Spatial Structures in the Social Sciences
2018 Winter GIS Institute

Final Presentation Program

January 19, 2018 Population Studies and Training Center
Seminar Room

9:30 – 9:45 am	**Welcome**
9:45 – 11:00 am	**Session I:** GIS Applications in the Social and Environmental Sciences
11:00 – 12:00 pm	**Session II:** GIS and Spatial Analysis for Health Research I
12:00 – 1:15 pm	**Lunch**
1:15 – 2:30 pm	**Session III:** GIS and Spatial Analysis for Health Research II
2:30 – 3:30	**Session IV:** Spatial Humanities
3:30 – 3:45 pm	Certificate Presentation
3:45 pm	Close of Conference

PARTICIPANTS

Nicholas Barnes (Watson Institute)

Chin Chin Ch'ng (School of Public Health)

Arielle Childs (School of Public Health)

William Goedel (School of Public Health)

Dana Graef (Anthropology)

Narae Kim (School of Public Health)

Martha Kuhlman (Bryant University)

Ruth W. Lo (History of Art and Architecture / Urban Studies)

Alicia Maggard (History)

Catrina Mueller-Leonhard (School of Public Health)

Nicole Muhlbauer (Hasbro Children's Hospital)

Guanghui Pan (Sociology)

Bryn Pernot (Public Humanities)

Kelly Sanchez (School of Public Health)

Tanvee Singh (School of Public Health)

Xiaoqian Wan (Sociology)

Heidi Weidele (School of Public Health)

Aaron Weisbrod (Economics)

PROGRAM

SESSION I:
GIS APPLICATIONS IN THE SOCIAL AND ENVIRONMENTAL SCIENCES

Nicholas Barnes, *Criminalized Democracy: The Electoral Impact of Rio de Janeiro's Drug Trafficking Gangs*

Aaron Weisbrod, *The 1917 Halifax Explosion: A City Rebuilt or Changed?*

Guanghui Pan, *Determinants of Entering Bureaucratic System in Imperial China: Family, Village, and District Effects*

Xiaoqian Wan, *Assisted Housing Dispersion and the Deconcentration of Poverty in Chicago*

Dana J. Graef, *From Colonization to Conservation: A GIS Analysis of Deforestation in Southern Costa Rica*

SESSION II:
GIS AND SPATIAL ANALYSIS FOR HEALTH RESEARCH I

William C. Goedel, *Proximity of Opioid-Involved Overdose Fatalities to Naloxone Distribution Locations*

Kelly Sanchez, *Fatal Overdose Deaths in Hispanic/Latino Neighborhoods Throughout Rhode Island*

Catrina Mueller-Leonhard, *Early Life Exposure to Diesel Exhaust in Hamilton County, Ohio*

Nicole Muhlbauer, *Pediatric Population and Carcinogen Exposures in Rhode Island*

LUNCH BREAK, 12:00–1:15 PM

SESSION III:
GIS AND SPATIAL ANALYSIS FOR HEALTH RESEARCH II

Heidi Weidele, *Redesigning RIPTA: Who Are We Forgetting?*

Narae Kim, *Health Opportunity Index of Rhode Island: Is Where People Live Related to How Healthy the People Are?*

Arielle Childs, *Patterns of Skilled Nursing Facility Referrals and Respiratory Infections in the United States*

Chin Chin Ch'ng, *Spatiotemporal Trends of Dengue Cases in Malaysia from 2010 to 2014*

Tanvee Singh, *Disparities in Access to and Availability of HIV Care in Kenya*

SESSION IV:
SPATIAL HUMANITIES

Martha Kuhlman, *Comics of the New Europe*

Bryn Pernot, *Mapping Access to Free Museums in Chicago*

Ruth W. Lo, *Food and Urban Development in Fascist Rome*

Alicia Maggard, *Marine Pathways to Power: Mapping the Panama Route*

PRESENTATION ABSTRACTS

Nicholas Barnes – Criminalized Democracy: The Electoral Impact of Rio de Janeiro's Drug Trafficking Gangs

For more than three decades, Rio de Janeiro's powerful drug trafficking gangs have monopolized violence in hundreds of favelas across the city's sprawling urban landscape. With this monopoly of violence, gangs have dominated favela-level politics by offering cooperative politicians and political parties unfettered access to favela voters in their territories during election campaigns. Although this type of electoral fraud is well-documented in numerous scholarly works, there has been little systematic investigation into the nature of these collaborative arrangements nor their electoral impact. This article aims to fill this gap by building on more than 5 years of combined fieldwork that involved significant ethnographic and interview data collection. We also leverage the gradual implementation of Rio's flagship public security program, the Unidades de Polícia Pacificadora (UPPs), and the recapture of the state monopoly of violence in more than 250 favela territories from 2008 to 2014, to investigate the impact of gang territorial control in municipal-level elections.

Arielle Childs – Patterns of Skilled Nursing Facility Referrals and Respiratory Infections in the United States

Frail older skilled nursing facility (SNF) residents are at increased risk of acquiring respiratory infections. An understanding of the distribution of referrals to SNFs resulting from respiratory infections in hospitals is necessary to understand when also investigating hospital readmission and healthcare cost analysis. We will use geographical information systems (GIS) to map variations of these variables across the country, and compare how different factors interact. Using universally available Medicare data for skilled nursing facilities, we will interpret patterns formed by visualizing the data in several different ways. Our research will focus specifically on respiratory infections, readmission rates, referrals to skilled nursing facilities, and any applicable healthcare costs. For the interest of comparability, we will only use cost of healthcare data that has been standardized, and state data for our regions. We would expect the data to demonstrate higher healthcare costs where there are higher rates of SNF referrals, and decreased readmission rates amongst regions with lower SNF referrals. It is likely that areas with greater referrals to skilled nursing facilities are likely to be located in more populated regions. This information can be useful for guiding vaccination and other prevention efforts to prevent respiratory infections in SNFs that can lead to costly hospitalizations and readmissions.

Chin Chin Ch'ng – Spatiotemporal Trends of Dengue Cases in Malaysia from 2010 to 2014

Dengue is an important mosquito-borne viral disease, affecting more than 1.5 billion people worldwide, with tropical and subtropical regions having the highest burden. In Malaysia, there are thousands of dengue cases each year and it is considered one of the most important public health issues. Dengue infection causes a flu-like illness and can develop into severe, life-threatening hemorrhagic fever and dengue shock syndrome. Dengue viruses are transmitted to humans (host) through the bites of the female striped Aedes aegypti mosquito (vector). Incubation period occurs after the viruses have been transmitted to the human host. The period ranges from 3 to 15 days (usually lasting for 5-8 days) before the characteristics of dengue infection appear. The mosquitoes are most active in early mornings and late afternoons and

breeds easily during the rainy seasons but can also flourish in peri-domestic stagnant water, e.g. water contained in plastic bags, cans, flower pots, old tires or other containers.

Many factors have been associated with dengue transmission. Marked spatial and seasonal diversity in dengue incidence reflects the influence of climate and geography on dengue transmission. Increase in temperature and precipitation can accelerate the development rate of mosquitoes and then lead to increased mosquito breeding, which might result in an outbreak of dengue epidemic. With an average rainfall of 250 cm (98 in) a year and an average temperature of 27 °C (80.6 °F), Malaysia is a perfect breeding environment for these mosquitoes. The objective of this study is to map and analyze the spatial temporal distribution of dengue incidence in Malaysia from 2010 to 2015 and to observe for case patterns and hot spots.

William C. Goedel – Proximity of Opioid-Involved Overdose Fatalities to Naloxone Distribution Locations

In response to the growing epidemic of opioid-involved overdose fatalities, the Rhode Island Department of Health has authorized the distribution of naloxone, an opioid antagonist capable of reverse the effects of an acute opioid overdose, to individuals without a prescription with the aim of increasing community capacity to respond effectively to overdose events. Given their role as centers of community health, retail pharmacies represent important venues for the distribution of naloxone. This analysis aims to compare the spatial distribution of opioid-involved opioid fatalities in Rhode Island to the distribution of retail pharmacies providing naloxone using buffers of varying shapes and sizes. Between January 2014 and December 2016, 699 opioid-involved overdose deaths were pronounced in Rhode Island. Nearly all overdose fatalities (98.3%) occurred within 1000 meters of a retail pharmacy distributing naloxone, where 56.8% were within 750 meters of one of these pharmacies and 31.3% were within 500 meters. Access to naloxone by lay community members at retail pharmacies appears inadequate. Future research is needed to understand potential barriers to lay community members accessing naloxone at retail pharmacies.

Dana J. Graef – From Colonization to Conservation: A GIS Analysis of Deforestation in Southern Costa Rica

While contemporary Costa Rica is lauded for its forest conservation programs, during the mid-1900s the government had very different policies. As highways made southern Costa Rica more accessible, non-indigenous people were encouraged to colonize the region and to convert forests into land for cattle and agriculture. One group of Italians, displaced by the violence of World War II, moveed to southern Costa Rica to establish a colony, which is now called San Vito. From the early 1950s, when they arrived to ‘dominate the forests,’ as one government official said, the area around San Vito was significantly deforested. One major exception was a botanical garden—now the Las Cruces Biological Station—where areas of forest were maintained for research and conservation. My GIS Institute research will integrate and analyze three sources of data: (1) open source data of land cover change around Las Cruces provided by Rakan A. Zahawi, Guillermo Duran, and Urs Kormann, (2) data on roads and towns obtained from a Costa Rican government website, and (3) a layer showing the boundaries of Las Cruces that I will georeference and digitize. Drawing on GIS analysis of these data, I will examine rates and patterns of deforestation both *within* and *outside* of the biological station boundaries from 1947

to 2014. By creating buffers around the biological station, the town of San Vito, and nearby roads, I will analyze patterns and trends in deforestation in the region.

Narae Kim – Health Opportunity Index of Rhode Island: Is Where People Live Related to How Healthy the People Are?
The Office of Primary Care and Rural Health of Rhode Island Department of Health is in the middle of a research project of developing a Health Opportunity Index which is made up of over 30 variables. The purpose of the project is to see disparities of Social Determinants of Health and find areas which might need more support to improve its residents' health status. During the second week of GIS Institute, I will calculate the mini version of the Health Opportunity Index combining a few variables. Furthermore, I will compare it with physical and mental health status of each area and see if the Index actually reflects not only the disparities of Social Determinants of Health but also the disparities of healthy lives within Rhode Island.

Martha Kuhlman – Comics of the New Europe
Currently I am working on an edited volume of scholarship about graphic narratives from the former Eastern Europe with José Alaniz of Washington State tentatively titled "Comics of the New Europe" since a number of these countries are relatively new members of the EU. There are several festivals, publishers, and other connections within this subculture that would be worth mapping. Specifically, there are comics journals (which tend to feature more experimental and daring work than mainstream comics) that bring together an international array of artists. Three journals that I think would be especially interesting to map are: Stripburger (Ljubljana, Slovenia, 1992--present), Kus (Riga, Latvia, 2007--), and Aargh (Brno, Czech Republic, 2000-present).

For the purposes of this presentation, I want to map the locations of cartoonists mentioned in the bibliography of the “International Graphic Novel” chapter from *The Graphic Novel* (Cambridge, 2017) to make the point that Eastern and Central Europe is entirely missing from this survey. Then, as a comparison, I would map the location of cartoonists anthologized in the comics journal *Aarg*h (Brno) to show that there are in fact many artists and writers from this region who are overlooked. This information could be useful in convincing publishers that more scholarship on this region is warranted. Moreover, it can be an argument for supporting translations of works from these countries.

Ruth W. Lo – Food and Urban Development in Fascist Rome
The Italian fascist regime placed extraordinary emphasis on food and diet as it realized that they were literally vital to population growth and territorial expansion in the Mediterranean. My research analyzes the ways in which the Italian state and the municipal government utilized the built environment to manage the complex relationships between the nation, city, food, and citizens.

This project maps the connections between food, architecture, and urbanism in fascist Rome. Using the heavily politicized capital city as a case study, I trace the transformations to the urban center and the city's relationship to the surrounding rural landscape. I will use GIS to position food structures, transit networks, and land reclamation projects onto historic maps in order to illustrate their spatial connections.

Alicia Maggard – Marine Pathways to Power: Mapping the Panama Route
The history of U.S. continental expansion is usually told as a terrestrial story—native contact and conquest, wagon trains and overland forty-niners. This paper, however, argues for a greater attention to the role of maritime transit in the expansion of American power. Specifically, it presents a visualization of "the Panama route" that carried an estimated one-fifth of all California emigrants between 1849 and 1859. Passengers who traveled to San Francisco via the Panama route boarded steamships at New York or New Orleans bound for the Atlantic side of Panama, crossed the isthmus overland, and then caught a different steamship north from Panama's Pacific coast. The Panama route not only proved essential to moving American passengers, troops, treasure, and mails between the nation's two coasts, but also established the footprint of U.S. power in the hemisphere. No good map of the route, however, survives from the time or has been created since.

Catrina Mueller-Leonhard – Early Life Exposure to Diesel Exhaust in Hamilton County, Ohio
Traffic related air pollution is a global public health issue that disproportionately impacts those that reside in urban environments. As air pollution caused by traffic increases and people continue to migrate toward cities, the public health impacts are expected to worsen. A small amount of research has been conducted examining the relationship between early childhood and air pollution with most suggesting that increased early life exposure is associated with altered childhood growth with an increased risk of obesity (Basu et al., 2004; Bell et al., 2007, 2008; Gray et al., 2014; Harris et al., 2014; Hyder et al., 2014; Parker et al., 2005; Savitz et al., 2014). It has been demonstrated that inhaled fine particulate matter smaller than 2.5μm (PM2.5) can penetrate the gas exchange region of the lungs, enter the bloodstream, and negatively impact the health of children (Parker and Woodruff, 2008; Sun et al., 2016). Cincinnati, OH is at the heart of Hamilton County and is home to the intersection of three interstates and seven US highways systems. Consequently, it is a heavily trafficked region for diesel powered vehicles. Children spend much of their early childhood outside the home in schools, childcare centers, and parks. Using geographic distance to roadways, I set out to assess how many of these early childhood centers may be impacted by fine particulate matter from diesel exhaust in Hamilton County, Ohio.

Nicole Muhlbauer – Pediatric Population and Carcinogen Exposures in Rhode Island
Pediatric cancer is a relatively rare diagnosis; however, each year about sixty children in the state of Rhode Island are diagnosed with cancer. The development of pediatric cancer is likely multifactorial, involving genetics, lifestyle, and exposures. The impact of environmental carcinogens in cancer development is a well-described phenomenon. The World Health Organization estimates that 7-19% of cancers are attributed to environmental exposures. Pesticides, tobacco smoke, industrial pollution, and superfund sites have been associated with pediatric malignancies. Methods: Spatial Analysis with ArcGIS and RIGIS. Results: I hope to identify the proportion of pediatric patients living near a carcinogenic exposure. Furthermore, I hope to identify if there is a socio-economic difference between those living near exposures and those not living near exposures. Conclusions: Forthcoming. I hope this project will provide a context for my scholarly project of fellowship, which seeks to analyze exposures in known patients with pediatric malignancies.

Guanghui Pan – Determinants of Entering Bureaucratic System in Imperial China: Family, Village, and District Effects

This paper tests family, village, and district effects on participating and succeeding in the bureaucratic selection process in imperial China. Using an administrative data in Northeast China in the Qing Dynasty (1644-1911), this paper illustrates that: for individuals, his probabilities of participating and succeeding in the process are highly positively correlated with his kinship networks, while his brotherhood size negatively influence his success rates in the selection. For village level, inter-family connections and the occupational composition of the village are the determinants of the number of people succeeding and participating. There exists the spatial autocorrelation among the districts. This paper takes both the "imperial examination" path and the "purchasing title" path into consideration, reveals the similarities and the differences the family, village, and district effects on the two paths.

Bryn Pernot – Mapping Access to Free Museums in Chicago

Over one-third of the United States population is people of color, yet over 90% of core museum-goers are White (Farrell & Medvedeva, 2010). Research on systemic social exclusion from museums has tended to focus on barriers like cost, geographic distance, and lack of interest yet this model often fails to explain how barriers might overlap (Dawson, 2014). A common approach to diversifying museum visitorship has been to create museum free days. But studies have shown that these days often end up serving those who are already most likely to be aware of museum programs and draw a wealthier and more well-educated population than paid attendance days (Pekarik, 2007; Dilenscheider, 2015). Thus, it is inaccurate to state that price is the primary barrier to engagement for non-visiting audiences. This project aims to examine how cost overlaps with spatial factors like geographic distance and proximity to public transportation. In order to achieve this, I will map the locations of free museums and museums with free days in Chicago and compare this geographic data with Census tract information and public transportation systems. Using data from the Institute of Museum and Library Services, MuseumStat has mapped the location of museums across the country and overlaid this information with Census data. I will expand on this work by bringing in city-specific transportation data and looking more closely at what neighborhoods have access to free museums.

Kelly Sanchez – Fatal Overdose Deaths in Hispanic/Latino Neighborhoods Throughout Rhode Island

Rhode Island is currently experiencing an overdose epidemic. Since 2012, fatal overdoses in Rhode Island have nearly doubled from 183 deaths in 2013 to 336 deaths in 2016, with an increase in deaths each year. Though all communities in Rhode Island have been affected by overdose death, some racial and ethnic groups have been more present in the fatal data than others. Racial/ethnic reporting for overdoses has been unreliable at a state level. Inaccurate and incomplete race/ethnicity data could mask vulnerable populations and delay the dissemination of resources to certain ethnic groups that might not be seen as high risk.

The present study aims to better understand the burden of overdose deaths in predominantly Hispanic/Latino neighborhoods (HLN). The proportion of fatal overdoses in HLN will be used as a proxy for individuals of Latin descent who have had fatal overdoses. Point data for fatal

overdoses (n=866) from the Center for the Office of State Medical Examiners will be analyzed using ArcMap. Spatial analyses including the cluster and outlier analysis will be conducted to identify hot spots and cold spots for overdoses. Further research will include conducting correlation tests to detect the relationship between overdose incidents and HLN.

Tanvee Singh – Disparities in Access to and Availability of HIV Care in Kenya
Previous research has found areas with high concentration of HIV-infected people have a disproportionately low density of HIV-related services in Kenya. The total population of 48.46 million included approximately 1.6 million people living with HIV (PLWH) in 2015, making Kenya's HIV epidemic the fourth largest in the world. The purpose of this project is to show the geographic distribution of HIV-infected people who receive antiretroviral therapy (ART) according to the physician density, and distribution of health facilities in Kenya at the county level. Data was obtained from Kenya Open Data Initiative - Humanitarian Data Exchange and the 2015 Kenya Demographic and Health Survey (DHS) in the form of shapefiles and joined to create a comprehensive dataset. The results of these maps will be a valuable addition to my thesis, which looks at the system level barriers to retention in HIV care in Kenya.

Xiaoqian Wan – Assisted Housing Dispersion and the Deconcentration of Poverty in Chicago
This project seeks to explore the spatial pattern of urban poverty in the segregated city of Chicago as well as the distribution of population by ethnicity change over the last two decades in the broad Chicago metropolitan area. With the policy movement starting from the 1990s of the mass demolition of Housing Projects constructed in 1970s, the city seeks to reduce the 'concentrated effect' of the durability of poverty. By dispersing new assisted housing programs into mixed-income neighborhoods, it is expected to see the reduction of poverty concentration. This project thus is interested in whether the spatial pattern of poverty concentration has changed over time in reaction to the political effort. The spatial pattern of poverty de-concentration should nonetheless be considered in the broad context of depopulation of the central city to its metropolitan suburban places. Thus, this project will also bring in the pattern of population flow through the metropolitan area that includes the surrounding satellite cities. With the available data, it is expected to see a but limited trend of poverty de-concentration in the city of Chicago.

Heidi Weidele – Redesigning RIPTA: Who Are We Forgetting?
The Rhode Island Public Transit Authority, or RIPTA, is a cheap and convenient service provided by the state of Rhode Island to help residents navigate the state without hassle. Though very comprehensive in its routes, the RIPTA system neglects to serve a large area of the state, thus preventing many residents from accessing easy transportation. I will be utilizing data that captures RIPTA bus stops, routes, and the Rhode Island census to determine how much of the population does not have easy access to RIPTA routes and stops. Using ArcGIS I will map established bus routes and overlay census data to analyze the size and demographics of the non-serviced populations. Based on the ArcGIS output I will be able to recommend how RIPTA should expand and adjust its services to meet the specific needs of the entire Rhode Island population, as well as reduce traffic and unnecessary travel in geographies without RIPTA service.

Aaron Weisbrod – The 1917 Halifax Explosion: A City Rebuilt or Changed?

The Halifax Explosion in 1917 was one of the largest non-nuclear detonations in history. When a ship loaded with munitions for World War 1 caught fire and floated in the docks in Halifax, NS, the resulting explosion wrecked a large portion of the city, instantly killing 5% of its inhabitants. We use digitized versions of Canada's 1911 and 1921 censuses to compare the population distribution across Halifax before the explosion and after the rebuilding process has completed. The 1921 census can place respondents with a fine level of geographic precision within the city using their sub-district codes. We use the records of which streets corresponded to which sub-district to divide a map of historical Halifax into its roughly 30 sub-districts, and can see how the incomes and employment of local residents vary spatially over historic Halifax. We also examine rental prices for properties in these areas, which have strong theoretical ties to welfare measures for residents who live there. By examining the area of the city where the majority of residents and structures would have been wiped out in 1917, and were also therefore rebuilt and upgraded, we can evaluate if Halifax returned to its previous spatial equilibrium or if the rebuilding and removal of its original residents led to a change in how wealth and value was spread across the city.