

Geography Faculty, Staff and Student Posters

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Study Area – Chicago

Results - con't

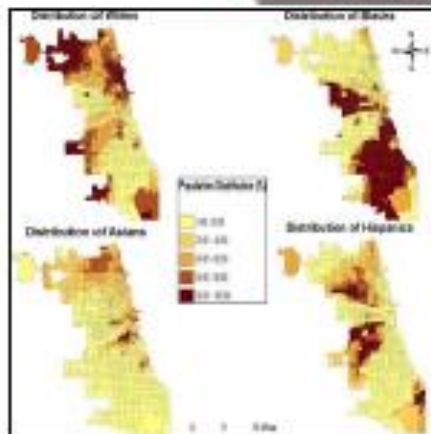
- A preventable health hazard caused by exposure to environmental lead from outside and inside sources
- Increased blood lead levels are 10 µg/dL and above
- Implications include impaired growth, lower IQ, nervous system and kidney damage, decrease muscle and bone growth

Total population of
T. 8004/11.6

- *Examine the health effects of lead poisoning in children and the legal implications aspects of lead poisoning legislation
- *Review the evolution of Chicago communities in terms of urbanization, industrialization, and related environmental and socio-demographic health risks
- *Examine the pediatric health geographies of four community areas in Chicago:
 - two at high risk of lead poisoning
 - two at low risk of lead poisoning
- *Evaluate the geographic access to health care facilities that meet the needs of the at risk children residing in these communities

- White 38.2 percent
- Black 35.6 percent
- Hispanic 26 percent

* The city is considered to be the second largest in African American population and third in Hispanic.



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Data

Demographic/Economic for Chicago

- Lead has the ability to replace some of the important metals the human body needs - Calcium, Iron, Zinc

- American Community Survey 2005-2009, 5 year estimate
- Chicago Metropolitan Agency

Median Household Income and House Value

- The lead poisoning acceptable levels also decreased throughout the years from 60 µg/dL in 1960's, 40 µg/dL in 1971, 30 µg/dL in 1978, 25 µg/dL in 1985, to 10 µg/dL in 1991

- Chicago Housing Community and Development

Lead Poisoning Distribution and Shapefiles

- Children between infancy to the age of 6 have a higher chance of health damage

- * Department of Public Health of City of Chicago

Methods

Ho₂. The lead poisoning rates for Chicago are not significantly higher than the national rates.*

H₀₂: The lead levels observed at 0.5 miles near the medical facilities are consistent with the rest of the city.*

H₀₅: The lead levels observed at 0.5 miles near the industrial areas are consistent with the rest of the city. *

*The alternative hypothesis for each null hypothesis will include that there is a difference.

*All variables observed were examined based on census tracts.

Variable	Number (%) Total count	Percentage (%) Total count	Percent of Estimated Rural Local Levels of ppg/L or Greater (%)
Total Number of Rural Local Units	107 (62)		2.8
Age (years)			
Younger < 15	46 (78)	14	0.1%
≥	57 (97)	18	0.5%
0	34 (58)	10	0.3%
1	12 (21)	4	0.1%
2	10 (17)	3	0.1%
3	10 (17)	3	0.1%
Rural Equivocal Type			
Equivocal	25 (43)	11	1.1%
Non-equivocal	82 (138)	19	2.4%
Percent Rural Local Levels in All categories are Equivocal type			
total	107 (62)		
0-15	1 (5)		
16-20	1 (5)		
21-30	1 (5)		
31-40	1 (5)		
41-50	1 (5)		

Local Publishing Date of Chicago, 2007

Variable	Number (%) Total count	Percentage (%) Total count	Percent of Estimated Rural Local Levels of ppg/L or Greater (%)
Total Number of Rural Local Units	107 (62)		2.8
Age (years)			
Younger < 15	46 (78)	14	0.1%
2	17 (28)	16	0.5%
3	14 (24)	16	0.4%
4	11 (19)	16	0.1%
5	10 (17)	16	0.1%
6	6 (10)	7	0.0%
Rural Equivocal Type			
Equivocal	25 (43)	23	1.1%
Non-equivocal	82 (138)	18	2.4%
Percent Rural Local Levels in All categories are Equivocal type			
total	107 (62)		
201-250	1,540		
251-300	1,028		
301-400	718		
401-500	366		

Local Publishing Date of Chicago, 2007

Local Publishing: State of Chicago, 2002

HYPOTHESIS 1: Comparison of Lead Poisoning Levels

One Sample t-Test				
	df	t-stat	p-Value	95% CI for Mean
Population Mean Less than	95	2.078	0.0200	(1.00, 2.15)

Two Sample t-Test					
The Difference is					
	df	t-stat	p-Value	95% Confidence Interval of Difference	
				Lower	Upper
Mean of Sample 1 minus Mean of Sample 2	95	2.078	0.0200	1.00	2.15



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Data rejected the hypothesis

*Hypothesis 1: Lead poisoning levels in Chicago are significantly higher than the national levels.

*Hypothesis 1: Based on GIS techniques applied, lead levels observed of 0.5 miles near the medical facilities are not consistent with the rest of the city.

*Hypothesis 1: Based on GIS techniques applied, lead levels observed at 0.5 miles near the industrial areas are not consistent with the rest of the city.

Author(s): *James A. Thompson*
The Cleveland Foundation, 1118 East 12th Street, Cleveland, Ohio 44115
Subject(s): *1990-1991; Social Sciences and Health Sciences; Public Health Systems & Change; Theoretical Foundations; Regional Health Systems; Regional Health Systems & Change; Theoretical Foundations; Regional Health Systems & Change; Theoretical Foundations; Regional Health Systems & Change; Theoretical Foundations*
Subject(s): *1990-1991; Social Sciences and Health Sciences; Public Health Systems & Change; Theoretical Foundations; Regional Health Systems; Regional Health Systems & Change; Theoretical Foundations*

The Gentrification of Long Island City, NY: 1990-2010

Jarvis Rojas

State University of New York at Binghamton, Geography Department



Introduction

Since the 1980s many inner city neighborhoods that have experienced urban decline have undergone the process of gentrification which has resulted in their reinvestment. Gentrification restructures urban space and stems from social, political and economic factors. Disinvested inner city neighborhoods that have experienced decline have been transformed into areas of opulence and wealth. The neighborhoods that experience gentrification are characterized by low income working class families and a renter based housing market. Once the process begins dilapidated structures are rehabilitated and new buildings are built while wealthy upper class households that have a bachelors degree or higher and are young and not married move into the area. This causes rents and property values to increase and leads to the displacement of the low-income working class families.

Research Questions

How has the demographic, socio-economic, and ethnic/racial changed since gentrification began in LIC?

Literature Review

Production Theory: The rent gap is the difference between how much rent/value that a particular site is worth at its current use and the potential amount of rent/value that the site can be worth at a higher or "better" use.

When the rent gap is determined to be great the area undergoes gentrification because developers can make a profit.

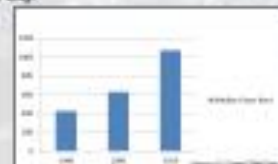
Consumption Theory: The consumption theory explains that young college graduates who work in professional occupations and are highly paid move into a gentrifying/gentrified areas.

Study Area

The study area is Long Island City, in Queens New York

Race and Hispanic/Latino Population

- Long Island City has a total population of 306,092. Its racial make up is 57% White, 15% Asian, and 7% Black. Its Hispanic/Latino population is 25%.
- It is a central neighborhood in NYC that is five minutes away from midtown Manhattan and has excellent access to public transportation.
- The neighborhood has the most industrially zoned land in NYC.
- Gentrification process has led to the shedding of its vacant and abandoned industrial structures.
- Median household rent have been increasing in Long Island City.



Null Hypotheses

H₀₁: There is no significant difference in the demographic SES of Long Island City between 1990-2010.

H₀₂: There is no significant difference in the racial make up of Long Island City between 1990-2010.

Data and Method

Data Acquisition Sources

- Census Public Use Microdata (PUMS) 1990-2010 US Census
- Census Tracts American Fact Finder US Census
- National Historical Geographic Information System

Variables of Study

- Population
- Economic
- Housing

Method of Data Analysis

- Chi Squares were used to test differences
- Maps were created using ESRI ArcGIS

Discussion

-1991

Age Cohorts: The age of the population in Long Island City is becoming progressively younger since 1990.

There has been a dramatic increase in the population with a bachelors degree or higher. This is an indicator that gentrification is occurring in LIC as more college graduates move to the area.

Marital Status: The single and never married population are increasing relative to the married population.

Total Household Income has changed since 1990 with households making \$75,000 increasing faster than those making under \$75,000. Households with incomes less than \$50,000 are declining which indicates that lower income households are decreasing.

-1992

Since 1990 the racial breakdown of Long Island City has changed. The Asian population has increased in the area while the white population decreased between 1990-2000 but began to increase in 2010. The Black population has been negatively affected their percentage has dropped.

-1993

The median monthly gross rent has been increasing since 1990 due to the greater demand to live in the area. This is in agreement with the literature on gentrification that states that rents increase. As rents increase it will place pressure on low income households to move out of the area.

References

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Results and Analysis

• I reject the H₀₁

Chi Square Table: H ₀₁			
variable	Value	DF	Asymp. Sig. (2-sided)
Age	2305.208	8	0.000
Education	15703.09	6	0.000
Marital Status	5986.445	10	0.000
Household Income	47025.52	6	0.000



• I reject H₀₂

Chi Square Table: H ₀₂			
variable	Value	DF	Asymp. Sig. (2-sided)
Race	9412.111	4	0.000

Figure 1: Percentage of Age Cohorts

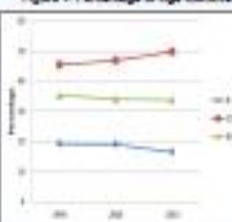


Figure 2: Percentage of Educational Attainment

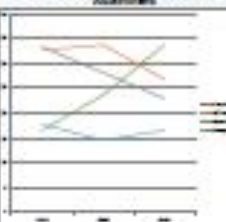


Figure 3: Percentage of Marital Status

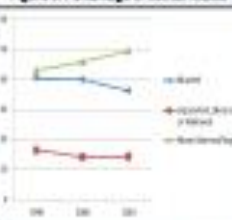


Figure 4: Total Household Income

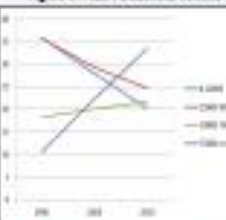
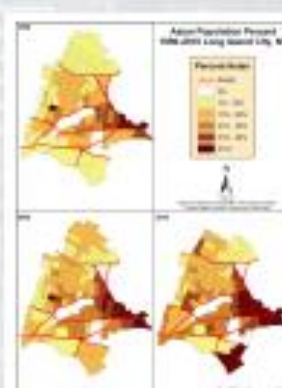
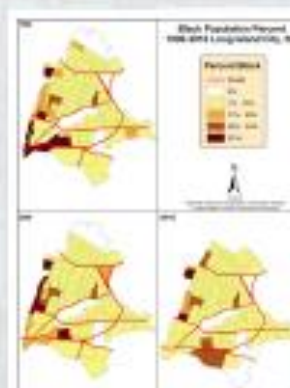
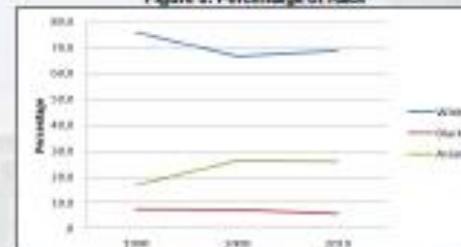


Figure 5: Percentage of Race



An Examination of Socioeconomic Status of Chinese and Koreans in the Flushing, Queens Area in 2010

By Paul Sung-Pyo Park



Introduction

This study focuses on the Asian Chinese and Asian Korean population of Flushing, NY and its adjacent neighborhoods within NYC defined Community District 7. It attempts to examine the differences in the socioeconomic status between these two Asian ethnicities in 2010 based on PUMS data (2005-2009 ACS). It also seeks to define the settlement patterns of these ethnicities within Queens. Queens has a long history of immigration due to its close proximity to entry points such as Ellis Island, La Guardia Airport, and John F. Kennedy Airport. However, it was not until the 1970s, post-INA of 1965 when massive numbers of Asian immigrants entered. Chinese and Korean immigration has yet to slow down and it leaves a couple of questions:

- What are the socioeconomic statuses of the Chinese and Korean population?
- What are the settlement patterns these groups?

Literature Review

- With greater power held by global cities, it is important study the Asian population which is the most urbanized minority group in the US [C. J. Smith and J. R. Logan].
- "Continuous gateways, such as New York and Chicago, are long-established destinations for immigrants and continue to receive large numbers of the foreign-born" (A. Singer).
- "In 1910 one out of seven of the nation's immigrants lived in New York City and 41 percent of the city's residents were foreign-born. Nearly a hundred years later, at the beginning of the twenty-first century after four decades of massive immigration the sheer size of the city's immigrant population is greater than ever before" (M. Price).
- "All percent of recently-occupied (between 1990 and 2002) housing units had a foreign-born household, with this figure rising to over 70 percent in many neighborhoods in Brooklyn and Queens" (M. Price).
- Between 1990 and 2000 Asian homeownership increased by 70% with the Chinese leading the increase (G. Painter, L. Yang, and Z. Yu).
- Chinese homeownership differs from the conventional theory of immigrant assimilation, many of these individuals may have skipped of accumulative upward mobility (G. Painter, L. Yang, and Z. Yu).

Concepts

- SES: The Socioeconomic Status is a sociological and an economic combination in total measures of an individual's status relative to others based on tenure status, income levels, educational attainment, and occupation.
- Gateway City: A city that is the entry location and serves as the primary arrival and departure point for a country or a major subregion.

Study Area

- Flushing, NY, a neighborhood of Queens County known for high Asian concentration with a total population of 247,354 (100%) and an Asian population of 122,094 making up 49.4% based on SF1 Demographic Profile data using the spatial scale of Community District 7 (same boundaries as PUMA 4103) (NYC Department of City Planning 2011).
- The boundaries of Flushing are difficult to define, however, it is bounded by I-678 to the west and follows along Main Street, which runs parallel with I-678 and Northern Boulevard that runs perpendicular and extends deep into Long Island.
- Flushing is the urban-core of this area, thus, attracting commercial and residential activity.
- It is influential to adjacent neighborhoods and serve as an important transportation hub

Table 1. Asian Population in Queens County NY 2010

Ethnicity	Population	%	% Total Population
Chinese	203,218	91.12%	1.00%
Korean	14,307	22.88%	2.9
Total	217,525	100.00%	22.8%

Source: American Factfinder 2010



Table 2. Asian Population in Flushing, NY (CD 7) 2010

Ethnicity	Population	%
Chinese	71,852	42.24%
Korean	27,881	22.84%
Total	99,733	100.00%

Source: American Factfinder 2010

Table 3. Asian Population in Flushing, NY and Adjacent Neighborhoods (CD 7, 4103, 4104, 4106) 2010

Ethnicity	Population	%
Chinese	118,827	61.25%
Korean	48,723	22.88%
Total	167,550	100.00%

Source: American Factfinder 2010



Methods

- The differences of socioeconomic status between the Chinese and Koreans based on ACS PUMA data 2010 using educational attainment, occupation, homeownership, and English proficiency.
- Chi-Square analysis is used to compare observed and expected values based on ethnicity.

Hypothesis

- Ho1: There is no difference in educational attainment between the Chinese and Koreans of PUMA 4103, 4104, and 4106.
- Ho2: There is no difference in occupation between the Chinese and Koreans of PUMA 4103, 4104, and 4106.
- Ho3: There is no difference in homeownership between the Chinese and Koreans of PUMA 4103, 4104, and 4106.
- Ho4: There is no difference in English proficiency between the Chinese and Koreans of PUMA 4103, 4104, and 4106.

Table 4. Chi-Square Test Results of Educational Attainment

Ethnicity	Population	%	% Total Population
Chinese	71,852	42.24%	1.00%
Korean	27,881	22.84%	2.9
Total	99,733	100.00%	22.8%

Table 5. Chi-Square Test Results of Occupation

Ethnicity	Population	%	% Total Population
Chinese	71,852	42.24%	1.00%
Korean	27,881	22.84%	2.9
Total	99,733	100.00%	22.8%

Table 6. Chi-Square Test Results of Homeownership

Ethnicity	Population	%	% Total Population
Chinese	71,852	42.24%	1.00%
Korean	27,881	22.84%	2.9
Total	99,733	100.00%	22.8%

Table 7. Chi-Square Test Results of English Proficiency

Ethnicity	Population	%	% Total Population
Chinese	71,852	42.24%	1.00%
Korean	27,881	22.84%	2.9
Total	99,733	100.00%	22.8%

Data Portrayal and Analysis

- The variable of Ethnicity was used to run Chi-Square Test analyses with Educational Attainment, Occupation, Homeownership, and English Proficiency to statistically verify and determine to reject or accept the null hypotheses.
- Chi-Square for Ethnicity and Educational Attainment (Figure 1.0) was significant at $p < 0.05$, thus, the Ho1 is rejected showing that Chinese and Korean Educational Attainment is different.
- Chi-Square for Ethnicity and Occupation (Figure 1.1) was not significant at $p < 0.05$, with a p-value of 0.385. Thus, Ho2 is not rejected.
- Chi-Square for Ethnicity and Homeownership (Figure 1.2) was significant at $p < 0.05$, however, more than 15% of cells had an expected count less than 5. Thus, this goes against the assumption of a Chi-Square analysis.
- Chi-Square for Ethnicity and English Proficiency (Figure 1.3) was significant at $p < 0.05$, thus, Ho4 is rejected at p-value 0.032.
- Statistical analysis demonstrates that existing difference of socioeconomic status between Chinese and Koreans of Flushing (PUMA 4103, 4104, and 4106).

Summary and Conclusion

- Deriving from Table 2, and Table 1, approximately, 58.12% of Chinese and 75.00% of Koreans in Queens settle in or adjacent to Flushing, NY.
- Flushing (PUMA 4103) has the largest Chinese (75,992) and Korean (27,881) concentration based on population in NYC.
- Including adjacent neighborhoods (PUMA 4104 & 4106), this number of Chinese increases to 118,827 and Koreans to 48,723.
- There is a significant difference of socioeconomic status between the Chinese and the Koreans based on Educational Attainment and English Proficiency.
- Based on Census 2010 data, NYC has a total population of 8,175,133, where Queens has 2,230,722, making it the second largest borough in NYC. Among the total population of Queens, 22.84% are Asian and approximately 48% are foreign-born immigrants (M. Price).

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Evaluation of SMOS Level 3 soil moisture products using International Soil Moisture Networks

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Introduction

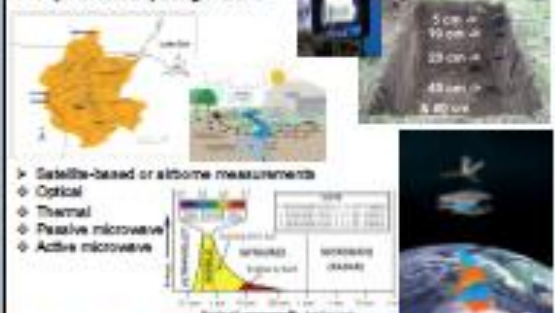
Why Do We Care About Soil Moisture

- Hydrology (floods, runoff)
- Numerical weather prediction (drought, precipitation)
- Agriculture & water management
- Climate change



How to Acquire Soil Moisture Data

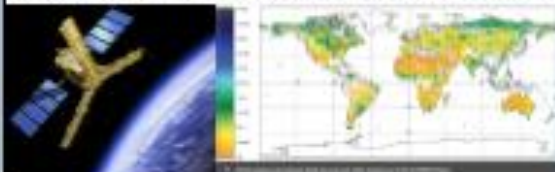
- Ground-based in situ measurements
- Physical-based hydrologic models



- Satellite-based or airborne measurements
- Optical
- Thermal
- Passive microwave
- Active microwave

Soil Moisture and Ocean Salinity (SMOS) Mission

- Launched on November 2, 2009 by European Space Agency (ESA)
- First dedicated soil moisture satellite mission
- Global observations of soil moisture over the Earth
- L-band (1.4GHz/21cm) passive microwave
- Mission objective: accuracy of 4% volumetric soil moisture, spatial resolution of 35-50 km and revisit time of 1-3 days
- Crossing times: 6AM and 6PM local time for ascending and descending orbits



Methodology

Validate SMOS Level 3 products over continental U.S. by using soil moisture monitoring stations from International Soil Moisture Network (ISMN)

- Direct node-to-site comparison
- Detect combinations of site and satellite nodes with good global statistics and representative dynamics
- Global comparison between different networks

Contributing Networks:

- Atmospheric Radiation Measurement (ARM)
- Automated Weather Data Network (AWDN)
- Cosmo-ray Soil Moisture Observing System (COSMOS)
- Illinois Climate Network (ICN)
- Soil Climate Analysis Network (SCAN)
- SNOWpack TElemetry (SNOTEL)
- US Climate Reference Network (USCRN)

Monitoring Stations:

- More than 700 stations across the U.S.
- Near real time (NRT) with hourly sampling data
- Represent a variety of conditions across the U.S.
- Soil moisture at different depth, soil temperature, air temperature, precipitation, etc.

SMOS Soil Moisture Products

- Level 3 data products: 3-day global product on EASE grid of 25 km resolution
- Time span: 1/1/2010-12/31/2012

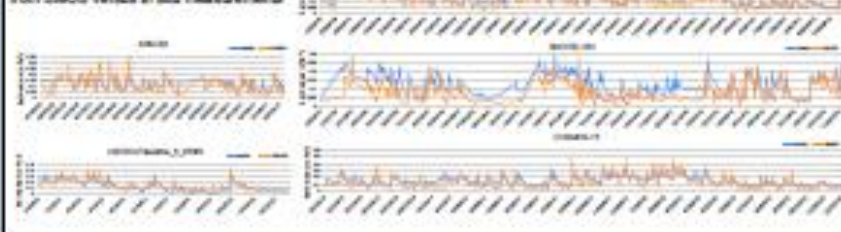
Data extraction

- Nearest nodes located less than 25 km from the monitoring sites
- Ascending and descending orbits were processed separately



Results

Time series plots of soil moisture retrievals from SMOS versus in situ measurements



Results

Scatter plots of soil moisture retrievals from SMOS versus in situ measurements



Conclusions

- Statistics show an underestimation of the soil moisture from SMOS Level 3 products compared to in situ measurements
- SMOS meet the mission requirement of 0.04 m3/m3 over bare soil and/or low vegetation areas
- Differences are observed over many sites and need to be addressed
- Overall, SCAN and USCRN networks perform better than ARM, COSMOS and SNOTEL
- Statistics show similar results for both ascending and descending orbits

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Uneven Outcomes Due to Puerto Rican Racial-Ethnic Perceptions?

Potential Indicators for Foreign-Born Dominicans and Cubans in San Juan

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Introduction

For more than two hundred years, the population in the Caribbean was constantly intra-migrating, suggesting no specific push and pull forces that made them move from one place to another (Quany, 2008). However, due to political changes, poverty and economic stagnation the region began to suffer around the 1960's, transforming the population perspective into a more emigration-oriented society. The geographical position and the Role of Puerto Rico in the region as a US territory, its high economic development, and similar history, language and culture, with Cuba and Dominican Republic, made it a country a primary destination for these immigrants (Furkhouer, 1990).

Purpose

-Have a better understanding about the migration to Puerto Rico and find, if any SES or settlement patterns differences exist between the Cubans and Dominicans in San Juan.

Research Questions

- Is there any socioeconomic difference between the native-born Puerto Ricans and the foreign-born in San Juan?
 - Is the SES of one group better than the other?
- Are the income differences or the education attainment related with the nationality?
- Are all three ethnic groups spatially segregated in San Juan?
- Are settlement patterns related to their income?

Literature Review

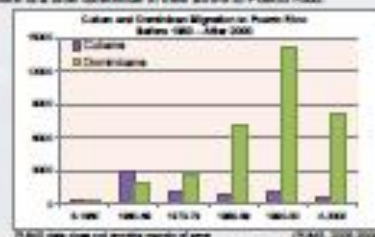
- Movement of people to gateway cities creates changes and tensions in the socioeconomic, cultural and political life of the city. (Price et al. 2008)
- Immigrants' socio-economic aspects (residential and ethnic commercial areas) have a concrete spatial implication on cities and are not always welcomed by native residents (Price et al. 2008)
- Cubans and Dominicans have entered opposite sectors in the Puerto Rican labor force, no matter their socio - economic background on their birthplace (Quany, 1989).
- During the high wave of the Cuban migration, Puerto Rico's economy was booming and more receptive of labor force, while most of the Dominicans arrived when the economy was stagnated and the competition of skilled jobs increased (Quany, 1989).
- Many countries have a caste-like systems that distinguish citizens, residents, temporary workers, guest, refugees, undocumented, illegal immigrants etc. (Price et al. 2008)
- Most Cubans in San Juan are considered "white" in physical appearance in contrast with Dominicans who are considered "black" or "mulatto" by the Puerto Rican standards (Quany, 1989)
- Differences between US legal status (Quany, 2008).
 - Cubans are consider US refugees
 - Dominicans are perceived illegals

Null Hypotheses

- H_{01} There is not a significant difference between Puerto Ricans, Cubans and Dominicans' income in San Juan.
- H_{02} Cubans' household incomes are not significantly higher than Dominicans' household income in San Juan.
- H_{03} Cubans and Dominicans' do not significantly differ in their education attainment.
- H_{04} Cubans and Dominicans' do not significantly differ in their occupation distribution.
- H_{05} Cuban and Dominican settlements in San Juan do not significantly differ from each other.
- H_{06} Cubans and Dominicans' settlements in San Juan are not significantly related to their economic status.

Study Area

- San Juan has the highest degree of economic development of the island, being also the center of its financial district (Denton et al. 2007).
- 35.57% of the Cubans and 52.77% of the Dominicans living in Puerto Rico for 2010 where located in San Juan (US Census Bureau 2010)
- There is a time difference in their arrive to Puerto Rico.



-The pull and push factors change between the two groups (1965-1990).

Reason	% Cubans	% Dominicans
Economic	28.4	83.0
Political	6.2	3.8
Family	80.8	12.7
Other*	13.8	23.7

-Cubans and Dominicans' occupation distribution in Puerto Rico as been different across the years (1965-1990).

Occupation	% Cubans 1975	% Cubans 1980	% Dominicans 1975	% Dominicans 1980
Managerial, Professional	38.3	30.7	24.3	12.3
Service	19.0	22.3	81.5	80.7
Sales and Office	38.7	48.0	18.2	20
Farming, Farming and Forestry	0.3	0.7	0.6	0.4
Construction and Maintenance	2.1	2.3	6.4	4.8

Data and Method

- Data Acquisition Sources
 - 2005-2009 PUMS data San Juan County
 - Census Tract - San Juan 2000 US Census Bureau

Variables of Study

- Population's income
- Educational Attainment
- Population's settlements
- Occupation

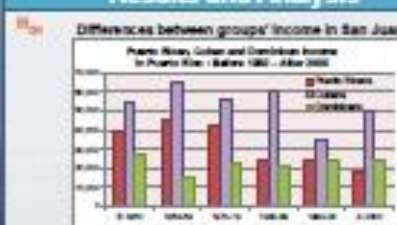
Method of Analysis

- ANOVA, Spearman and Chi Square were used to test the differences
- Arc Map 10.1 used to create the maps

References

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- Furkhouer, R., & Harris, P.A. (1990). The ethnic migration distribution: Dominicans and Cuban Immigrants in Selected Urban Areas and Puerto Rico. International Migration Review, vol. 14(2).
- Price, M., & Harris, P.A. (2008). Migration to the metropolis: The role of immigrant gateway cities. American Journal of Sociology, vol. 114(4).
- US Census Bureau - Puerto Rico

Results and Analysis



Reject the H_{01} Sig. p=.05 (N=48)
Reject the H_{02} Sig. p=.05 Strength: .731

Cubans and Dominicans' Education Attainment in 2005-2009

Education Attainment	# Cubans	Income	# DN	Income
Not in school	144	\$27,814	1,710	\$15,340
Less than High School	1,047	\$40,437	17,893	\$19,799
HS Graduated	1,800	\$50,781	7,088	\$25,107
Some College	1,197	\$50,919	5,181	\$26,580
Higher Degrees	3,067	\$75,819	2,886	\$21,866

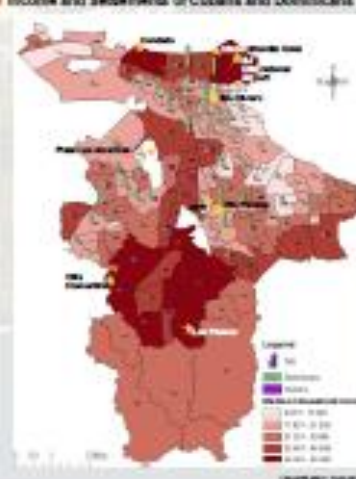
Reject the H_{03} Sig. p=.01 Strength: .388

Occupation Distribution in Puerto Rico, 2005-2009

Occupation	# Cubans	Income	# DN	Income
Managerial, Professional	2,345	\$91,071	2,188	\$26,540
Service	481	\$28,028	11,288	\$21,822
Sales and Office	1,188	\$29,887	3,807	\$28,881
Farming, Farming and Forestry	0	NA	38	\$21,822
Construction and Maintenance	300	\$28,074	5,437	\$26,143

Reject the H_{04} Sig. p=.01 Strength: .488

Income and Settlements of Cubans and Dominicans in SJ



Results and Analysis Cont.

- H_{05} Reject the H_{05}
- Cubans' settlement patterns are related with the high income areas at census tract level.
- H_{06} Reject the H_{06}
- Cubans' settlement patterns are significantly different from Dominicans' settlements at the census tract level.

Discussion

- The results shows that there is a significant difference between Puerto Ricans, Cubans and Dominicans' income. Cubans have a higher income even when they are compare with the Puerto Ricans in San Juan.
- There is a significant correlation with being Cuban and have high income in San Juan. This correlation is moderately strong. The negative direction suggests that Dominicans are more likely to have less income in this city.
 - This is also supported by the map that shows a higher presence of Cubans in areas above the median \$23,473 (+/- \$453) (American Fact Finder, 2010)
- Although the strength is weak, the results show that Cubans in San Juan are related in a significant way with have a high education attainment. The negative direction suggests that Dominicans have less education attainment in San Juan.
- There is an empirical evidence that Cubans and Dominicans have different settlement patterns at the census tract level. Even when a large population of both groups lives in Santurce, Cubans are located in sub-barrios like Miramar, Condado, Ocean Park. In the other hand Dominicans in Santurce lives in deteriorated quarters such as Ponce No.15, Villa Palmeras and Barrio Obispo (Picture 1), etc.(Quany, 1989)
- Cuban main settlements, mentioned above, are also known as the wealthy and suburban areas of San Juan such as Los Pasos (Picture 2). However, Dominicans main settlements are located in the principal low and middle low areas. This could be clearly observed on the maps.



- In 1989, Quany suggested that one reason for inequality between Cubans and Dominicans in Puerto Rico could be the racial perception that Puerto Ricans have about each group. Twenty-two years later, the economy, immigration flow, and profiles has changed. However, the Puerto Rican's perception of race remains the same (Picture 3 & 4). This suggests that even after two decades, racial perception still can be the reason that explains their socioeconomic inequalities on the island.



Object-oriented Representation and Analysis of Coastal Changes for Hurricane-induced Damage Assessment

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Abstract

Hurricanes and tropical storms represent severe threats to coastal properties, settlements, and infrastructure. The research objects are to:

- Develop an object-oriented conceptual framework for representing hurricane-induced damages
 - Much more concise and explicit representation of damages than grid-based raster representation.
- Develop algorithms to numerically detect and quantify change objects
 - Extract quantitative spatial distributed information about damages for supporting hazard mitigation and recovery activities



Introduction

Conventional Methods for Coastal Change Analysis

- Ground surveys
- Accurate measurements
 - Small spatial coverage
 - Time-consuming
 - Difficult in inaccessible and hostile environments
- Digitizing and interpreting aerial photographs
- High spatial resolution
 - Costly and time-consuming
 - Labor-intensive



Airborne LiDAR Technology for Coastal Change Analysis

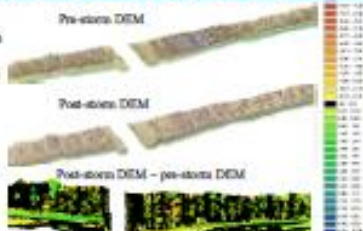
- Airborne LiDAR (Light Detection And Ranging) System
- 15 cm vertical accuracy
 - 1-2 m spatial resolution
 - Cost-effective, rapid mapping



Cell-based Approach for Coastal Change Analysis

Problems:

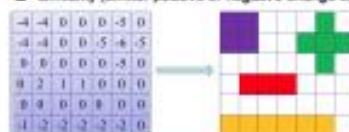
- Large volume of data associated with raster representation
- No much explicit information about damages
- Difficult to be used for hazard mitigation and post-hurricane recover decision making



Methodology

Object-oriented Representation of Change Objects

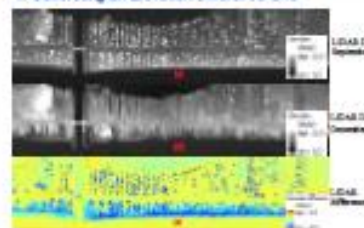
- Based on elevation difference grid
- Group grid cells into individual change objects based on
 - spatial connectivity (spatially adjacent cells)
 - similarity (similar positive or negative change cells)



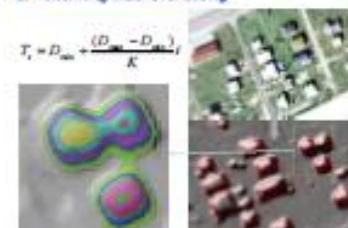
Ontology-driven Pattern Recognition



1. Generating an Elevation Difference Grid



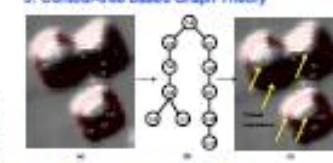
2. Performing Multi-level Slicing



4. Change Objects Delineation



3. Contour-free based Graph Theory



5. Deriving Expected Semantic Properties



6. Deriving Thematic Attributes



Results



Classification & Damage Assessment



Buildings: 8847 m² Trees: 6010 m² Sediment erosion: 27102 m²
Coastline: 1.015 km Gravel: 10400 m² Sediment deposition: 22361 m²
Shoreline pushed inland by 15.2 m

Table 1. Classification error matrix

Overall accuracy: 95.9%

	Building	Tree	Gravel	Sediment erosion	Sediment deposition	Coastline
Building	8847	0	0	0	0	0
Tree	0	6010	0	0	0	0
Gravel	0	0	10400	0	0	0
Sediment erosion	0	0	0	27102	0	0
Sediment deposition	0	0	0	0	22361	0
Coastline	0	0	0	0	0	1.015

Conclusion

- An object-oriented analytical framework for representing morphological changes for damage assessment
- Object-oriented representation provides explicit and quantitative damage information for supporting hazard mitigation and post-storm recovery effort
- An effective change object detection algorithm based on multi-level slicing and contour-free graph theory
- A software tool for automatically deriving quantitative attributes for change objects
- Taxonomy and rule-based approach for classifying change and damage types

References

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- Liu, H., et al., 2010. An object-based conceptual framework and computational method for representing and analyzing coastal morphological changes. *International Journal of Geographical Information Science*.
- Sellinger, A.H., et al., 2005. Evaluation of airborne scanning lidar for coastal change applications. *Journal of Coastal Research*, 19, 125-133.

Difference in frequency

Difference in availability

Fail to Reject the H_{01} : Sig. $p=0.46>0.1$
Strength=0.78

- Professor Florence Margal (Advisor)
- Professor John Fowler
- Ana I. Bárcenas Riera
- Sergio M. Chaves



Introduction

Scholars have identified three major factors affecting perception of wealth and inequality in the United States: "the dominant stratification ideology, individual social experience and the changing social atmosphere of the past decades, namely, rising social liberalism" (Kuegel & Smith, 1986). Each of these factors is believed to be based on an individual's social hierarchy related experiences, educational background and dominant political culture (Kneidl, 2000). In the United States, capitalism tends to promote position and wealth with ideological beliefs. Individuals align their perceptions with dominant cultural views, justifying "wealth results from hard work, exceptional talents and effort" or in contrast "that it follows from unequal opportunities, connections, dishonesty, or from failures of the economic system" (Kneidl, 2000). These views are perceived as legitimate only if the person normatively supports the causes based on his or her own cultural experience in his or her place of upbringing.

Literature Review

- The United States is the wealthiest nation on earth and exhibits among the highest levels of economic inequality of any advanced industrial nation (Boudreau and Wallace, 1996; Braun, 1991; Karbo, 1996).
- The nature of public opinion about the causes of the substantial economic disparities in the United States is not well understood (Hunt, 2004).
- On beliefs about wealth: African Americans, Latinos, and Whites show similar levels of support for individualistic explanations; however, ethnic minorities are more structuralist than whites on this issue. On beliefs about poverty, ethnic minorities are simultaneously more structuralist than are whites (Hunt, 2004).
- When Forbes has discussed nationality it has overstated diversity and understated the Jewish representation on its list (Blunder, 2011, 4).

Null Hypotheses

- H_{01} : American students overestimate White Anglo-Saxon Protestant (WASP) prominence.
- H_{02} : American students underestimate Jewish prominence.
- H_{03} : International students overestimate Jewish prominence.
- H_{04} : American students overestimate Black, Hispanic and other White prominence.

Data

Binghamton University: Located on a 930-acre campus in upstate New York, it enrolls 5,000 graduate students and 21,801 undergraduates from all over the United States as well as international students hailing from over 100 countries worldwide. Of those, 3,200 are Jewish students.

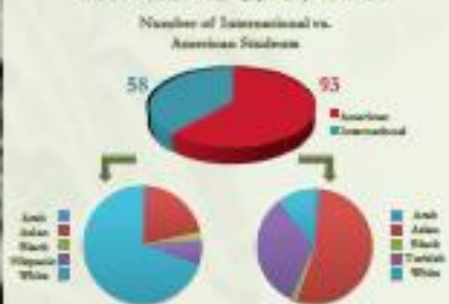


Table 1: Average of Student Perceptions in Reality

Ethnicity	American	International	Reality
Ashkenazi American	33.1	31.5	33
Ashkenazi International	11.1	61.6	33
Sephardi American	24.2	35.6	33
Sephardi International	25.1	35.6	33
Mizrahi American	33.9	36.0	33
Mizrahi International	36.4	33.4	33
Other American	23.6	25.1	33
Other International	27.4	41.1	33
Non-Jewish American	3.8	7.1	6.0
WASP	100.0	11.1	55.5
WASP International	35.7	61.0	55.5

Table 2: Descriptive Statistics

Ethnicity	Mean	Median	Mode	Standard Deviation	Minimum	Maximum
American	33.1	33	33	1.1	33	33
International	31.5	31	31	1.1	31	31
Ashkenazi American	33.1	33	33	1.1	33	33
Ashkenazi International	31.5	31	31	1.1	31	31
Sephardi American	33.9	34	34	1.1	34	34
Sephardi International	35.6	36	36	1.1	36	36
Mizrahi American	33.9	34	34	1.1	34	34
Mizrahi International	36.0	36	36	1.1	36	36
Other American	23.6	24	24	1.1	24	24
Other International	25.1	25	25	1.1	25	25
Non-Jewish American	3.8	4	4	1.1	4	4
Non-Jewish International	7.1	7	7	1.1	7	7
WASP	100.0	100	100	1.1	100	100
WASP International	11.1	11	11	1.1	11	11

Methods

Data Acquisition

Student In-Class Surveys

Student Self-Reported Ethnicity Assignment

Variables of Study

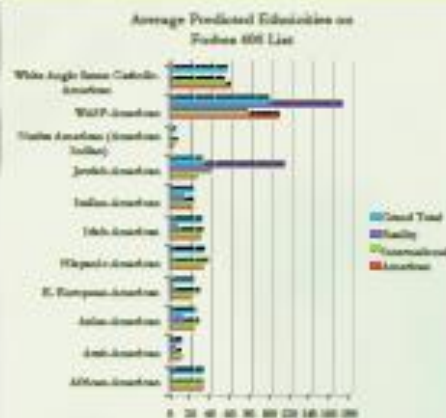
Ethnicity of Student

Ethnicity Ranks by Perceived Wealth

Method of Analysis

Comparison of Means/Graphs

Results and Analysis



Self-reported Reasons for Ethnic Wealth Perceptions



References

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- Hunt, M. O. Race/Ethnicity and Beliefs about wealth and poverty 31 July 2004. Social Science Quarterly 85. 1. 623-660.
- Kuegel, J. K. Smith, R. E. 1986. *Beliefs about inequality: American views of what is and what ought to be*. Third Paperback Printing.
- Kneidl, M. Perceptions of Poverty and Wealth in America and Post-Communist Countries. 2000. Social Justice Research, 13. 1. 161-176.

Discussion

- Both American and International students underestimated WASP prominence on the list.
 - American students had an average of **108.9**
 - International students had an average of **77.1**
 - 31.8** person difference in predictions
 - 62.6** and **94.4** difference between predictions and reality, respectively
- Of the two, American students predicted closer to reality for WASP representation on the list.
- Both American and International students underestimated Jewish-American prominence on the list.
 - American students had an average of **27.9**
 - International students had an average of **41.1**
 - 13.2** person difference in predictions
 - 86.1** and **72.9** difference between predictions and reality, respectively
- Of the two, International students estimated Jewish-American prominence slightly closer to reality than American students.
- With the exception of Jewish-American and WASP-American, both American and International students overestimated prominence of all other ethnicities.
- Media was the most reported factor influencing student perception of wealth and ethnicity.

Potential Issues

- The sample size of this data is low when looking at results by student ethnicity.
- Student self-reporting of ethnicity may not have been accurate.
- Not every student understood the survey instructions and some students worked in groups.
- Data was collected at a New York State University; this may not be representative of the entire U.S., especially given Jewish prominence in the region.

Acknowledgements

Dr. Mark Blunder
Dr. John Pender
Matthew Pender

Geovisualization of Mitigation Strategies for Pedestrian Evacuation for Near-Field Tsunami Hazards Along the Cascadia Subduction Zone

Shannon Grumbly and Dr. Tim G. Frazier

Department of Geography, Binghamton University

Introduction

With projected increases in populations along coastlines, societal exposure to a variety of coastal hazards is likely to increase. Particularly threatening to humans are tsunamis, which can strike with little to no warning. Along the US Pacific Coast, the Cascadia Subduction Zone places communities at risk for near-field tsunamis which can strike within 15 to 45 minutes after an earthquake. In the event of a sudden near-field tsunami, evacuation choices are likely to be made by self-controlled, pedestrian traffic.

Evacuation research is commonly an exposure analysis and does not consider pre-disaster mitigation implementation. Risk perception largely influences the likelihood for individuals and stakeholders to implement crucial mitigation policies. By quantifying variables that hinder evacuation potential, risk mapping procedures can be applied to evacuation potential to accurately portray risk and thus lead to steps in increasing resiliency for coastal communities.



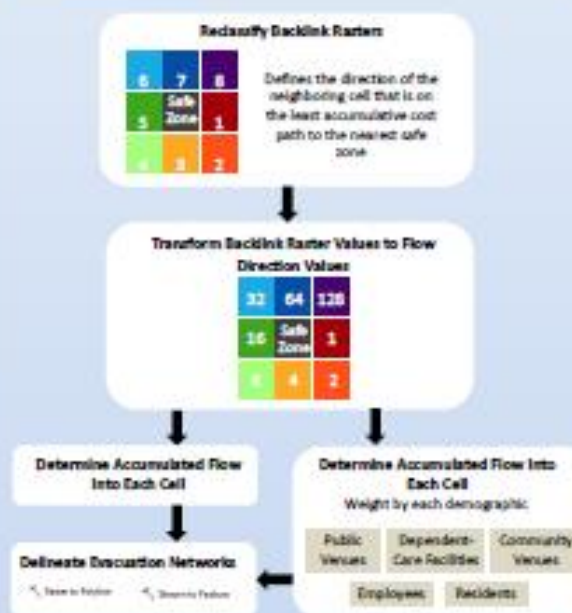
Objective

- To estimate the least-cost paths for pedestrians given land cover barriers and to estimate the number of people traversing these paths using ArcMap's hydrology toolset
- To utilize risk mapping procedures to accurately visualize near-field tsunami risk for pedestrians

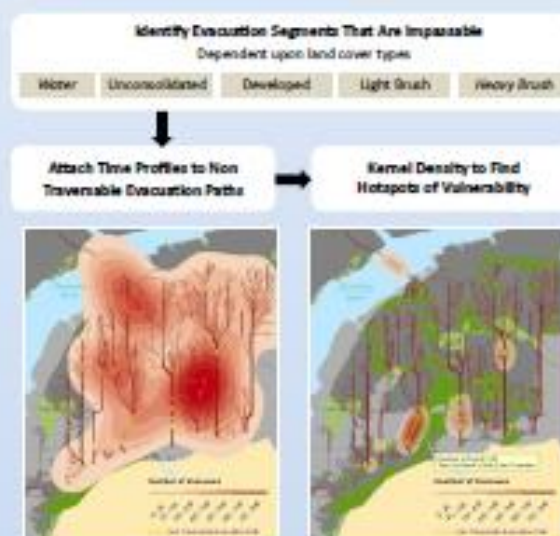
Research Questions

- How does the use of different GIS Hydrology tools impact the development of least cost evacuation pathways?
- How can mapping risk be utilized to encourage mitigation strategy implementation?
- How can the application of cartographic principles be used to accurately portray risk?

Methodology



Application of Methodology



Results and Further Analysis

- By identifying inaccessible portions of the least-cost paths to safety, mitigation efforts can be focused on congestion hotspots in terms of land cover constraints
- Future work will examine other elements of vulnerability along the estimated evacuation routes and identify problematic areas given other demographic and economic data

Acknowledgements

I would like to acknowledge Dr. Nathan Meisel for research contributions and the United States Geological Survey for providing funding for this study.

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Modeling Flood Mitigation Alternatives in Margaretville, New York

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Abstract

Managing New York City's water supply requires collaboration between the city of New York and the upstate communities within the New York City (NYC) "watershed." The 1987 Memorandum of Agreement (MOA) set aside aid for the upstate watershed towns to the water utility projects. One use of these funds was the creation of the Catskill Watershed Corporation (CWC), located in Margaretville, New York in the Catskill Mountains. In the wake of flooding in 2012 from Hurricane Irene, towns in this region have local engineering firms to model flood mitigation alternatives that may receive funding by CWC. In Margaretville, modeled alternatives have called for removal or relocation of several key businesses. An interview with CWC in the summer of 2013, modeled flood mitigation alternatives with little impact on Margaretville's business district. Reactions of local leaders to the model results reveal the benefits of modeling as a tool to collaborate with communities. However, some individuals viewed the model results as complete truth, despite local environmental agencies who stress that modeling is incomplete without input from community members who personally faced flooding.

Introduction

- NYC's water supply is comprised of two upstate "watersheds":
 - Catskill/Delaware (or West of Hudson [WOH])
 - Croton
- Watershed domain was used to flood communities into reservoirs as late as the 1980s.
- After decades of animosity, the 1987 Memorandum of Agreement (MOA) set aside aid for upstate communities to the water utility flood insurance policy.
- The MOA created the Catskill Watershed Corporation (CWC) to fund water supply, storm water, economic development, and recently flood mitigation projects in the WOH watershed.
- 2012 flooding from Hurricane Irene devastated communities in the WOH.
- Local communities have hired engineers to complete Local Flood Analyses (LFAs) and model flood mitigation alternatives.
- In the summer of 2013, I worked as an intern with CWC and modeled several mitigation alternatives in Margaretville, NY.



Margaretville, NY

- 500-person village and home to CWC office
- Located on the East Branch Delaware River floodplain and an alluvial fan
- Historic flood event in 2013
- Chosen for New York Rising Communities Reconstruction Program with flood modeling done by an engineering firm

Study Problems

- Previous focus of flood mitigation alternatives on removal/relocation of local businesses is an issue for some local leaders
- Goal: Flood reduction with minimal impact on business
- Models are received well by local leaders, but overreliance on their results is a concern



Location	Area (sq. ft.)
CVS Pharmacy	10,000
Home Depot	20,000
Walmart	30,000
Target	40,000
Best Buy	50,000
Home Depot	60,000
Walmart	70,000
Target	80,000
Best Buy	90,000
Home Depot	100,000
Walmart	110,000
Target	120,000
Best Buy	130,000
Home Depot	140,000
Walmart	150,000
Target	160,000
Best Buy	170,000
Home Depot	180,000
Walmart	190,000
Target	200,000
Best Buy	210,000
Home Depot	220,000
Walmart	230,000
Target	240,000
Best Buy	250,000
Home Depot	260,000
Walmart	270,000
Target	280,000
Best Buy	290,000
Home Depot	300,000
Walmart	310,000
Target	320,000
Best Buy	330,000
Home Depot	340,000
Walmart	350,000
Target	360,000
Best Buy	370,000
Home Depot	380,000
Walmart	390,000
Target	400,000
Best Buy	410,000
Home Depot	420,000
Walmart	430,000
Target	440,000
Best Buy	450,000
Home Depot	460,000
Walmart	470,000
Target	480,000
Best Buy	490,000
Home Depot	500,000

Change in Water Surface Elevation

Methodology

- RFMA hydraulic data were applied to Army Corps of Engineers Hydraulic Engineering Center River Analysis Software (HEC-RAS)
- Elevations were edited to simulate "floodplain benches" or areas of excavation where fill, etc. has been added to the floodplain
- Floodplain benches could not require removal or relocation of businesses or other structures in the village
- Results were mapped using ESRI ArcGIS and Army Corps of Engineers HEC-GeoRAS extension to create depth grids and inundated areas

Model Results

- Combination of two floodplain benches had greatest reduction
- Total inundated area reduced
- Results were presented to the CWC Board of Directors, comprised of local leaders and environmental agency representatives



The Role of Models

Benefits

- Models have been useful to help locals visualize the impacts of various mitigation alternatives
- Improves partnership with communities when all mitigation suggestions are modeled

Potential Issues

- Models are only representations of reality, but are taken as total and complete truth
- Minimize the knowledge and direct experiences of locals
 - Local scientists and environmental agencies are pushing for more input from community members



Sources

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- HEC-RAS, 6.1.0, U.S. Army Corps of Engineers, Washington, DC.



Migration Patterns of Dominicans in the Caribbean

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Introduction

We attempt to shed light on the migration pattern of Dominicans within the Caribbean region. Before the 1980's, the migration flow of Dominicans was conservative due to the strict migratory controls imposed by the government of Rafael Leónidas Trujillo. The fall of his regime, and the periods of political and economic instability that followed, motivated thousands of Dominicans to migrate, primarily into the United States. This migratory movement has been extensively documented and studied. However, little is known about the migratory patterns that led to the formation of Dominican communities in several island nations of the Caribbean. As such, we intend to explain the pattern and the motivation behind this migratory movement.

Literature Review

- There are several theories that attempt to explain international migration:
 - Neoclassical:** individuals choose to migrate due to difference in wages and the perceived availability of jobs in the destination (Todaro, 1969).
 - New economic approach:** migration is a collective decision by a close group (family) that seeks to minimize risks while maximizing the benefits. Difference in wages is not the only variable that influences the decision to migrate (Bach, 1997).
 - Structural approach:** decision to migrate is not taken by the individual, rather external forces compel the individual to migrate (Jurek and Williams, 1998).
 - Transnationalism:** migrant settles assimilate to the host country, yet have contact with the sending country. Instead, the migrant is active in the economic, political, and socio-cultural events in the sending country (Portes, 1999).
- Chain migration is a migratory pattern where an individual migrates to a destination based on information and/or aid provided by either a family member or a friend who has already settled in the host country. The aid can be economic (air fare) and/or social support (lodging, job placement, help assimilating, etc.) (MacDonald & MacDonald, 1964; Rosenzweig, et al. 2002).
- This migratory pattern is characterized by two (2) aspects. First, migrants tend to share a common origin and destination. Second, the nuclear family tends to join the migrant once his conditions in the host country improve (MacDonald & MacDonald, 1964).
- In the Caribbean region, limited economic opportunities have been the main push factor motivating the migration of individuals to destinations within the Caribbean, North America, and Europe (Rosenzweig et al., 2012).
- Before 1960, the Dominican Republic was a receiving country (Burgelman et al. 1999; Dancy, 2005). Between 1990 and 1995, the migration of Dominicans was limited due to strict set by the regime of Rafael Leónidas Trujillo. The fall of his regime led to a period of political instability that motivated the migration of thousands. Economic instability hastened this phenomenon during the 1970's and 1980's (Dancy, 2007).
- Although the Dominican migratory patterns have concentrated in New York, New York and San Juan, Puerto Rico, recent migratory patterns have led to the formation of sizeable communities in Antigua, Curaçao and the U.S. Virgin Islands (Dancy, 2007).

Research Questions

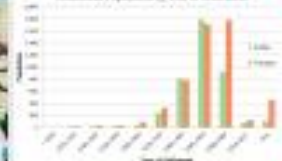
- Who is migrating? When did it begin? What are their motivations?
- Does the Dominican migration to other destinations in the Caribbean share any similarity with the migration described in the existing literature?
- How do they learn about the receiving countries in the Caribbean?
- Is this migratory pattern an example of chain migration?

Study Area

- Charlotte Amalie, St. Thomas, U.S. Virgin Islands
- Roseauville, St. Kitts, St. Kitts and Nevis
- Oropetia, Antigua
- Willemstad, Curaçao



Dominican Population by Year of Interview



Dominican Population in U.S. Virgin Islands

Year	Male	Female	Total	Change (%)	Total Population	Percent Population
1990	207	211	418	1.0%	10,000	0.4%
1995	207	200	407	1.0%	10,000	0.4%
2000	207	200	407	1.0%	10,000	0.4%
2005	207	200	407	1.0%	10,000	0.4%

Year	Male	Female	Total	Change (%)	Total Population	Percent Population
1990	1,000	1,000	2,000	1.0%	10,000	2.0%
1995	1,000	1,000	2,000	1.0%	10,000	2.0%
2000	1,000	1,000	2,000	1.0%	10,000	2.0%
2005	1,000	1,000	2,000	1.0%	10,000	2.0%

Year	Male	Female	Total	Change (%)	Total Population	Percent Population
1990	1,000	1,000	2,000	1.0%	10,000	2.0%
1995	1,000	1,000	2,000	1.0%	10,000	2.0%
2000	1,000	1,000	2,000	1.0%	10,000	2.0%
2005	1,000	1,000	2,000	1.0%	10,000	2.0%

Methodology

Due to data limitations, it is not possible to create a detailed profile of the Dominican migrant in the Caribbean. Based on census data for the U.S. Virgin Islands (USVI), Antigua and Curaçao we are only able to present the following:

- Population of Dominican descent, 1970-2010 (USVI)
- Year of settlement (Antigua and Curaçao)
- Dominican population by sex (Antigua and Curaçao)
- Age and sex distribution of Dominican population (Antigua)

To fill these gaps, we relied on information provided by two (2) sources. First, an interview with a key informant: Rosa, Virginia de van Riel, Consul General of the Dominican Republic in Curaçao. Second, a series of semi-structured interviews conducted on the islands of St. Thomas (USVI), St. Kitts, Antigua, and Curaçao. The interviewees, who were selected on a snowball sample, were asked the following:

- Age and educational attainment before migrating
- Province of origin in the Dominican Republic
- Year of migration and motivation
- Friends or family members in host country
- Current job occupation

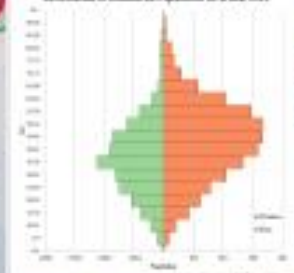
Acknowledgements

We wish to thank the Consulate of the Dominican Republic in Curaçao for taking time out of their day to answer all our questions. Special thanks to Prof. Wan-Ya from the Department of Geography of the State University of New York at Binghamton for her invaluable comments.

Major Findings

- Three distinct periods of migration: before 1980's and after 1980's
- Before 1980's, number of migrants was modest, multiple variables motivated migration
- After 1980's, number of migrants increased exponentially, motivation was purely economic
- Large scale migration to destinations within the Caribbean began in the late 1980's and continued through the 1990's. This wave of migrant shares the same demographic and social characteristics as those that migrated to Puerto Rico during the same period
- Dominicans migrated for economic reasons, as a response to the economic crisis in the Dominican Republic. Destinations within the Caribbean were attractive due to lax migratory controls in the late 1980's and early 1990's and, in the case of Antigua, the need for unskilled labor
- A family member or a friend advised 90% of our interviewees to migrate to the host country
- A small group of the five interviewees (12%) migrated to the receiving country because, as the husband of one of their spouses, it was easier to formalize their migratory status
- Interviews revealed variations in the underlying motivations for migrating to the specific host country:
 - Antigua and Curaçao: possibility of obtaining Dutch citizenship, migrating to Europe
 - St. Kitts: place of birth of an ancestor, easier process to legalize migratory status
- In terms of origin, 80% of our interviewees arrived from the province of San Pedro de Macoris. This could be a result of the labor demands created by the sugar cane industry in the early 20th Century. This motivated a migration of workers from other Caribbean islands, some of which settled permanently and/or married Dominican women
- The Dominican migrant is predominantly female. In the most extreme case (Curaçao) there are 300 Dominican females per 100 Dominican males. Most of the jobs available during the 1980's and 1990's were in occupations traditionally held by women (domestic workers, nanny, prostitution, etc.)
- Family reunification varies between destinations. While Dominicans tend to be by themselves in St. Thomas, Dominicans in both Antigua and Curaçao tend to bring the rest of their family once they formalize their legal status

Distribution of Dominican Population by Sex, 2005



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Potential areas to locate *Gracilaria tikvahiae* and *Sargassum polyceratum* macroalgae mariculture systems in marine waters around Puerto Rico: A Geographic Information Systems (GIS) Approach.

Quiñones-Vilches, N.; Melendez, J.; Barreto, M.

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Abstract

In this study, we identified the potential geographic sites to locate macroalgae cultivation for *Gracilaria tikvahiae* and *Sargassum polyceratum* in marine waters around Puerto Rico. Three ArcGIS models were developed to define suitable sites for *Gracilaria tikvahiae* and *Sargassum polyceratum* macroalgae mariculture sites in Puerto Rico: 1) the Human/Physical Constraint model; 2) the Ocean Wave and Current Model; and 3) the Macroalgae's Optimal Environmental Characteristics Model. Results showed that the Human/Physical Constraint model eliminated nearly 99% of the Puerto Rico's Exclusive Economic Zone (EEZ). According to this model, depth, which is related to the regional tectonic formation of the study site, is the most restrictive variable to conduct *G. tikvahiae* and *S. polyceratum* macroalgae mariculture activities in Puerto Rico waters. The Macroalgae's Optimal Environmental Characteristics Model showed that SST (Sea Surface Temperature) could reduce *G. tikvahiae* optimal growth around Puerto Rico during winter season to 0.07% of the EEZ.

Introduction

- Puerto Rico is ideally suited to facilitate the development of macroalgae mariculture systems based on Puerto Rico's tropical climate and oceanic location with easy access to water.
- A location assessment for macroalgae mariculture is required for the development of an algal-based bioenergy system in Puerto Rico.
- The study developed three GIS model to analyze possible locations for macroalgae mariculture operations for biofuels systems.
- Human/constraint and environmental variables were analyzed to identify potential sites.
- The models were applied to all marine waters around Puerto Rico within the EEZ. (U.S., 2012).
- Benefits of Macroalgae Mariculture in Indonesia:



For further information, please contact: Dr. N. Quiñones-Vilches, nqui@binghamton.edu

Study Area



Ring Design Platform (25 m)



Methodology

General Problem

Specific Problem

Variables

Output - Models



Results

Union of the three models areas

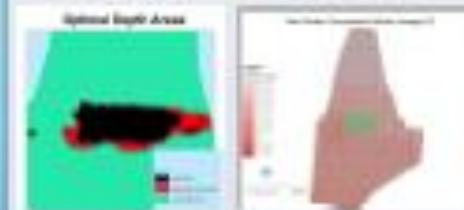
Specie	Temporal Scale	Area km ²
<i>G. tikvahiae</i>	Annual	2486
<i>G. tikvahiae</i>	Winter	17
<i>G. tikvahiae</i>	Summer	2486
<i>S. polyceratum</i>	Annual	2486
<i>S. polyceratum</i>	Winter	2486
<i>S. polyceratum</i>	Summer	2486

Final Outcome



Conclusions

- There is a better macroalgae specie option to develop large scale *S. polyceratum* macroalgae production in a safe and sustainable industry on the tropical coast of Puerto Rico. Suitable sites were mainly identified in the west (42% of total area) and south (35% of total area) coastal waters of Puerto Rico.
- Suitable sites to conduct *G. tikvahiae* mariculture activities during winter period are: near Mayaguez municipality (west area of Puerto Rico).
- Depth variable restrict 98.9% of the area to conduct *G. tikvahiae* and *S. polyceratum* macroalgae mariculture activities in Puerto Rico waters.



- Only 0.07% of the Puerto Rico's Exclusive Economic Zone met the SST average that *G. tikvahiae* need to have for optimal growing conditions in the winter temporal scale.

Acknowledgments

- Dr. Rosane Grafals
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- Joel Melendez
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Contact

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Assessing Coastal Vulnerability and Beach Stability: A Connecticut Case Study

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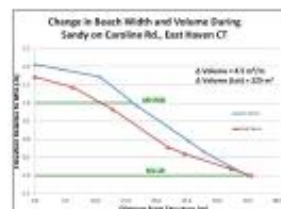
Introduction

Hurricanes Irene and Sandy have caused unprecedented damages to the Connecticut shoreline in recent years, particularly in East Haven. The fact that these storms occurred successively has raised concerns about rising sea levels and storm intensification, likely attributable to climate change.

In response to this, student researchers responded by going out into the community to document storm damage and gather data. The analysis of such information proved useful for policy and decision making in the area. This environmental research also benefitted a variety of community partners such as coastal town managers, environmental regulatory agencies, and informal environmental education centers.

Coastal Vulnerability

Topographic elevation, presence of seawalls, and raised structures all influence the severity of wave damage during storms. Data analysis, however, indicated that beach width and height were the primary determinants of the degree of wave damage to coastal structures. Elevation was another notable factor. The data collected has been used to support proposed policy changes that would make it easier to maintain the buffering capacity of local beaches in the face of large storm waves through updated beach nourishment projects and policy.



This graph represents the volume of beach width lost due to Superstorm Sandy at a specific profile location.



This map illustrates the damages to homes along the East Haven shoreline during Sandy based on interviews conducted by Stephanie Chang in conjunction with data from town records.

Constructing Flood Maps

Following the flooding that accompanied the peak storm surge of Hurricane Sandy, debris lines associated with the flood were located, photographed, and addresses were noted. Successively, blue dots were painted on the spots that represented the debris upper boundaries. Later, these locations were recorded using geographic positioning technology (GPS) and the elevations were measured using laser based surveying technology (total station).

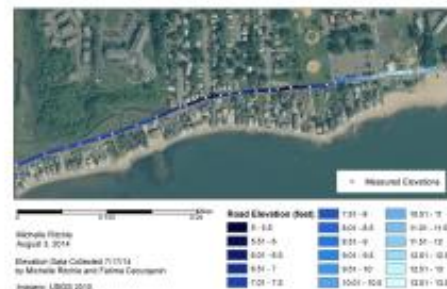
Flood line locations were then processed using Google Earth and Geographic Information Systems (GIS). An average elevation for flood line locations was calculated along with a measure of variability (standard deviation). The average elevation for the flood debris (8.93 feet) was then compared with the peak storm surge water elevation measured at the New Haven tide gauge. The difference between the tide gauge elevation and the elevation determined by averaging debris elevations was just 0.8 inches.

After analyzing wave damage during Sandy, a series of maps were constructed using ESRI's ArcGIS showcasing coastal road elevations, Sandy's peak storm surge, and a series of flood predictions based on the IPCC's sea level rise projections. These maps were then shared with the East Haven town engineers' office to aid in updating their emergency response plans. This research also became a part of the town of East Haven's official report to FEMA.

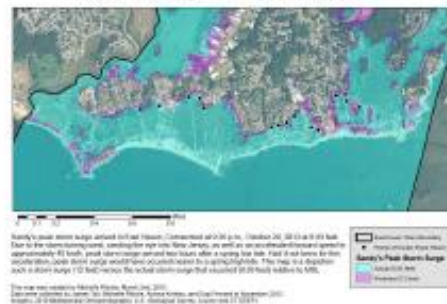


Felicia Gougeon and Michelle Ritchie surveying in East Haven, Connecticut.

Cozy Beach Avenue, East Haven
Road Elevation Relative to MSL



Superstorm Sandy's Peak Storm Surge in East Haven, Connecticut:
What if it occurred after high tide instead of low tide?



The map was created by Michelle Ritchie, Binghamton University, and Felicia Gougeon, East Haven, Connecticut. The map was created using ESRI's ArcGIS software.

Conclusion

Since Connecticut's coastline is intensely urbanized and therefore, increasingly vulnerable to coastal disasters as we have seen first hand from hurricanes Irene and Sandy, it is time for societal perceptions of the coast to change in a way that incorporates scientific research being done in the area. More importantly, research results should influence policy and future decisions made about the coastline.

The research conducted in East Haven not only helps with disaster management and early warning protocols, but it clearly shows the risks of developing at the coastline. In the near future, managed retreat from the coastline in highly vulnerable areas should be explored, and further development in these regions should be strongly discouraged.

Through the work done with the Werth Center, it is our hope to educate people, particularly present and potential community members, about the implications of these storms and how we can learn from them to be well equipped in the face of future coastal disturbances.

Deer Detection in a Nature Preserve: Applying Geospatial Analysis

Alexa Sikoryak¹
Department of Geography

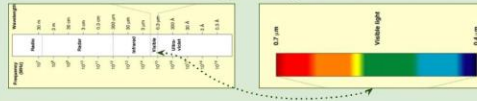
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Introduction

- Dense deer populations threaten human and environmental health, serving as vectors of Lyme disease and destroyers of the forest understorey.
- Obtaining a population estimate is vital to manage deer impact.
- Use of applied geospatial techniques can assist in assessing deer populations at a reduced cost to Binghamton University.
- Purpose: to determine if pairing UAVs, ground surveillance, and thermal cameras can produce a deer population estimate.**

Electromagnetic Spectrum



Study Area

- Binghamton University nature preserve was established in 1969 as a protected designated area for recreational and instructional use.
- Located near a large urban population, contains a sizeable known deer population, and campus resources provide the technology for thermographic aerial surveillance.
- 20 tax parcels over 182 acres varying in size, grade, and deer density.
- Owned by Binghamton University and associated State agencies.
- Dense tree canopy and thick vegetative cover, leading researchers to utilize thermal imaging and UAVs during the winter.
- Densest deer populations in the winter are found in edge habitats at lower elevations, with gentle slopes, and close to human habitation.

Areas of Interest



Methodology

- Map tax parcels and trails owned by Binghamton University.
- Map cross sectional diagrams of parcels to illustrate gradient.
- Ground level reconnaissance utilizing winter snow-cover to estimate deer density by geocoding location of tracks, droppings, and animal sightings.
- Collected ground level thermal images (Flir One for iOS 80x60 resolution) and panchromatic images of deer, tracks, and droppings.
- Ground level thermal images to obtain thermal signature of deer.
- Used thermal signature of deer to calibrate UAV thermal camera.
- Prioritize overflights in areas with the densest population.
- Created flight plans to capture both still photos and videos.
- Performed flights to test the effectiveness of Zenmuse XT infrared camera (640/30 FPS) and low light camera (1920 x 1080p / 30 FPS).
- Used Drone2Map software to process images for detection of deer.
- Created story map to illustrate findings.

Literature Review

- Different species in the same area led to difficulties identifying animals, especially white tailed deer.³
- Population density for population management.³
- Detecting wildlife in agricultural fields.⁴
- Far red/near infrared wavelengths most effective for detecting mule deer; detection error minimized by snow cover.²
- Combining RGB and TIR spectral bands produced the most accurate deer count; low thermal contrast between air temperature and deer reduced accuracy.⁶
- Air temperature below thermal signature of deer (70°F), snow cover on ground, and lack of vegetation are optimal conditions.⁷

Conceptual Framework

Deer Identification

Environmental Factors	Technology	Human Spatial Factors
<ul style="list-style-type: none">vegetationanimal behaviorsnowcoverweather limitations	<ul style="list-style-type: none">UAV/Dronethermal cameras	<ul style="list-style-type: none">people as a food sourceedge habitats

Hypothesis

- UAV overflights/ground surveillance paired with thermal cameras are viable strategies to obtain deer population density in the Binghamton University nature preserve.

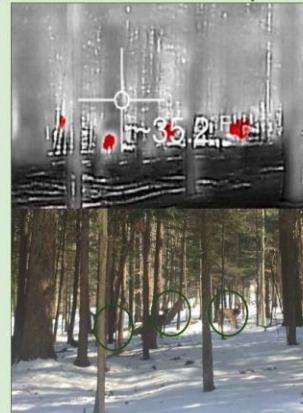
Results and Analysis

Tax Parcels, Topography, & Geocoded Deer Density Determined by Ground Surveillance

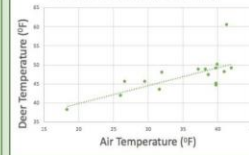


- Approximately 400 signs of deer (tracks/droppings/sightings) were recorded through ground level surveillance in the tax parcel located closest to campus.
- The most remote tax parcel at the highest elevation in the nature preserve contained only 9 signs of deer.
- Snow cover aided ground detection of deer, tracks, and droppings.
- Lack of snow or muddy conditions made detection extremely difficult.
- Use of FlirOne thermal camera concluded that thermal signature of deer follows a near linear trend based on air temperature.
- Inclement weather inhibited collection of aerial and ground data.
- The drone's thermal camera detected heat signatures at an altitude of 150 feet.
- The low light, high resolution camera proved to be most effective in identification of objects on the ground.
- Varying tree height and changes in elevation created hazardous flying situations.
- Drone battery life was reduced by cold weather, limiting flight times.
- Litchi's 100 waypoint maximum restricts the total area and the number of pictures that can be collected during each flight.
- <https://arcg.is/DH1Kq>

Ground Level Thermal/Panchromatic Comparison



Thermal Signature of Deer



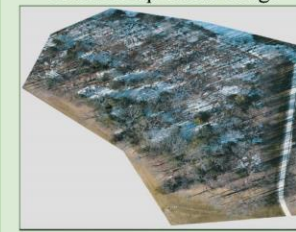
Aerial Thermal/Panchromatic Comparison



Litchi Flight Plan



Drone2Map Aerial Image



Conclusions

- Densest deer populations are found closest to human habitation and at lower elevations.
- Inclement weather (precipitation and high wind speeds) prevented ground level reconnaissance and UAV overflights.
- Ideal conditions for data collection include dry days with snow cover on ground, low wind speed, and below freezing temperatures.
- Extreme caution must be taken when flying drones over the tree canopy.
- Low light and standard cameras were more effective when identifying objects from the air.
- Thermal cameras and ground observation were more effective when identifying deer on the ground.
- Battery life of the UAV and Federal Aviation Administration's restrictions imposed on Drone users limited area surveyed during each flight.

Future Research

- Future research using collected data will include more UAV overflights to determine deer density from the air.
- Calibration of the drone's thermal camera using thermal signature of the deer will increase chances of detection.
- Utilizing high resolution Zenmuse XT thermal camera and flying during times of low light (early morning or late evening) may aid identification of deer with thermal cameras.

Credits

- Michael Davis assisted with an earlier form of the proposal.
- Geography 307D assisted with the collection of ground level thermal images of deer.
- L.P. Chertov, et al. "WILDLIFE MITIGATION USING REMOTE SENSING (UNMANNED AERIAL VEHICLE AND THERMAL INFRARED IMAGING ACQUIRED FROM AN UNMANNED AERIAL VEHICLE (UAV))." *The International Archives of the Photogrammetry*, 2015, pp. 241-248.
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Abstract

Compared to the years 1976-2007, Oklahoma has experienced a 40-fold increase from 2008-2013². These earthquakes are associated with Underground Injection Control (UIC) Class II wells, which inject chemically treated water into porous subsurface rock formations¹. Oklahoma has been particularly affected by these disposals: prior to 2008, OK experienced about one earthquake (M>3) per year, however, after 2008, the state saw hundreds of earthquakes per year as a result of increased wastewater disposal⁵. Using logistic regression, we took a statistical approach, similar to hydrogeological modeling, to project a probabilistic output for earthquake occurrence.

Model Parameters

Table 1: List of parameters inputted into the model and a description of their effect on causing earthquakes.

Rate of injection (barrels per month)	High rate injection wells are more likely to be associated with induced seismicity than lower rate injection wells. ⁴	Pressure of injection	Similar to injection rate, high pressure injections cause more distress and are more likely to result in seismicity. ⁴
Injection well distance to basement	Seismic moments are strongly correlated with the proximity of injection to the crystalline basement. ⁴	Injection well drilled to basement	In wells drilled to the basement, wastewater is injected directly into the basement, reducing effective stress and possibly causing fault slip. ⁴
Well distance to faults	For an earthquake to occur, a fault needs to be reached an activated. Therefore, wells closer to faults are more likely to set off an earthquake. ⁶	Likelihood of fault slip relative to injection well	Since faults need to be activated for an earthquake to occur, wells located near faults that are likely to slip are more likely to cause earthquakes. ⁶
Earthquake distance to faults	Earthquakes that occur in close proximity to other fault lines are capable of reactivating faults and causing them to slip. ⁶	Likelihood of fault slip relative to earthquake	If an earthquake occurs near a fault that is likely to slip, a higher magnitude earthquake may follow as a result of fault slip. ⁶

Output Equation = 1.54537 -1.50029 ED_earth.to.fault+ 0.05781 EA_earth.to.fault+ 4.67922 BBLs.month+ 2.27404 Pressure -7.81624 inj.dist.to.basement -4.45288 ED_inj.to.fault+ 0.11057 EA_inj.to.fault+ 0.40077 In_bedrock_Y.N

Regression Analysis

Parameter	Coefficients	Std. Error	t-value	Pr(> t)
(Intercept)	1.54537	0.10357	14.921	<2e-16 ***
BBLs.month	4.67922	0.13430	34.841	<2e-16
ED_inj.to.fault	-4.45288	0.14971	-29.742	<2e-16
Inj.dist.to.basement	-7.81624	0.29308	-26.669	<2e-16
In_bedrock_Y.N	0.40077	0.03887	10.311	<2e-16
ED_earth.to.fault	-1.50029	0.21362	-7.023	2.17e-12
Pressure	2.27404	0.10221	22.249	<2e-16
EA_earth.to.fault	0.05781	0.04992	1.158	0.2468
EA_inj.to.fault	0.11057	0.05190	2.131	0.0331

Null deviance: 36217 on 28711 degrees of freedom. Residual deviance: 26167 on 28703 degrees of freedom.

Table 2. Parameters are ordered from greatest impact on earthquakes to least.. EA_ earthquake.to. fault* is not significant ($\alpha > 0.05$).

Methodology

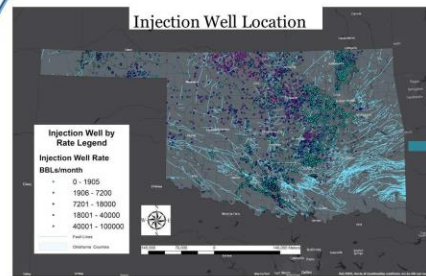


Figure 1: High rate injection wells are located to the north of the state, while low rate wells are toward the east.

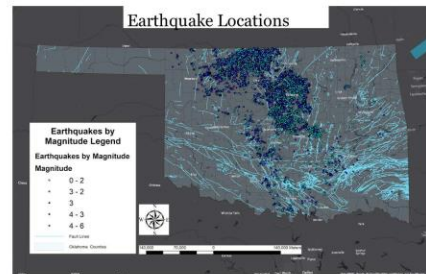


Figure 2: Earthquakes are located in similar areas to injection wells rather than on the fault lines. This indicates a correlation between the two.

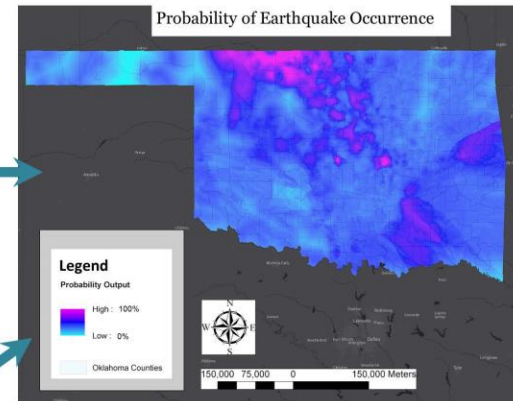


Figure 3: Future earthquakes are statistically most likely to occur in the purple regions, and least likely in the light blue regions.

Model Validation

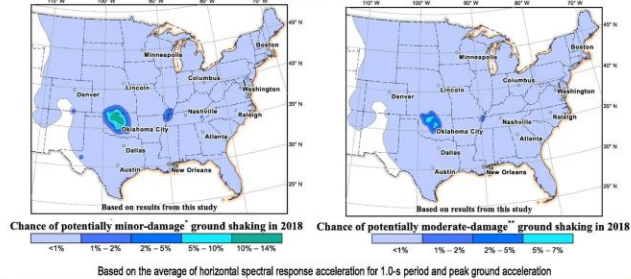
Random Points:
Mean: 0.3534
St.Dev: 0.1061

P-value<0.0001
The chance of seeing this difference in values is less than 0.01%

Test Data:
Mean: 0.4679
St.Dev: 0.1180

Compare to Other Models

2018 One-Year Seismic Hazard for Oklahoma (adapted from the USGS)³



Based on the average of horizontal spectral response acceleration for 1.0-s period and peak ground acceleration

Conclusions and Future Work

- ❖ The Probability Output map shows much more clearly defined regions of high and low probability than the USGS Hazard Map
- ❖ Of all the parameters, rate of wastewater injection (BBLs/month) correlated most strongly with causing earthquakes
- ❖ Some parameters were left out of the model and will be investigated in the future. These include:
 - Cumulative volume (BBLs)
 - Spatial/Temporal Clustering of Past Earthquakes
 - Porosity and Permeability of Lithology

*This model works under the assumptions of Binomial Distribution and Interpolation

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The Incidence of Lyme Disease and the Use of the Acaricide, Cyromazine, Across New York State

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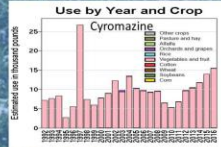
State University of New York

Abstract

Pesticide use aimed at arachnids, known as acaricides, are used in agricultural and lawn applications across the U.S. R Programming was used to analyze a list of acaricides. Spearman's Test found a statistically significant correlation between Cyromazine and the incidence of Lyme disease in New York state. The Kruskal-Wallis test revealed that there is a difference between the medians of the Cyromazine sample data as well as the Lyme disease data for the four years tested. Acaricide resistance genes have been documented in ticks as well as other arachnids and insects. Given the world's growing population and increasing need for arable land, the subsequent use and effect of acaricides like Cyromazine need to be researched to determine their risks.

Introduction

Although Lyme disease has been heavily researched, the bacteria continues to spread. Given the risk of Lyme disease to human health, the less than optimal treatments, and the escalating virulence, this health concern is growing into a crisis. Pesticide use aimed at arachnids, known as acaricides, have been used in agricultural and lawn applications across the U.S. The question of whether acaricide resistance is correlated with Lyme disease is addressed here. Pesticide resistance has been documented in cattle ticks with the development of a new gene in response to frequent applications in agricultural conditions. The spatial aspects of acaricide resistance could provide another dimension to Lyme disease research and acaricide use.



Cyromazine, an acaricide used in poultry cages and fruit/vegetable crops is used across New York. It is a growth regulator which affects the nervous system of insects and arachnids.

Methodology

R Programming was used to analyze an existing stratified random sample of acaricides (kg) and Lyme disease data. Cyromazine was found to be correlated with the incidence of Lyme disease across New York. A nonparametric analysis was performed using Spearman's correlation test and Kruskal-Wallis Rank and Sum test.

The following hypotheses were tested:

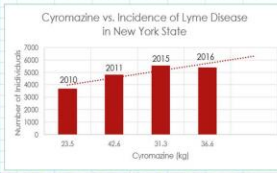
H_0 : There is no correlation between the use of Cyromazine and the incidence of Lyme disease in NY Counties.

H_1 : There is a correlation between the use of Cyromazine and the incidence of Lyme disease in New York Counties.

Spearman's Correlation (r_s) Cyromazine (high)

Year	p-value	r_s
2010	4.65×10^{-3}	-0.35
2011	6.61×10^{-3}	0.36
2015	4.32×10^{-5}	0.50
2016	2.60×10^{-2}	0.28

With low p-values, we reject the null hypothesis, there is a statistically significant relationship between Cyromazine and the incidence of Lyme disease.



Kruskal-Wallis Rank and Sum Test

H_0 : The medians of four years of Cyromazine sample data are the same.

H_1 : The medians of four years of Cyromazine sample data are not the same.

Result: Using R Programming, a low p-value of 1.18×10^{-11} confirmed that the medians over four years of Cyromazine sample data are not the same.

H_0 : The medians of four years of Lyme disease sample data are the same.

H_1 : The medians of four years of Lyme disease sample data are not the same.

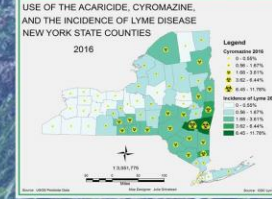
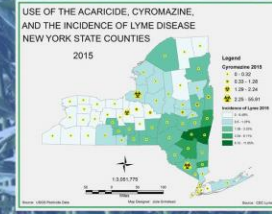
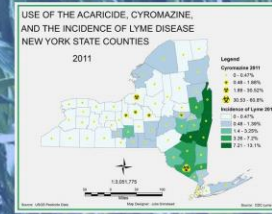
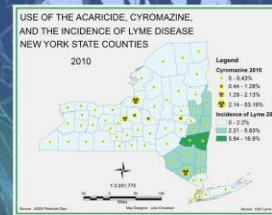
Result: Using R Programming, a low p-value of 2.2×10^{-16} was obtained confirming that the medians over four years of Cyromazine sample data are not the same. This shows that as Cyromazine use escalated, so did the incidence of Lyme disease.

Spread of Lyme disease mirrors use of Cyromazine in 2016 (compare maps below).



Results

The maps below reflect the progression of over time in which there is a statistically significant relationship between Cyromazine use and the incidence of Lyme disease.



Conclusion

The continued spread of Lyme disease continues to be a challenge. Many ecological aspects of the bacteria have been studied but its relationship to acaricide use is only starting to be understood. There are a myriad of acaricides on the market and many have been approved for agricultural use, however Cyromazine shows a statistically significant relationship with the incidence of Lyme disease across New York Counties. A coincidence? Acaricide resistance genes have been documented in ticks as well as other arachnids and insects. This resistance gene can be transmitted to offspring who never come in contact with a crop field, a house lawn, or an acaricide. Given the world's growing population and increasing need for arable land, the subsequent use and effect of acaricides like Cyromazine needs to be researched and weighed in light of its risks and benefits.



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DISTRIBUTION OF GREEN SPACE AND ENVIRONMENTAL JUSTICE IN CUYAHOGA COUNTY, OHIO

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Introduction

- ❑ Race and socio-economic status are known to greatly influence resource allocation and access.
- ❑ Most studies have shown that minority groups have less access to green space.
- ❑ Uneven distribution of green space has become serious environmental justice concern.
- ❑ Access to green space has been associated with improved health behavior.
- ❑ It is therefore important to examine where these inequalities exist and ways to overcome them.

Hypotheses

- ❑ Percent black population of census block groups will be negatively associated with proximity to green space.
- ❑ Median Income will be positively associated with proximity to green space.
- ❑ Percent black population of census block groups will be negatively associated with size of nearest green space.

Methods

Data Processing

- ❑ Linked population data to block groups boundary (n=1178)
- ❑ Manually digitized park access points (n=547).
- ❑ Calculated mean center of census block groups.
- ❑ Measured the distance (miles) from mean center to nearest park access point.

Statistical Analysis

- ❑ Performed linear regression analysis between dependent and explanatory variables – R software.

Explanatory variable	Dependent variables
Percent black population	○ distance to nearest park
Median Income	○ Park size

GIS Mapping

- ❑ Mapped spatial distribution of percent black population, median income and green space size.



Digitized park access points

Study Area: Cuyahoga County, Ohio

- ❑ Cuyahoga county is one of the hyper segregated counties in Ohio state and US.
- ❑ High segregation is attributed to racial and social exclusion policies in the 19th and 20th centuries.
- ❑ 63.6% white, 29.7% black or African American, 2.6% Asian, 4.8% Hispanic or Latino.
- ❑ Minority and low-income residents are concentrated around Cleveland city.
- ❑ Poor health outcome in the county has been associated with racial segregation and income inequality.

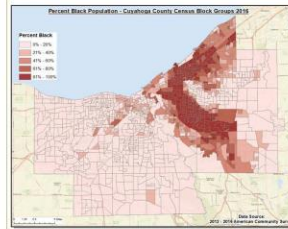


Figure 1.



Figure 2.

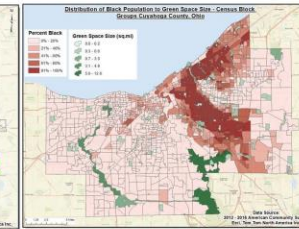


Figure 3.

Results

Multiple Linear Regression for proximity to green space

Explanatory Variable	Coefficient - Slope	P - Value
Percent black population	- 2.840e-03	3.26e-06 ***
Median Income	1.017e-05	1.68e-4 ***

- ❑ P – Value indicates a statistically significant relationship between percent the dependent and independent variables.
- ❑ Coefficient for black population indicates that for every 1% increase in black population there is a -0.0043 decrease in distance to park.
- ❑ Coefficient for median income indicates that for every 1% increase in median income there is 1.017e-05 increase in distance to park.
- ❑ Accept the hypotheses that percent black population is negatively associated with proximity to green space and median income is positively associated with proximity to green space in Cuyahoga county.

Simple Linear Regression for size of nearest park

Explanatory Variable	Coefficient - Slope	P - Value
Percent black population	-0.0142	1.35e-07 ***

- ❑ P – Value indicates a statistically significant relationship between percent black population and park size.
- ❑ Coefficient indicates that for every 1% increase in black population there is a -0.0142 decrease in size of nearest green space.
- ❑ Thus as black population increase in a census block group, size of green space consequently decreases.
- ❑ Accept the hypothesis that percent black population of census block groups is negatively associated with size of nearest green space.

Discussion & Implications

- ❑ Relationship between proximity to green space and black population in Cuyahoga county deviates from findings of most studies on green space accessibility and environmental justice.
- ❑ Results indicates close proximity between black block groups and green space location.
- ❑ This can be attributed to Cleveland's "Greenway Plan".
- ❑ Relationship between median income and proximity to green space on the other hand correlates with most existing literature.
- ❑ Relationship between park size and the location of blacks in the county also correlates with most existing literature.
- ❑ Black block groups have relatively smaller park size ranging between 0.16 and 0.55 square miles as seen in figure 3.

Conclusion and Future Studies

- ❑ Though high percentage of black population lives in close proximity to green space in Cuyahoga county, size of these green spaces are relatively small.
- ❑ Future studies should consider other explanatory variables like, population density, unemployment rate and educational attainment.
- ❑ Also is the need to examine the relationship between park proximity and health outcomes in these black block groups.
- ❑ Future studies should also examine the rate of park usage in these black block groups.

Acknowledgment

- ❑ Prof. Louisa M. Holmes

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547 Park access points

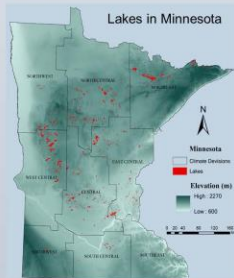


Introduction

- Lake ecosystems are crucial resources for aquatic wildlife and human being.
- Global climate change has begun to affect lake ecosystems.
- Understanding how climate change affects lakes is essential for managing water resource and the associated ecosystem services
- Few studies examined the relationship between lake level variations and climatic variables.
- Spatial and temporal similarity of lakes in Minnesota still unclear. Thus, it is questionable whether the lakes in Minnesota have spatial-temporal heterogeneity.

Study Area

- Minnesota is located in the northern regions of the United States.
- The region possesses numerous lakes and 11842 lakes over 10 acres.
- Lowest temperature usually in February, whereas the highest in July.
- The climate over the state is different featured by spatial heterogeneity. Thus, lakes in the different regions show distinctive responses to the climate.



Data

Lake Area Data

Extracted from water frequency map

Lake Level Data

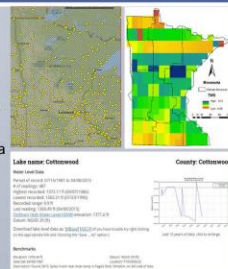
Daily reading on lake gauge

Meteorological Data

Monthly weather station data

Water Storage Data

GRACE mission were launched in March 2002 under the NASA earth system science Pathfinder program



Methods

Cluster Analysis – k-means

- Lake level changing for the cases assigned to the same cluster tend to be more similar than those in different clusters.

Mann-Kendall Test

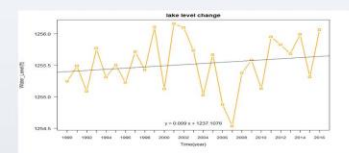
- Detecting the monotonic trends in time series hydro-climatic data.
- Kendall rank correlation coefficient is used to evaluate the relationship between two measure quantities.

Linear Regression

- Fitting a linear simple regression equation.
- Testing the statistical significance of the regression equation by the t-test

Datasets processing

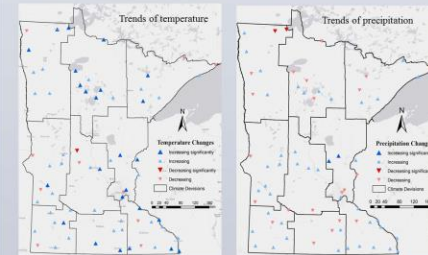
- Meteorological data were collected from meteorological stations in Minnesota and calculated as monthly and yearly data.
- The lake area data were derived from water frequency map by using 1% as a threshold.



Results

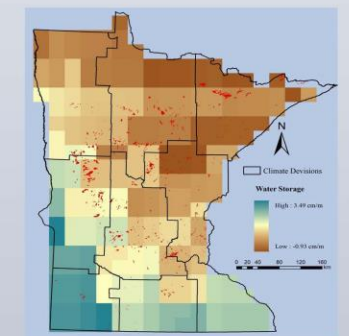
1. Trends of climate change

- Temperature increased in most areas of Minnesota and some gauge stations showed significant increasing trend.
- Most of the south area experienced decreased precipitation.



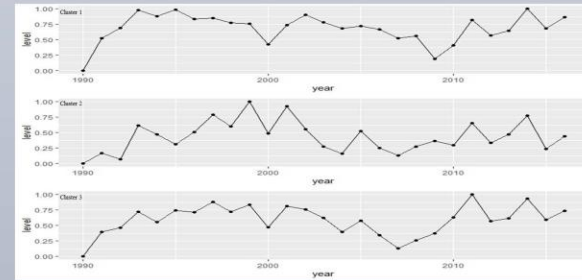
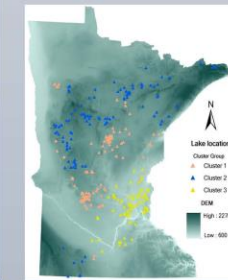
2. Water storage changes and lake-level variations

- Time-series of GRACE-observed mean water storage in 2009 over different cluster of lakes. The northeastern area experienced the decreased water storage.



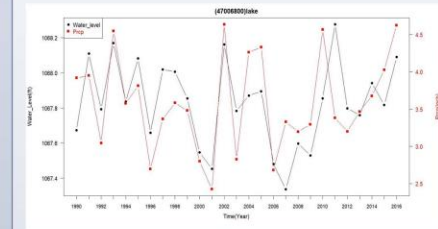
3. Cluster analysis on water level change

- 233 examined lakes are divided into three clusters.
- Each lake level variation was calculate by averaging the water level variations for all lakes in the same cluster.



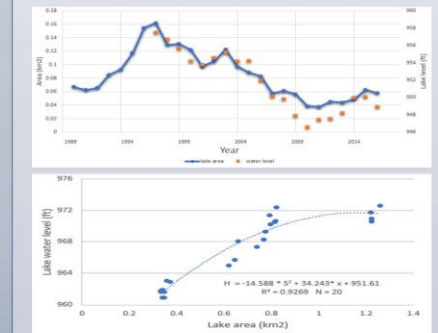
4. Relationship between lake level and precipitation

- Some lakes are sensitive to fluctuations in rainfall amounts.



5. Relationship between lake level and lake area

- The relationship between water level and lake area of Plaisted lake from 1990 to 2016.
- Correlation analysis of 20 data point pairs on lake level and lake area.



Conclusion

- Cluster analysis method based on lake level variation and the lake level changes are affected by geographic factors as well as geological materials. Thus not all lakes within one group are spatially clustering, with some lakes scattering-distributed.
- The abrupt lake-level changes were associated with change in climate conditions, especially under the high precipitation and low temperature.
- Considering the more climatic variables, for example evaporation, soil moisture, and glacier melting, and anthropogenic factors.

Reference

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THE EFFECTS OF SMOKING ON HUMAN HEALTH IN WEST VIRGINIA STATE.

Winnie Ngare,

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INTRODUCTION AND BACKGROUND

- Tobacco smoking ranks as the top preventable cause of disease and premature death.
- West Virginia ranks as the top state in tobacco use with a 26.7% smoking prevalence compared to the nationwide smoking prevalence of 17.4%.
- About 440,000 people die per year as a result of smoking.
- People with low income and education tend to smoke more.
- Smoking is the leading cause of respiratory disease, cancer and cardiovascular disease.

METHODS.

- ✓ Census data from the NHGIS website along with health data from West Virginia department of health and human resource.
- ✓ Used Arc map tool, a GIS, to map the data.
- ✓ Ran a regression model to test the significance of the results.
- ✓ Used Maps and plots to display results.

Primary explanatory factors.

- ✓ Low birthweight, poor health, potential years of life lost and mental health.

Other factors

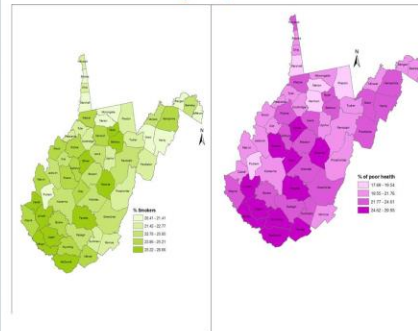
graduation rate and income inequality.

HYPOTHESES.

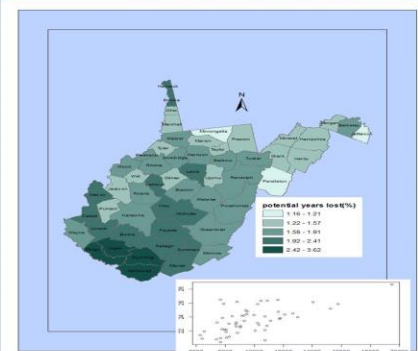
1. Low birthweight is positively related to smoking.
2. Poor / fair health is positively related to smoking.
3. Potential years of life lost is positively related to smoking.
4. Poor mental health is positively related to smoking.

RESULTS.

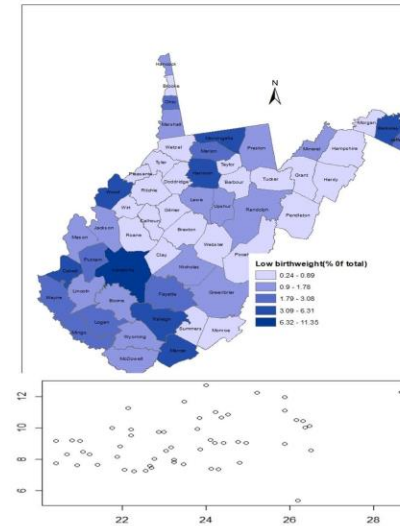
Tobacco smoking and poor/fair health.



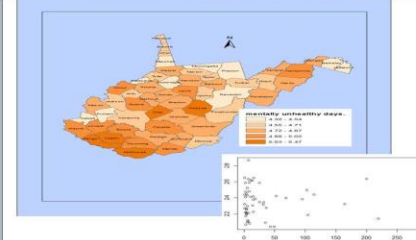
Years of potential life lost and smoking.



Lower birth weight and smoking.

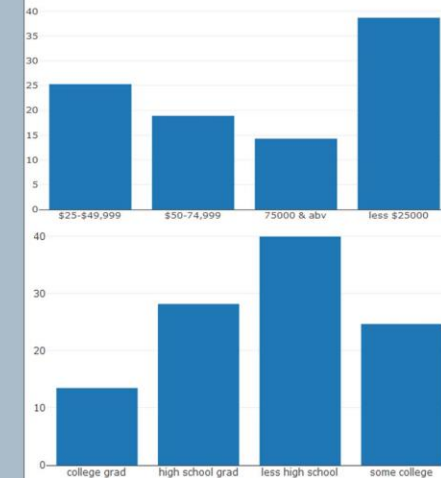


Mentally unhealthy days and smoking.



- Poor health is positively related to smoking.
- The average potential years of life lost by smokers increases with an increase in tobacco use.
- Tobacco smoking is positively associated with lower birth weight.
- There is no strong relationship between smoking and mental health.

People with little income and education are likely to smoke more than those with higher income and education.



DISCUSSIONS

- Smoking prevalence exhibits a spatial trend in West Virginia. It shows huge variations in tobacco effects across counties.
- The covariates reveal an inequality gap in income and education across counties.

RECOMMENDATIONS.

- Effective policies to address poverty in heavy smoking counties.
- Incentives to encourage higher learning.
- Creating awareness about the harmful effects of tobacco smoking.

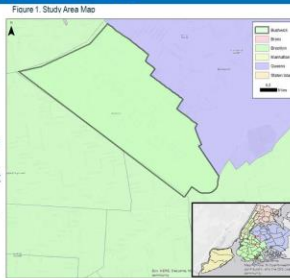
Introduction

Background and Purpose

- During the 1950's there was a high amount of middle class families moving out of New York City to the suburbs taking their income with them. As a result, the inner cities were left with low income families that were unable to maintain city value.
- Creative Classes have created a new urban atmosphere around the world that has changed the way urban policy is created and maintained in a variety of ways.
- The term "creative class" refers to pioneers of the artist gentrification movement, the starving artists that focus on a bohemian lifestyle. This should not be confused with "hipsters", who are essentially the "piggybackers" of artist movement gentrification. Typically this group moves into the gentrified neighborhood after changes are made and popularity spikes. While the artists came into any area with little money, this group has a cushion of money.
- As the artist movement grows, the communities become popular and well known, typically with those of a different class than the neighborhood.
- The Bushwick Collective is committed to showcasing art on the buildings in Brooklyn, creating a more hip environment. Artists create pieces, potentially tag their information, and leave for others to enjoy/expand.
- While this new concept of design is shaping a sense of place in area, there are some critiques of it such as, is this neighborhood idea sustainable?
- It also raises the question of how does this affect the existing community?

Study Area and Context

- The Study area is Brooklyn, specifically looking at the neighborhood of Bushwick.
- Many different forms of gentrification have occurred in the boroughs including but not limited to race, age (college students) and immigrant gentrification
- Creative class gentrification is a newer form that originated in Greenwich Village, however most people see SoHo as the start of creative class gentrification
- There are many reasons why these people choose to live in the selected neighborhoods:
 - cheap rent
 - high loft ceilings
 - bright lights
 - "Industrial chic" scene
- Bushwick is an area that has been known to be poverty stricken with an "intense" background.
- Historically it has been known to be a more Hispanic neighborhood.
- The neighborhood has suffered and been destroyed.
- Now various pieces have shown up in select area combating the graffiti

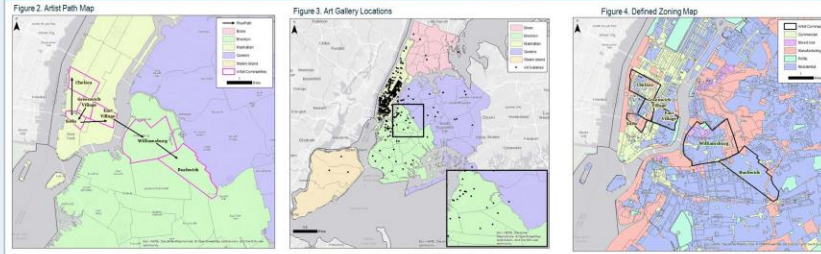


Hypothesis

- H1 - Street art and art galleries locations can influence the changes in poverty, rental rates, and demographics.
 H01 - Street art and art galleries locations cannot influence the changes in poverty, rental rates, and demographics.
 H2 - Social media can act as an indicator of gentrifying neighborhoods.
 H02 - Social media cannot act as an indicator of gentrifying neighborhoods.
 H3 - Street art creates stressors for original inhabitants affecting their future well-being
 H03 - Street art does not create stressors for original inhabitants



Background Maps

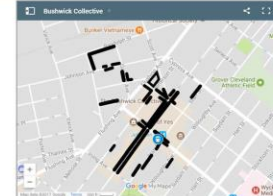
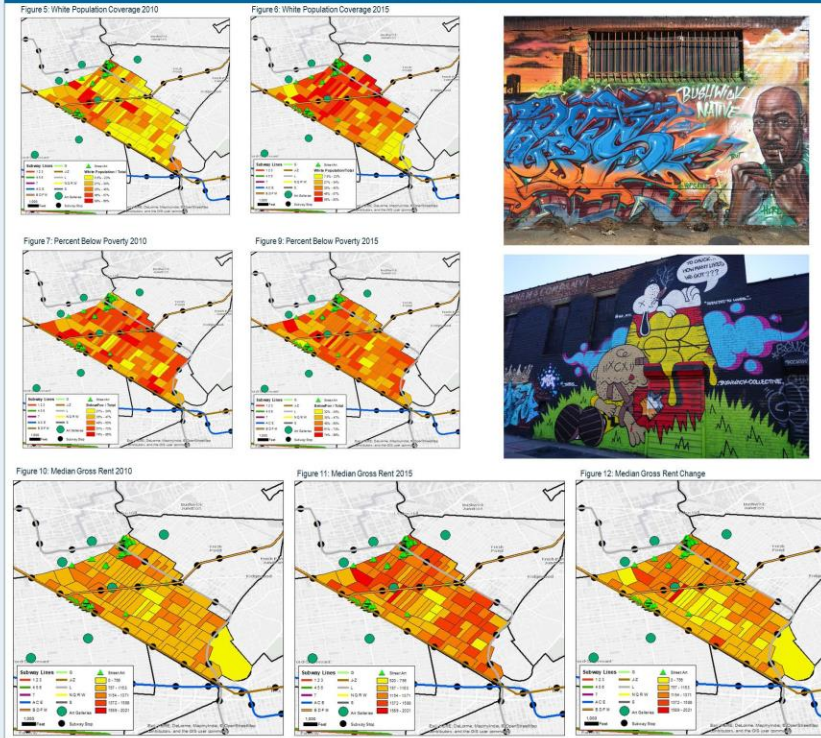


This is the path of artists since the 1950s. Starting from Greenwich Village, artists moved into SoHo during the 1950s/1970s. Then were pushed out to the East Village due to increasing rent rates in the 1970s/1980s. People from SoHo also moved to West Chelsea in the 1980s/1990s. People from the East Village moved out to Williamsburg in the 1990s and then to Bushwick in the 2000s.

Art galleries are very popular throughout Manhattan but are contained to various neighborhoods. This map is able to show that there is a high number of galleries in the neighborhoods being studied.

The data here defines specified zones all over New York City. Note that "Mixed Use" refers to an area that is both Residential and Manufacturing.

Results



The Bushwick Collective has been a major contributor to art in Bushwick. The map above shows a map of a walking tour around the neighborhood bringing tourists from all over to Bushwick. Along the trail you can see a collection of different pieces whether it being a political message or just aesthetically pleasing. Artists are not just Bushwick based, some come from different countries just to create a piece in Bushwick. The art, while at some points amazing, do not show the full spirit and culture of the people of Bushwick.

Methodology

- Gather hot spot zones
- Show clusters of street art
- Show locations of art galleries
- Show the different zoning areas of NYC in terms of relative expansion and zone designation
- Calculate poverty level of census block groups based on New York City standards
- Calculate the differences between rental rates
- Gather gentrifying data
- Determine what factors are considered to be a stressor
- Use Google Earth and CANVS app to identify street art locations with historical data
- Locate movement amongst a demographic

Conclusions

While stressors to individuals are subjective, I believe that my results of a group demographic, poverty changes, and rental rate changes in specified areas can contribute to a stressful environment. Undergoing dramatic change is not easy especially with a quick turnover. Bushwick itself is still fighting, graffiti versus street art. The results show that it is possible to have concentrations around street art and art galleries. The question is how much impact. Additionally, it is interesting to note that you can see changes along the subway lines as well, something that I was not testing for. Overall these detections although a small analysis, it can definitely that this neighborhood is going through transition. Just like Williamsburg before it, people are now getting drawn into these once crime ridden neighborhoods for the hip, art, bohemian culture. People do forget however how neighborhoods shaped their culture to begin with. I'd like to develop further on this topic by adding in more material as listed below.

Recommendations

- Go through art galleries file to redetect accuracy
- Get more in-person data such as GPS coordinates of different art
- Interview artists and residents to find out their perspectives
- Account for other factors in the analysis
- Try to contact CANVS again for their copy of street art data
- Get graffiti/tag locations to compare to street art
- Photograph street art pieces and graffiti
- Extract data from Instagram about these art pieces

