as well as a visual display of health resources and assets as they're proximally located to the location are available. Ultimately, many features and assets will be identified and mapped across the State of Rhode Island; however, this course project will focus on those related to specifically related to nutrition in Providence in order to demonstrate conceptual application of this tool. By integrating place and health enables providers to understand contexts of and locate resources for patient health as well as the provision of tailored care to individual patients.

**Michael Hoffmann – Spatial Analysis of Chlamydia and Gonorrhea in Rhode Island: Identifying Clustering, Service Accessibility, and Other Spatial Characteristics**

Incident cases of chlamydia and gonorrhea, two sexually transmitted diseases, have increased substantially in Rhode Island since 2011. STD surveillance data collected from the Rhode Island Department of Health in 2013 were used to conduct a geospatial analysis of chlamydia and gonorrhea in Rhode Island. Addresses of cases of chlamydia (n=4309) and gonorrhea (n=455) reported in 2013 will be geocoded by census tract. Data will be analyzed by spatial autocorrelation to identify clustering of chlamydia and gonorrhea in RI. STD testing sites and local high schools will also be geocoded in clustered areas to help determine accessibility of appropriate services and explore the possibilities for STD prevention. Accessibility, estimated by proximity to STD services at various distances, and the distribution of patients around healthcare sites are also calculated. Simple regression analysis of variables such as income-level, race and ethnicity, and gender will be conducted to identify predictors of service accessibility or lack thereof. Such an analysis can inform STD treatment and prevention services to identify critical geographic areas, populations, and opportunities to improve service accessibility.

**Heinke Jäger – Restoring a Unique Forest in the Galapagos Islands**
The Galapagos Islands are renowned for their unique plant and animal species; however they are threatened in their existence due to land use change and invasive species. One of the threatened species is the sunflower tree which only occurs in Galapagos and forms a forest on the island of Santa Cruz. The extension of the forest has been severely reduced by agriculture and the remaining area is now adversely impacted by invasive blackberry. The Galapagos National Park is currently carrying out control of blackberry but with an unknown result and possibly negative effects for the sunflower tree. Therefore we set up an experiment to compare areas of the forest with and without blackberry. We established 17 10x10 m plots in each area (34 in total) and took one GPS coordinate per plot. We collected percentage cover for each plant species and number of trees per plot and I would like to show the different species composition in each plots. With this visualization I hope to get an idea how species composition changes with blackberry control and how blackberry interacts with other (invasive) species.

**Akhil Lohia – Gender Paradox in South India – Mapping to Analyse the Differences in Sex Ratios by Region and their Causes in Vellore, Tamil Nadu**
South India has long been at the forefront of economic and social development in South Asia. Recent decades of economic liberalization have been accompanied by below-replacement fertility, with resulting increases in parents' investments in their children's human capital. Boys and girls have not benefited equally from these inputs, however. An intriguing "gender paradox" has emerged in the state of Tamil Nadu, where forms of female discrimination coexist with female advantage. On the one hand, adolescent girls are advantaged in higher secondary school enrollment and completed years of education relative to adolescent boys. On the other hand, parental preference for sons appears to be intensifying and has led to worsening outcomes at the youngest ages, including female feoticide and excess female child mortality.

The emergence of this gender paradox is disquieting. With rising incomes and below-replacement fertility, parental inputs in transition economies have become more varied, are sustained from infancy through adolescence, and aim to promote multiple dimensions of child well-being. We wish to use GIS to analyse the sex ratios in the Vellore district of Tamil Nadu across various age groups of children to identify the regions with such differences in sex ratios at different ages. Furthermore, we wish to find out the reasons for such differences by linking these differences to the parental income and education in those areas and trying to come up with an explanation for the variation.

The data for this project comes from an NICHD-funded study in rural Vellore district, Tamil Nadu which includes a census of all households in 420 villages.

**Simon Mariwah – What Has Geography Got to Do with It? Determinants of Socio-Economic Development of Ghana**
Geographical location of a region has long been used to explain the spatial variations in socio-economic development between regions and nations. Though some researchers do not agree with the absolute deterministic role of location in development, it is generally accepted that the physical environment sets certain constraints or limitations. In Ghana, the three Northern Regions (Northern, Upper East and Upper West Regions) have consistently been regarded as the poorest of the ten regions in Ghana. While several socio-cultural factors have been advanced to

explain high incidence of poverty in those regions, little is known about how physical environmental or geographical characteristics of the regions might have contributed to this phenomenon. This study hypothesises that geographical location of a region has an influence on the potential development (measured by incidence of poverty) of the regions. Data for the study were extracted from various sources including the 2010 population and housing census, 2005/06 round of the Ghana Living Standards Survey as well as soil, rainfall, temperature, road network data of Ghana. Using ArcGIS 10.1 to process the data and Geoda to run the spatial statistical analysis, logistic regression was done to determine the extent to which geographical variables explain the high headcount poverty in the three northern regions of Ghana. Since natural resources are unevenly distributed by nature, it is recommended that conscious efforts should be made towards mitigating these geographical causes and consequences of socio-economic development.

**Michael Murphy – Exploring Environmental Inequality and Privilege in Rhode Island**
American social scientists have long been interested in unequal exposure to environmental hazards, or environmental inequality. Beginning in the 1970's a small group of researchers used data from the Environmental Protection Agency to study exposure to air pollution. They found that economic status mattered and that poorer neighborhoods had more polluted air (Zupan 1973; Kruvant 1975; Berry 1977). From here a new research enterprise blossomed as scholars and activists began to share accounts of environmental injustice (Bullard 1993,1994; Hofrichter 1993; Bryant and Mohai 1992). These scholars were primarily focused on disproportionate impact of environmental hazards on communities of color, or what has been called environmental racism (Bryant 1995). Yet in studying environmental inequality, it is becoming increasingly important to study its inverse, environmental privilege (Norgaard 2011; Park & Pellow 2011; Taylor 2009). As Pellow and Brehm explain, "environmental privilege allows access to coveted amenities, such as forests, parks, green space, healthy food, coastal properties, and elite neighborhoods." Using the mapping and spatial analysis tools provided in ArcMap, I will explore the spatial dynamics of environmental inequality and privilege within Rhode Island.

**Wenchi Pan – Association between Long-term Exposure to Air Pollution and Liver Cancer in Taiwan**
Ambient air pollutants, especially particulate matter (PM), are associated with adverse health effects such as short- and long-term mortality, cardiovascular diseases, and lung cancer. Recently, we conducted a pilot project to evaluate the association of long-term exposure to fine particulate matter ($PM_{2.5}$) and risk of liver cancer in Taiwan. Interestingly, we did found there is a significant association between $PM_{2.5}$ and liver cancer. The major sources of $PM_{2.5}$ potentially come from mobile (i.e. traffic pollution) and stationary sources (i.e. power plant). However, it is unclear which source plays the major roles driving the association of $PM_{2.5}$ and liver cancer. In order to address in this scientific gap, we propose to utilize the Risk Evaluation of Viral Load Elevation and Associated Liver Disease/Cancer-Hepatitis B Virus (REVEAL-HBV) study, a longitudinal community-based cohort conducted in Taiwan since 1991, to assess the association between distance to road and risk of liver cancer. Specifically, we will use geographical information system (GIS) to geocode participants' address, and to calculate the proximity to major roads for each participant as a surrogate for long-term exposure to $PM_{2.5}$ from mobile sources. We will apply Cox proportional hazards model to evaluate the magnitude of air pollutants on incidence of liver cancer adjusting for age, gender, viral infection, and other

potential confounders. Collectively, we believe this project provide a great opportunity to reveal the linkage between air pollution and the development of liver cancer.

**Maura Pavalow – Locating Transit Deserts: A Spatial Analysis of Transit Access in Rhode Island**

The term "transit desert" was coined in 2013 to describe an urban area where people have limited access to forms of transit (Jiao & Dillivan 2013). Drawing upon the concept of "food deserts," or urban areas where people have limited access to healthy food, the emerging field of research explores inequity through access to transit (Clarke et al 2002; Alkon et al 2011). Populations in transit deserts are often "excluded from access to employment opportunities, access to retail options, and overall participation in society," while populations in locations with sufficient or excess transit have greater access to such opportunities (Jiao & Dillivan 2013: 25). This project strives to contribute to this nascent field, and local work on transit access, by conducting a spatial analysis of transit deserts at the state-level, through a case study of Rhode Island. The methodology will largely draw upon the model of Jiao and Dillivan, which involves spatial analysis of demographic data from US Census 2010 (e.g. age, income, race, and household drivers) and the Rhode Island Public Transit Authority (e.g. number of bus stops, frequency of service, number of routes per block group) utilizing GIS software. This project aims to explore inequity in Rhode Island through an investigation of the relationship between space and access to transit.

Works Cited

Alkon, Alison Hope, and Julian Agyeman. *Cultivating food justice: race, class, and sustainability*. MIT Press, 2011.

Clarke, Graham, Heather Eyre, and Cliff Guy. "Deriving indicators of access to food retail provision in British cities: studies of Cardiff, Leeds and Bradford."*Urban Studies* 39.11 (2002): 2041-2060.

Jiao, Junfeng, and Maxwell Dillivan. "Transit Deserts: The Gap between Demand and Supply." *Journal of Public Transportation* 16.3 (2013).

**Kara Pellowe-Wagstaff – Habitat Mapping in Coastal Baja California Sur, Mexico**

I study the linkages between ecosystem function and the delivery of valuable ecosystem services to humans. I am particularly interested in knowing how the quality of nearshore coastal habitats affects the populations of food species that rely on them, and thus, the provision of food to human communities onshore. Recently, social-ecological regions in Baja California Sur have been delineated and mapped, but these regions were created based on social and fisheries office boundaries, and ignored both habitat type and species harvested. A habitat map of coastal Baja California Sur does not currently exist, but its creation would enable better understanding of the ecosystem services that different areas provide, the types of organisms that inhabit them, and what types of habitats and organisms are best protected by Mexico’s national park system. Sharing of this spatial information with conservation practitioners in the region would help inform future marine spatial planning efforts.

I plan to use existing map layers and Mexican government data (such as fishing catch) to create such a habitat map of coastal Baja California Sur, Mexico, in an effort to answer the following questions: 1) what is the spatial distribution of habitat types in coastal Baja California Sur; 2) what types of habitats are protected within national parks; and 3) what proportion of sandy bottom habitats are protected in national parks? Later I will use the habitat map generated to examine spatial variation in valuable ecosystem services (e.g. food provision, tourism, water quality) across Baja California Sur, and how these services vary under diverse management scenarios.

**Keisha-Khan Y. Perry – Stop, Frisk, and Gentrify: The Carceral Layers of Black Dispossession in New York City**

This project explores the relationship between violent policing and black dispossession in New York City. Incarceration represents one crucial consequence of systemic criminalization that drives displacement and gentrification. In my first book focused on the city of Salvador, Brazil, I illustrate how police abuse functions as an integral dimension of government-sponsored practices of forced land expulsion of poor black residents for urban renewal. To understand this process in New York City, I plan to explore variables in the census and federal business data such as housing prices, household income, household composition, and boutique businesses to show how neighborhoods such as Harlem have been gentrified in recent decades. The New York Civil Liberties Union has collected data since 2002 on New Yorkers who have been stopped-and-frisked, and has published data by precinct that can be mapped onto these gentrifying neighborhoods. Another component of this research is an examination of the prison population (documented in local census data in towns throughout the state) to determine which neighborhoods are represented, and to show how mass incarceration has become a form of black displacement from cities. The dehumanizing stop-and-frisk practices tied to the growth in the prison population require careful attention in our analyses of the gentrifying urban landscape.

**Adrian Rubli – Bike Sharing and Public Transportation in Mexico City**

Starting in 2010, the Mexico City government implemented a bike-sharing program in the central part of the city, comprising about 5 neighborhoods (depending on the definition of neighborhood that you take). The program consists of over 250 bike stations, where registered users can rent a bicycle for up to 45 minutes at a time, with unlimited access to the number of times they rent. The annual fee is around 32 US dollars.

The main idea is to use the complete data on bike-share trips (which includes information on the user, the bike they used, and their origin and destination location and times for around 13 million trips from 2010 to 2013) combined with the location of public transportation (subway and bus stations) to determine the impact of the bike program on commuting decisions and usage patterns. For now, I'm interested in mapping the locations and seeing the spatial distribution by trip volume, which can then be related to neighborhood characteristics. Also, since most of the motivation for introducing bike-shares rests in claiming that they complement public transportation, I'm interested in seeing the correlation between distance to public transportation and trip volume by bike station. Future research will focus on determining whether the bikes are complements or substitutes for the previous public transportation networks, whether usage is directed towards solving the first and last mile problem (ie, for commuting purposes instead of

recreation), and estimating the efficiency gains in terms of commuting times (only if bikes are used for this purpose, and I would need additional data for this).

**Milan Satcher – Environmental Contributors to the Rising Body Mass Index of Refugee Children Resettled to the Elmwood Neighborhood of Providence, Rhode Island**
Upon entry into the United States, refugee children are generally undernourished and underweight. However, physicians at the Rhode Island Refugee Clinic at Hasbro Children's Hospital have observed that resettled refugee children enter the US with a BMI below the average for Rhode Island children but later surpass the RI mean BMI within the first couple years of resettlement. This transition from under- to over-nourishment is concerning because it increases the risk of chronic disease later in life. Given that refugee children are often resettled into poverty and face social and educational challenges that threaten their future earning potential, it is likely that as adults they will be poorly positioned to properly care for a chronic disease. Therefore, it is imperative that we understand and mitigate the contributors to this trend.

The majority of Rhode Island's refugee families are resettled into the Elmwood neighborhood of Providence due to its proximity to the Dorcas International Institute of Rhode Island (DIIRI), a vital hub of refugees' transition into American living. I plan to characterize the local environment of Elmwood in order to assess for potential contributors to the BMI trend using publicly available data.

**Kelsey Sherman – Omni Development Corporation: Affordable Housing in Providence and the Surrounding Areas**
It is a critical time for Rhode Island's housing market. The state is burdened by high-levels of unemployment and underemployment and there is a lack of affordable rental housing. In 2010, about 1/3 of cost burdened Rhode Island renters spend 50% of their income on rent (HousingWorks, RI). However, this problem has been realized and realization of this problem has created its own host of challenges. There are currently over 20 community development corporations (CDCs) working to develop affordable housing in Rhode Island. The high number of CDCs along with limited funding streams means that competition among these organizations is continually increasing. This project focuses on helping one particular Community Development Corporation, Omni Development Corporation (Omni), rise above the competition.

Omni Development Corporation develops affordable housing projects for low- and moderate-income individuals and families in Providence and the surrounding areas, including two projects in North Providence and one in Woonsocket. This project will visualize and analyze Omni's existing projects in relation to other affordable housing developments, and also demographic information such as per capita income, household makeup, and also race, gathered from CPS data. The intent of this project is to help Omni with their plans and applications for future development projects in these localities, ensuring that they are the most competitive, ultimately receiving the bid.

**Christina Williamson – From Mountain to Coast: Teuthrania as Territorial Landmark in the Landscape of Pergamon (Northwest Turkey)**
Pergamon is known as the most major of the minor Hellenistic kingdoms in Asia Minor. Its rapid rise to power in the third and second century BC is marked by skillful diplomacy and outright

manipulation, as its rulers, the Attalid dynasty, shifted allegiances in their quest for territory and internal stability. Throughout their reign, the valley of the Kaikos river (modern Bakırçay) towards the sea was increasingly a strategic route of access in the Attalid landscape. Teuthrania, an isolated mountain roughly midway in this valley, may well have played an important role in contributing to this new alignment of power and territory. Teuthrania figures in one of the foundation myths of Pergamon, but it is also a prominent feature in the landscape between Pergamon and the sea. Using ArcGIS, I will analyze the viewshed of Teuthrania in order to discover: 1) how visible it is from Pergamon, 2) how visible it is from the roads from the sea, and 3) which other ancient sites had the best view of Teuthrania, and what was their relationship with Pergamon? This will show the extent to which Teuthrania acted as a visual connector in bringing remote places 'closer' to Pergamon. Through visibility analyses, I hope to better understand how mythology was implemented to turn natural landmarks into signposts of power and authority.