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Assessing the distribution of environmental stewardship organizations and their relationship to the demographics of Los Angeles County

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by

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ASSESSING THE DISTRIBUTION OF ENVIRONMENTAL STEWARDSHIP ORGANIZATIONS AND THEIR RELATIONSHIP TO THE DEMOGRAPHICS OF LOS ANGELES COUNTY

By

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Abstract

An equal distribution of environmental stewardship organizations across the urban landscape provides an environment that facilitates community empowerment. The systemic issues found in Los Angeles County play an important role in the social development of the area. Through the utilization of modern technology and geographical mapping software, spatial distribution of environmental stewardship organizations provided an understanding of social conditions within Los Angeles County. Environmental stewardship organizations provide the capability for communities to be more engaged in helping to eliminate environmental injustice. The comparison of minority populations at the census tract-level emphasizes the importance of connecting environmental stewardship organizations with their target community at a static level of measurement. The assistance of the geographical mapping software provided the capability of conducting spatial autocorrelation, drawing the conclusion that environmental stewardship organizations are not equally distributed across Los Angeles County. The needs of the community continue to expand into different areas requiring an improvement to be made in order to improve the quality of life in various neighborhoods and the insurance of environmental equity. Currently it is difficult for organizations to cohesively work with one another to maximize their overlapping resources that would benefit the communities they provide environmental services to.

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Chapter 1: Introduction

Purpose and Significance of Study

Equal distribution of environmental stewardship organizations across the urban landscape provides the environment that facilitates community empowerment. Through consistent engagements, environmental stewardship organizations provide the capability for communities to be more engaged in helping to eliminate environmental injustice. Studies have shown that those who live in underdeveloped and impoverished areas where there is a high rate of pollution and toxic waste occurring tend to be of minority or non-white populations (Ohar 2016). Los Angeles has one of the highest minority populations in the United States with many of the people living under environmental pollutions and receiving little to no help or support (Ohar 2016). Los Angeles County provides a landscape where citizen scientists, interested community members, and active environmental stewardship organizations have the ability to exchange knowledge and collaborate with one another in order to change the social norm.

Environmental stewardship organizations (ESOs) are groups or organizations that provide ecosystem services (ES). In this case, ESOs manage nature in cities that are multifunctional and draw on an already existing appreciation of nature that builds upon the awareness of the broader suite of ES. They assist to embed multifunctional ecosystems and the services that they generate in urban areas and its occupants, while at the same time providing a link between the people and the environment (Andersson et al. 2014). ESOs conserve, manage, care for, monitor, advocate for, and educate the public about local environments whose activities may have participated in but is not limited to the restoration of wetlands, advocating

against toxics, promoting recycling, gardening in a schoolyard, cleaning up a vacant lot, or many other kinds of activities (STEW-MAP Survey). They interact with both natural resources and social systems taking on intensive heterogeneity in order to provide urban environmental security (Romolini et al. 2013; Svendsen 2010).

Environmentalism has shifted the mindset from "Not In My BackYard" (NIMBY) and environmental justice organizations proactively manage sections of the landscape and plan for sustainability to being stewards of the local environment and actively practicing sustainability and resilience (Svendsen and Campbell 2008; Grove and Burch 1997; Dalton 2001; Agyeman and Evans 2003). Urban areas are increasingly becoming the main focus of urbanization and cities in the United States have become home to 82% of the US population (World Bank 2016). With populations projected to increase in urban areas, impacts of human activities are causing major challenges in addressing the concerns of securing the long-term quality of life for people within cities (Andersson et al. 2014). The landscape and social conditions of a megacity has been able to provide ESOs a different avenue of approach of stewardship in cities (Romolini et al. 2013). With the renewed interest and awareness within the cityscape on subjects such as social, political, and economic significance due to the loss of population, power, and economic strength, ESOs play a key role in society that strengthen the capacity to participate in a vigorous and effective manner (Grove and Burch 1997; Clayton et al. 2000).

This study was conducted as part of the Stewardship Mapping and Assessment Project (STEW-MAP), a national program in partnership with the United States Department of Agriculture (USDA) Forest Service that aims to develop a better understanding of ESOs. Findings from these studies may provide these areas with information that may be used to improve

networks, facilitate an organizations' ability to connect more easily, collaborate, or receive funding when necessary. As the network of information grows with each city that participates; a more complete picture develops of how information, funding, and collaboration flows among ESOs in a city or region. The research shows that network structures vary widely, and that these variations can impact network effectiveness and the relationships between network structures and on-the-ground measures of effectiveness, or outcomes (Romolini et el. 2013; Provan and Milward 2001). Providing a visual aid in mapping the network structures has been proven in areas like New York to be an effective measure in impacting network effectiveness.

Historically, mapping has been an underutilized tool. It is by far one of the most powerful tools that is available and easily accessible with modern technology. Maps wield a power helping to define and represent what is on the surface of Earth (Appe 2013). With today's modern technology, maps are able to provide immediate information regarding almost any geographic topic that we can think of.

The USDA Forest Service has taken an interest in understanding the importance of urban ESOs actors as the landscape of the United States has made a dramatic shift from being primarily wildland and rural landscape to urban and metropolitan areas (Romolini et al. 2013) over the last century. Historically, urban areas were once rare and special places that provided a particular habitat for a small portion of humans (Grove and Burch 1997), have now become the thriving global economic centers that society has come to understand today.

Research Problem

Providing immediate information through visual story telling is an underutilized tool. Through the utilization of modern technology and geographical mapping software, spatial

distribution of ESOs provide an understanding of social conditions within an area. Comparing minority populations at the census tract-level helps to emphasize the importance of connecting ESOs with their target community. A conduction of the dense settlement patterns, information flow, and social innovation allows for urban areas to become a source of environmental solution (Svendsen et al. 2016). The immediate information that digital maps are able to provide will allow for a benchmark to be established of the interests and social development within the communities and the characterization of ESOs in Los Angeles County.

With the assistance of the maps, the County of Los Angeles may be able to assess the organizational structure and geographic distribution of an office location to field sites and indicating a positive or negative influence with the targeted community. The comprehensive information gathered may be shared through a platform that may provide assistance to the general public who are interested in knowing the groups, organizations, projects that may be conducted within an organization's stewardship boundary. The geographic data displays the polygons of stewardship boundaries of ESOs that are important for coordinating management of open spaces and the delivery of ecosystem services from natural areas (Svendsen et al. 2016).

Cities have begun shifting the paradigm of traditional thought of continuing to do business as usual to a process of mitigating and developing resilient practices for a sustainable future. Communities have become empowered to be a part of the change that is happening.

Definitions

1. Urbanization - The increasing number of people that live in urban areas
2. Urban area - Urban areas are ecosystems with interdependent resources and flows that are no less complex than wilderness or forested ecosystems
3. Urban clusters - Densely developed territory, and encompass residential, commercial, and other non-residential land uses of 2,500 and less than 50,000 people
4. Urban resilience - The ability of an urban system - and all its constituent soci-ecological and socio-technical networks across temporal and spatial scales - to maintain or rapidly return to desired functions in the face of a disturbance, to adapt to change, and to quickly transform systems that limit current or future adaptive capacity.
5. Stew-MAP - Stewardship Mapping and Assessment Project
6. Stewardship group - A group or civic organization that works to conserve, manage, advocate for, and/or educate the public about their local environment
7. CSOs - Civic society organizations
8. ES - Environmental services
9. ESO - Environmental stewardship organizations conserve, manage, monitor, and advocate and/or educate the public about their local environment
10. CES - Civic ecosystem services that manage nature in cities for multifunctional and draw on an already existing appreciation of nature that builds upon the awareness of the broader suite of ES and help embed multifunctional ecosystems and the services that they generate in urban areas and its occupants, while at the same time providing a link between the people and the environment
11. Civil society - Ideal to be achieved and the ideal work of NGOs, intergovernmental agencies, and other organizations
12. Megacities – a very large city, typically one with population of over ten million people
13. Federal Poverty Level (FPL) - A measure of income issued every year by the Department of Health and Human Services (HHS). Federal poverty levels are used to determine your eligibility for certain programs and benefits, including savings on Marketplace health insurance, and Medicaid and CHIP coverage.
14. Poverty thresholds – original version of federal poverty measure that is updated each year by the Census Bureau that is now mainly used for statistical purposes
15. Poverty guidelines – the other version of federal poverty measure issued each year in the Federal Register by the Department of Human Health Services (HHS) that are a simplification of poverty threshold and used for administrative purposes

Chapter 2: Literature Review

Overview

As proposed in the first chapter, the aim of this study is to understand the distribution of ESOs throughout Los Angeles County. This chapter will demonstrate how urbanization has played a key role in the development of the different aspects in society, how Los Angeles's history plays an important role in its social development of today, and the importance of civic engagement through the various means is important for the vital success of communities and neighborhoods. The chapter will conclude with research questions and the scope of the study.

Literature

Climate change is posing a series of interrelated challenges to the country's most densely populated places: its cities (Cutter et al. 2014). Cities are composed of complex inter-dependent systems (Revi et al. 2014) that are also areas of social spaces with a variety of social places (Vanclay 2008) with a spatial concentration of people whose lives are organized around nonagricultural activities (Weeks 2010). The cities sit at the nexus of a growing host of challenges, but they also remain our greatest hope for change (Armstrong 2016). Urban climate adaption provides an opportunity for incremental and transformative development (Revi et al. 2014).

Urban areas hold more than half the world's population and most of its built assets and economic activities (Revi et al. 2014). The trend of urbanization has become the driving force as well as a source of development with the power to change and improve lives. It has created a divide that is less obvious between the urban-rural gradient with the fraction of humans living

in cities continues to grow as technology continues to transform human society (Weeks 2010). Urban areas plan an important role as early responders to climate change challenges and climate action opportunities as urbanization and a dependency on an extensive urban infrastructure is beginning to make an appearance in rural settings (Cutter et al. 2014; Weeks 2010). The assistance of effective local governments provides support and assistance with the cooperation of multilevel governance through the enlistment and engagement of local groups and institutions such as ESOs (Revi et al. 2014). A proper climate change adaption plan can be implemented effectively at the local level.

Adaptation to climate change in cities is a necessity and depends centrally on what is done in the urban centers (Cutter et al. 2014; Revi et al. 2014). Urban areas have and are projected to experience rapid unplanned growth in underdeveloped infrastructure that may magnify policies that are poorly implemented in addressing equality (UNDESA 2014). Local issues like this can be addressed by ESOs in developing creative solutions within the urban environment (Lobo c2016). Adaptation and resiliency of the complex inter-dependent urban systems require support and cooperation across the multilevel governance of the city that also includes ESOs (Revi et al. 2014).

Urbanization is a recent phenomenon for humans after thousands of years where early humans led nomadic lifestyles of being hunter-gatherers. Historically, the urban revolution has been marked in two historical phases (Tellier 2009; Ellis 2011). The first historical phase occurred about five thousand years ago and lasted until 1825, which was towards the tail end of the industrial revolution where the population growth went from zero percent to five percent. The second historical event occurred thereafter where global population growth in

urban areas has dramatically increased to fifty percent (Tellier 2009). This phenomenon of urbanization can be attributed to the production of surplus of storable food, a system of writing, a more complex social organization, and technological advances such as the plough, potter's wheel, loom, and metallurgy (Ellis 2011). It is a phenomenon in which polarization through which activities and people gathered first in villages then in small towns, cities, and metropolises that has become the most important and striking in world history (Tellier 2009).

The dynamics of an urban landscape has evolved as the needs of humans and technological advancements have occurred. According to Grove and Burch (1997), urbanization has brought about social changes with the increase in population density. The concentration of people with diverse backgrounds and cultural upbringing assisted in morphing the landscape of the city to evolve as the occupants' needs do not remain static. The human interaction assimilates with the built environment incorporating traditional ecological concepts with human systems.

The social identity of the community makes an appearance as the ecology of the urban landscape evolves. The development of social hierarchy contributes to the unequal access to critical resources. Social hierarchies within the human systems donate themselves as influencing the unequal access to critical resources as those who are considered to be elite and celebrated have the ability to access resources easily. Grove and Burch determined that the social dynamics that emerged in human systems predetermines the spatial patterns in how communities developed within an urban area.

Cities and urban areas are key components of global sustainability through sustainable drivers and progress achieved through innovative energy efficiency, climate action, and social

innovation. McPhearson, Andersson, Elmqyist, and Frantzeskaki (2015) point out the complex nature of interactions within the urban social-ecological systems that pose a challenge to stakeholders and decision-makers in prioritizing urban planning and policy. Yet, if urban ecosystems are made a priority by urban governance and planning; the quality, quantity, and diversity of urban ecosystem is beneficial to the urban human health and well-being as it progresses towards the path of sustainability and urban resilience. Urban ecosystems are key components to bridge planning, management, and governance as the cities move forward with their goals of resilience.

Los Angeles has not and is not immune to the racial struggles that has plagued America throughout its history. The eugenics that occurred in America as a response to globalization with the increase of non-white minorities immigrating into America has infiltrated a "fear" mindset for Angelinos that pre-date the Watts riots. Racial conflicts and underlying systemic issues were the root cause for the 1992 Los Angeles uprising and is discussed in detail by Bergsen and Herman (1998). They discuss the competition that occurs between ethnic groups that contributed to the 1992 Los Angeles Riots. As in-migration of Latinos and Asians in the epicenter of the Los Angeles uprising, South Central Los Angeles was undergoing a desegregation of black neighborhoods and is considered to be the contributor the riots.

The frustration amongst the minority population of the impoverished areas of Los Angeles from economic competition and displacement is instrumental in the development of a mindset of resentment by the competing ethnic groups. The epicenter of the 1992 LA Uprising is the same epicenter infamous for the Watts Riots. Matei and Ball-Rokeach (2005) discuss the fear that has infiltrated the epicenter of the two most infamous racial riots in Los Angeles

history. This fear is greatest to the immediate and surrounding areas of Watts, but it is a fear that has systemically spread through the mindset of most of the population of Los Angeles. Mediated or direct communication channels play a central role in the construction of Los Angeles as a mental/social artifact (Ball-Rokeach et al. 2001). However, through simple acts of engagement within the community, these networks of organized reciprocity and civic solidarity are preconditions to the hallmarks of successful region as demonstrated by Putnam (1995).

Putnam (1995) discusses the importance of civic engagement through traditional means such as voter turnout, football games, choral societies, and PTA. The success of civic engagement provides a powerful tool that demonstrates empirical evidence of the success of the quality of public life and performance of social institutions. The social bonds amongst various ethnic groups with different education attainments provides the foundation to the importance of social networks for job placement and many other economic outcomes.

Civic engagement through stewardship organizations activities have become increasingly popular and has drawn the attention of Svendsen and Campbell (2008). The organizations are comprised of formal and informal organizations and networks that range in age, size, and geography. While environmental stewardship organizations function as an intermediary between civil society, NGOs, private sector, government agencies, they have also developed a dynamic social network within the city. As researchers continue to understand their structure, function, and relationships among other stewardship groups, it is important to understand the challenges that the organizations face with inconsistent funding and a mostly volunteer operation and limited paid employees. Environmental stewardship is only a piece of

the stewardship network that contribute to the revitalization of urban ecosystems and human communities.

Structure and function of stewardship groups and organizations may vary depending on the organizations focus and purpose. Environmental stewardship ideals are integrated into various and widespread civic efforts that allow for these organizations to function as bridge-organizations as Connolly, Svendsen, Fisher, and Campbell (2013) discovered while analyzing environmental stewardship governance in New York. The complex non-linear and non-hierarchic network of the organizations allows for the civic groups to be diverse within the community-based social network that became known as “civic innovation”. The entanglement of organizations within the governance of the city, regional, and national levels provided the appearance that civic organizations were on the decline. Complex ecosystems engage civic activism to respond to non-linear ecological changes that enhance human health and well-being that improve the quality of life. The development of civic engagement theoretically improve the social-ecological functions of the urban area.

The demonstration of communication by Kawonga, Blaauw, and Fonn (2015) is key in order for networks to work effectively together. The interactions, social relations, and similarities amongst the various actors describes the type of network (eg. degree centrality, density, and/or referral) has been developed. Through the facilitation of effective communication between the various levels of actors, the fostering of information sharing and joint work allows for collaborative input. By bridging the gap in communication, the integration of policies will be successful as they are progressively implemented by decision-makers.

Understanding the communication network of an urban area is similar to understanding the dynamics of urban density. McFarlane (2016) demonstrates how the topological approach of urban density demonstrates the socio-spatial pattern that develops within the urban development. The network and pattern that develops through the redistribution of jobs morphs the network as prominent ideologies, uneven development, power relations, and design concepts in urban planning emerge. Density is dependent upon the status of other issues, spaces and actors within the urban context. A topographical analysis of density provides the visual necessary as shifts within the city occur over time. Approaching the urban network from a topological perspective allows for the socio-spatial densities disclose the network of the city.

The visual extent of organizational boundaries that a map is able to provide has the ability to tell a story according to Marshal and Stabeing (2015). Visual story telling through maps allows researchers the ability to interpret and a descriptive where boundaries spatially fall amongst one another. By mapping the boundaries of the organizations, it provides a context and a narrative that highlights the civil society relations and the diverse sets of actors that incorporate the civil society network. According to Elwood (2006), the spatial narrative are flexible neighborhoods in different ways for different audiences, projects, or arguments. Spatial knowledge as being critical in understanding the characteristics and meaning that individuals, social groups, and institutions ascribe to particular places. These spatial stories express the needs, the assets, injustices, accomplishments, and reinterpretation as visuals of the depth that community organizations contribute into their communities through knowledge and validate the activities that they do.

Warsauvsky (2013) discussed how organizational size and the consistency in funding is dependent on the organization's location and classification and key to the organizations success. Those that were found in and served lower income communities operated on a limited budget that limited its size and resources that it was able to provide to the communities that they operated in. The polar contrast between organizations that operate and serve in affluent neighborhoods in comparison to those in impoverished areas amplified the stark contrast and the inequality that was found in the area.

Model

This study was modeled and is in connection with the ongoing project of the USDA Forest Service's Stewardship Mapping and Analysis Project (STEW-Map) that has been conducted in New York, Baltimore, Seattle, and other major cities in the United States. The goal of STEW-Map is to better understand who, where, why and how environmental stewardship groups and organizations are caring for their cities' urbanized landscapes (Svendsen et al 2016). Svendsen and the STEW-Map team (2016) provide a step-by-step instructional guide in how to plan and implement a STEW-Map project. An empirical study of a city's environmental stewardship is conducted while contributing to a set of products and applications, including a national online database.

STEW-Map was designed in order to develop a social layer of information that could be gathered and shared while simultaneously developing questions with the capability that gathered and consolidated urban geographic spatial information within a single place. STEW-Map has the capability to highlight existing stewardship resources that may overlap in order to assist and strengthen a local ESOs capacity while being able to provide a tool to increase citizen

engagement to those that are interested. The STEW-Map tool may prove to be useful in recognizing areas where there may be a limited amount of resources. STEW-map is able to highlight existing gaps and overlaps in order to strengthen organizational capacities, enhance citizen monitoring, promote broader public engagement with on-the-ground environmental work, and build effective partnerships among stakeholders involved in urban sustainability (Svendsen et al 2016).

Research Question

Based on the literature of how urbanization effects the social hierarchy of communities and the importance of stewardship engagement the broad research question for this study is, "What is the distribution of environmental stewardship organizations in Los Angeles County?"

In addition to the broad research question, the following questions were also explored.

1. What is the distribution of environmental stewardship organizations in Los Angeles County?
2. Do the demographics of Los Angeles influence how the ESOs are distributed?
3. Is there a greater influence of ESOs in high minority areas in comparison to low minority areas?

The hypothesis of this study is that ESOs are not distributed equally across the landscape of Los Angeles County with a greater concentration of ESOs located in impoverished, low-income areas in comparison to the more affluent communities and neighborhoods found within the county.

Table 1
Variable names and descriptions

Variable	Variable Description
Dependent	
ESO Turfs	The number of ESOs whose turf is found within a census tract
Independent	
Population	Number of people within a census tract
Median Income	The amount that divides the income distribution into to equal halves
100% below FPL	The percent of population of individuals and families in poverty contingent to poverty guidelines

Scope of Study

Los Angeles Stew-MAP is an analysis of the environmental stewardship organizations that are found within Los Angeles County. It is significantly larger than STEW-Map land areas that have been previously studied. Baltimore and New York combined are only equivalent to ten percent of the area that was studied by LA STEW-Map. With an area of 4,084 square miles, Los Angeles provides a unique landscape to 228 incorporated and unincorporated communities found within Los Angeles County. The county developed through an urban sprawl that dispersed the density of its population across a much a larger landscape in comparison to other megacities. The vast spatial expanse allowed for growth and a culture of commuting from the suburbs to the urban economic centers with a culture that drew a variety of people to immigrate into the area. The influx in population influenced the population boom since the 1950s with Hispanics dominating the landscape over Whites in the 1980s and Asians making a notable presence in the 1990s (Grad 2017).

Table 2

Land Area comparisons of Los Angeles County to STEW-Map study areas

STEW-Map Study Area	mi^2	% of LA County
Los Angeles County	4,084	
Los Angeles City	503	12%
New York City	305	7%
Baltimore	92	2%

The spatial analytics that is captured and may be a significant contribution to the STEW-Map project may provide data that correlates the importance of understanding socio-economics with the distribution of ESOs on not just a city-scale but a county-wide analysis of a predominantly minority population whose poverty levels is nearly a fifth of the population. With environmentalism equated to social justice and civil rights (Bullard and Johnson, 2000), Los Angeles may be a key factor in setting the stage in understanding how the distribution of ESOs can address these concerns.

Chapter 3: Methodology

Introduction of Methods

The scope of this study is to analyze and understand the spatial distribution of ESOs in comparison to the demographics across Los Angeles County. Los Angeles STEW-Map provides a landscape of 4,084 square miles. An area that is significantly larger in scale in comparison to other Stew-MAP cities that have participated in the past.

Los Angeles is unique in which the central core of its urban center is the City of Los Angeles with adjacent "rings" that is reminiscent of a metropolitan district and suburban sprawl that extends outward into neighboring counties. Conducting a Stew-MAP of this magnitude will be the first study conducted on a combined statistical area and incorporates Los Angeles's central urban core, Los Angeles Proper, and its metropolitan areas within the county boundary.

A survey similar to the standardized model of STEW-MAP conducted in New York and Baltimore was used to gather the data to provide the snapshot of stewardship organizations in Los Angeles County from 2014-2015. The standardized STEW-MAP survey underwent an OMB review and has been approved for public use throughout the United States by federal researchers and their collaborators. The response rate for the preliminary information gathering for LA STEW-MAP was 2% of the stewardship population that was identified. It provided a preliminary scope of the distribution of the stewardship organizations of Los Angeles County.

Sample

Environmental stewardship organizations were identified in Los Angeles County and invited to participate in a web-based survey in order to collect organization and stewardship boundary information. For this study, 140 preliminary responses were used as a result from the STEW-Map survey. The organizations that participated provided self-declared responses that indicated their level of involvement and purpose that qualified them to be classified as an environmental stewardship organization. From the 140 responses, 111 participants provided enough information for ArcGIS spatial analysis. Information such as physical location addresses and stewardship boundary or turfs were provided as a written description (north, south, east, west boundaries) were used for the spatial analysis.

Participants for the preliminary LA Stew-MAP who provided addresses to physical locations underwent a process in order to ensure accuracy with the address information provided in order to properly geocode. For organizations that provided a PO Box mailing address as their physical location underwent a reverse address lookup to impute the address for geocoding purposes. The physical location was converted into points that were geocoded through ArcGIS Online.

Stewardship boundaries were provided in a text form. The description of the boundaries was broad in indicating their boundaries within the Los Angeles County boundary where some went beyond the scope of this study. Pre-existing polygons from open GIS databases provided by the Census Bureau, the State, the County, and the City assisted in the development of majority of the polygons. The remaining polygons were drawn and developed as interpreted from the text.

Boundaries

The focus of this study is to discern the distribution of ESOs across a landscape of 4,084 square miles. Los Angeles County extends out to the western extent of the Mojave Desert in the Antelope Valley in the northeastern portion of the county to the 70 miles of coastline along the Pacific Ocean. The county is home to valleys, islands, rivers, desert and mountains. The two most prominent mountains being the Santa Monica Mountains and San Gabriel Mountains.

The demographic information for Los Angeles County were taken from the American Community Survey (ACS). ACS is an ongoing survey under the umbrella of the Census Bureau that gathers information on the ever-changing population dynamics on a yearly basis every calendar year (January to December). The information gathered from the survey generates data that is important in providing assistance to the federal and state funds that is allocated and distributed each year (ACS 2017). The ACS provides a more detailed scope in various topics related to the demographics, employment, housing, veterans, and other topics that is useful for decision makers, planners, and entrepreneurs within the community. The point shapefile of the geocoded addresses and the polyline shapefiles of the stewardship boundaries were overlaid over demographics taken from the 2011-2015 American Community Survey 5-Year Estimates (ACS 2011-2015). The ACS 2011-2015 encompasses the scope of time the Stew-MAP survey was conducted capturing population results that provides a snapshot representation of the communities within the study. From ACS 2011-2015 five year estimates, tables 'S0601 – Selected Characteristics of the Total and Native Population in the United States' and 'DP05 – ACS Demographic and Housing Estimates' were used for demographic information. These

particular tables disseminated the 5-year estimates of key demographic categories of the total population of Los Angeles County.

Census tracts downloaded from the Census Bureau's Tiger Shapefiles database was used as delimited boundaries throughout the Los Angeles County. They are universally acknowledged throughout the United States and provide a more static and well-defined geographical area in comparison to ZIP-code boundaries, council districts, and city boundaries. Census tracts are not a perfect social construct of a "neighborhood", but provides a reasonable approximation of local social conditions (Bergsen and Herman, 1998). Census tracts generally consist of 1,500 to 8,000 people with an optimum number of 4,000 people per census tract. As census tracts stay consistent from decade to decade, this will allow for future research to continue in understanding the importance and distribution of ESOs in Los Angeles County.

Analysis

A preliminary analysis of the demographics of Los Angeles County allowed for a visual understanding of the scope of the population for the snapshot of time the data captured as a result of the Stew-MAP survey conducted in 2014-2015 in correlation with the ACS 2011-2015 five-year survey. The geocoded point shapefile were overlaid with the demographics in order to conduct preliminary analysis of Los Angeles County.

Initial basic spatial pattern analysis were conducted in order to identify the pattern that is presented by the geocoded points through the use of average nearest-neighbor, mean center, and directional distribution ellipse. These tools assisted in providing an initial analysis of the ESOs physical locations.

The Average nearest-neighbor (ANN) is a technique that measures the distribution of a pattern through an algorithm that assisted in pattern recognition (Ruiz, 1986). The average nearest-neighbor observes the mean distance distribution to the features nearest neighbor that is R times as great as is expected in a hypothetical random distribution of the same density (Clark and Evans, 1954). A pattern is determined as clustered, random, or dispersed dependent on the averages of all the nearest neighbor distances.

- clustered – averages less than an assumed hypothetical random distribution
- dispersed – average greater than assumed hypothetical random distribution

A mean center was constructed in order to determine the central point of the point features. This was used in order to help determine the central point for the various point layers. The mean center is calculated from the average of all of the points defined by the input feature class to determine the center feature.

Directional distribution through the use of a standard deviation ellipse measures the trend of for the set of points determined in the input feature. This tool calculates the standard deviation of each point to the mean center point in order to define the ellipse axes. The length and shape of the ellipse demonstrates a clear directional distribution of the features.

The development of the turf layer began with the translation of the cartographical text provided by the STEW-Map survey respondent of their ESO boundary(ies). The turfs were created through the assistance of gathering open sourced shapefiles of county, city, recognized city parks, federal national parks and monuments, zip codes, council districts, and city regional

areas. These sources included but are not limited to Los Angeles County GIS Data Portal, City of Los Angeles GeoHub, USFS Geodata Clearninghouse, and Census Bureau Tiger Shapefiles.

Spatial analysis of the polyline shapefiles of the stewardship boundaries or turfs began with the attributes for the individual feature classes that were contained in multiple turf attribute tables. The multiple turf attribute tables needed to be amalgamated into a single attribute table. The various numbers of rows that represented the multiple turfs for a single ESO were merged into a single row to represent all of the turf locations for the one ESO in a single layer. In order to accomplish this, the organization name was added to each attribute table. Feature classes were merged together through the use of the Merge tool. The multiple rows were found within a feature classes attribute table for a single ESO were merged together. By doing so, it simplified the task of identifying the multiple ESO trufs into a single layer. Descriptions of the turfs were provided by the respondents who represented the ESOs as viable cartographical descriptions of the ESO turfs. The layer was then spatially joined with Census tracts in order to analyze the data quantitatively.

The turfs underwent further spatial autocorrelation that utilized Moran's autocorrelation coefficient (Moran's I), Ripley's K function, and Anselin Local Moran I. Spatial autocorrelation is an observed phenomenon in a single area where a feature is compared to adjacent features that may or may not share similar values.

Moran's I is the global index of spatial autocorrelation typically used and believed to provide results that emphasizes how features differ from the values in the study area as a whole providing more significantly reliable tests (Mitchell 2009). Moran's I assumes that phenomena that are close are more similar than those that are further away by comparing each

value in a pair to the mean value for all features in a study area (Mitchell 2009). The spatial autocorrelation tool utilizes Global Moran's I that examines the local level of spatial autocorrelation in order to identify areas where values of the variable are both extreme and geographically homogenous (Oliveau 2005). Global indexes summarize over the entire study area the degree to which similar observations tend to occur in neighboring features. Depending on the results the strength of the correlation may be non-existent, weak, or strong according the variables that is used.

The Moran's I statistic for spatial autocorrelation is given as:

$$I = \frac{n}{S_0} \frac{\sum_{i=1}^{n} \sum_{j=1}^{n} w_{i,j} z_i z_j}{\sum_{i=1}^{n} z_i^2} \quad (1)$$

where z_i is the deviation of an attribute for feature i from its mean $(x_i - \bar{X})$, $w_{i,j}$ is the spatial weight between feature i and j, n is equal to the total number of features, and S_0 is the aggregate of all the spatial weights:

$$S_0 = \sum_{i=1}^{n} \sum_{j=1}^{n} w_{i,j} \quad (2)$$

The z_I-score for the statistic is computed as:

$$z_I = \frac{I - \mathrm{E}[I]}{\sqrt{\mathrm{V}[I]}} \quad (3)$$

where:

$$\mathrm{E}[I] = -1/(n-1) \quad (4)$$

$$\mathrm{V}[I] = \mathrm{E}[I^2] - \mathrm{E}[I]^2 \quad (5)$$

Figure 1 ESRI - ArcGIS Resources

Another approach in obtaining the fixed distance band is by conducting a multi-distance spatial cluster analysis that utilizes Ripley's K-function. Ripley's K-function supplies a powerful

analytical tool in studying the distribution of patterns (Haase 1995) especially for sedentary organisms or stationary constructions. In this case fixed turf locations of various ESOs throughout Los Angeles County.

A fixed distance band allows for the conceptualization of spatial relationships. By determining the threshold distance, this ensures that a consistent scale of analysis is conducted. This is suggested as a good option by ESRI for situations that include polygon data that is large in variation in polygon size where there are very large polygons at the edge of the study area and very small polygons at the center of the study area. Z-scores classified as significant from the series of spatial autocorrelation (Moran's I) was used in order to determine the highest z-score at what predetermined fixed distance band. The greatest z-score provided from the series of tests conducted was used as the fixed distance band in finding Anselin Local Moran's I through the use of Cluster and Outlier Analysis tool.

While a global index measures a single value that is applied to an entire study area, local indicators of spatial analysis (LISA) decomposes the global indices that contribute individual observations. The individual observations of LISA provided an indication of the extent of the significance of the values of spatial clustering located around the observation. Similar to global indexes of spatial autocorrelation, Local Moran's I detected the significance of clustering.

Anselin Local Moran's I tool provides a cluster or outlier analysis that provides a data set of the local spatial autocorrelation for Local Moran's I, Local Moran's I Z-score, Local Moran's I p-value. The set of results of the Local Moran's I Index is a ratio of the difference from the mean divided by the variance is a constant. The same value that is used for each calculation of I_i. Local Moran's I represents a desegregation of the global version of Moran's I into its component

parts in order to define the neighborhoods local variation in comparison to a neighbor adjacent whose features may or may not be similar (Mitchell 2009).

The Local Moran's I statistic of spatial association is given as:

$$I_i = \frac{x_i - \bar{X}}{S_i^2} \sum_{j=1, j \neq i}^{n} w_{i,j}(x_i - \bar{X}) \quad (1)$$

where x_i is an attribute for feature i, $\bar{X}$ is the mean of the corresponding attribute, $w_{i,j}$ is the spatial weight between feature i and j, and:

$$S_i^2 = \frac{\sum_{j=1, j \neq i}^{n} w_{ij}}{n-1} - \bar{X}^2 \quad (2)$$

with n equating to the total number of features.

The z_{I_i}-score for the statistics are computed as:

$$z_{I_i} = \frac{I_i - \mathrm{E}[I_i]}{\sqrt{\mathrm{V}[I_i]}} \quad (3)$$

where:

$$\mathrm{E}[I_i] = -\frac{\sum_{j=1, j \neq i}^{n}}{n-1} \quad (4)$$

$$\mathrm{V}[I_i] = \mathrm{E}[I_i^2] - \mathrm{E}[I_i]^2 \quad (5)$$

Figure 2 ESRI - ArcGIS Resources

The target feature and a neighboring feature are calculated against a mean for Moran's I (Mitchell 2009). The mean value of an attribute is calculated first in order for the difference to be calculated from the mean of each corresponding neighbor that is then multiplied by the weight of the neighbor (Mitchell 2009). The ratio of the difference of the mean divided by the variance is the constant used for each calculation of I_i. Unlike global I_i that produce a large

range of values for I_i, Local Moran's I represents a disaggregation of the global version of Moran's I into its component parts.

The values of the results from I from Local Moran's I is interpreted based on the index being positive or negative. A positive value for Moran's I indicates the feature is surrounded by features with similar values (Mitchell 2009). A feature associated with a positive Moran's I is determined to be a part of cluster. The opposite is true for negative values for I. A negative value for I indicates that the feature is surrounded by features with dissimilar values where in most cases the feature is a spatial outlier. The interpretation of the Local Moran's index can only be interpreted within the context of the computed Z-score or p-value.

The values computed by LISA allows for the computation of its similarity with its neighbors while simultaneously testing its significance for each location. The results produce five scenarios to interpret.

1. High-High – [Hot spots] Locations with high values of similarity among its neighbors.
2. Low-Low – [Cold spots] Locations with low values of similarity among its neighbors.
3. High-Low – Spatial outliers of locations with high values with low-value neighbors.
4. Low-High – Spatial outliers of location with low values with high-value neighbors.
5. Locations that have no significance to local autocorrelation.

The Cluster or Outlier Analysis made available as an extension of Local Moran's I provides an image, cluster/outlier type (COType) similar to that of a hot spot analysis. However, the analysis is not simplified to hot and cold spots but is inclusive of areas or locations in which it statistically determined to be spatial outliers. The spatial outliers may or may not be included

within a hot or cold spot. The COType field indicates statistically significant clusters and outliers with a 95 percent confidence level (Esri c2017).

Validity

The sample size for the research is smaller than expected in comparison to the population of ESOs that were identified during the initial compilation and gathering process. The data presented provides a foundation in which the research is able to be built upon. The processes in which the data analysis is conducted provides a level of confidence in replication once an appropriate sample size from the County of Los Angeles is able to be obtained in a future research. Once the process for LA STEW-Map is replicated in the next phase, the scope of the study is able to increase to incorporate the regional statistical analysis. The data gathered during the scope of this study provided an accurate snapshot in time of environmental impact and equity that was found to be present during the course of the study.

Methodological Limitations

The initial limitations discovered during this study was the gathering of cartographical description of the turf boundaries from each ESO. Through the analysis of the description it was discovered that a single ESO was provided multiple responses by different respondents. This has led to the fact that information gathered is limited to the respondent's interpretation and knowledge of their ESOs functions, capabilities and stewardship locations. Dependent on how clear and concise the respondent provided cartographical description was dependent on how the cartographical information was interpreted by me. This allows for human error to factor

into the methods, in particular cartographical description interpretation. The human error could then factor into the rest of the study and influencing the spatial autocorrelation that is conducted on the turf boundaries.

The use of indices provided a level of confidence, but still have their limitations in their capabilities in providing the results that researchers wish to find. Global Moran's I is limited by the simplistic design of the formula. With the strengths that come with a robust formula, Global Moran's I average of the local variations in the strength of spatial autocorrelation (Oliveau 2005). By utilizing the same set of limitations for an entire study, local variance is not taken into consideration. Global Moran's I provided an essential tool in being able to gather a quick assessment of an entire study area.

Chapter 4: Findings

Brief Overview

The focus of this study is to understand and discern the distribution of ESOs throughout Los Angeles County. The findings will help to answer the overarching research question and the subsequent exploratory questions if demographics can be correlated and assimilated to the distribution of ESOs.

The demographics (percent total minority, median income, and 100% below Federal Poverty Levels of Los Angeles County and City are displayed as a means of comparison in order to correspond to locations where there may need to be a greater focus.

Results

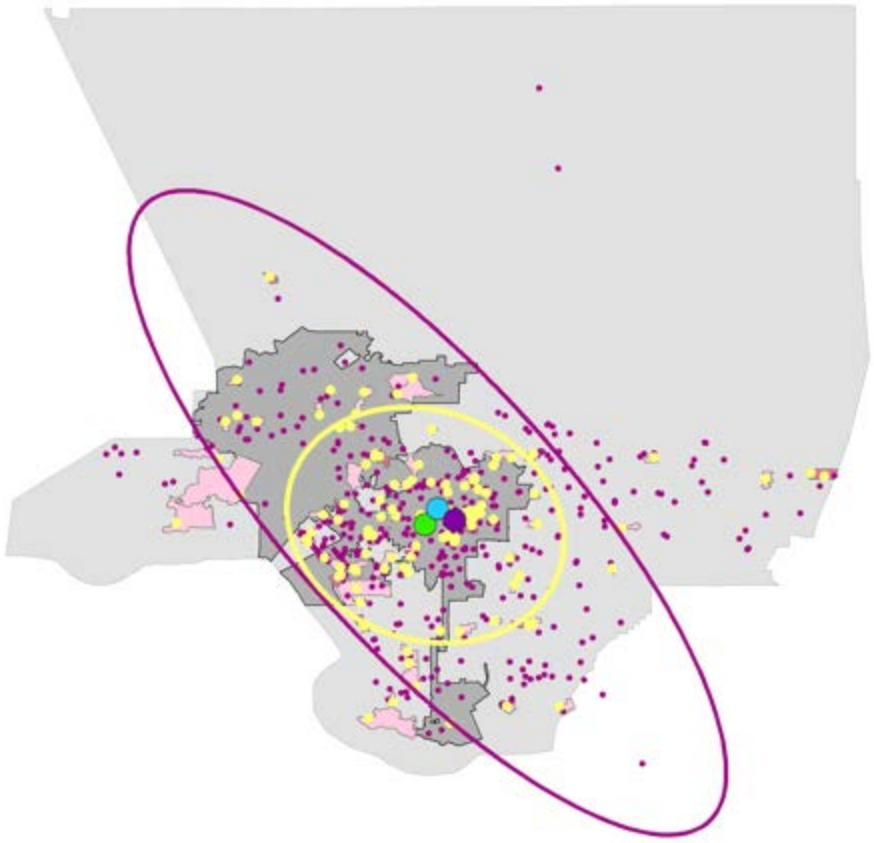

Figure 3 Purple dots are ESOs that were identified to participate in the survey and the yellow dots were ESOs that were identified and participated in the LA Stew-MAP survey.

The image of Figure 3 demonstrates the distribution of ESOs that responded and those that were identified across the County of Los Angeles. In both data sets the organizations were found to have a cluster pattern through the use of the Nearest Neighbor Analysis.

Downtown Los Angeles is the central area for all of the physical organization locations for all ESOs that were identified within Los Angeles County. The organizations that were identified are distributed in a northwest to southeast direction with the organizations that did respond to the Stew-MAP survey having their physical locations tightly clustered around the central figure of Downtown Los Angeles.

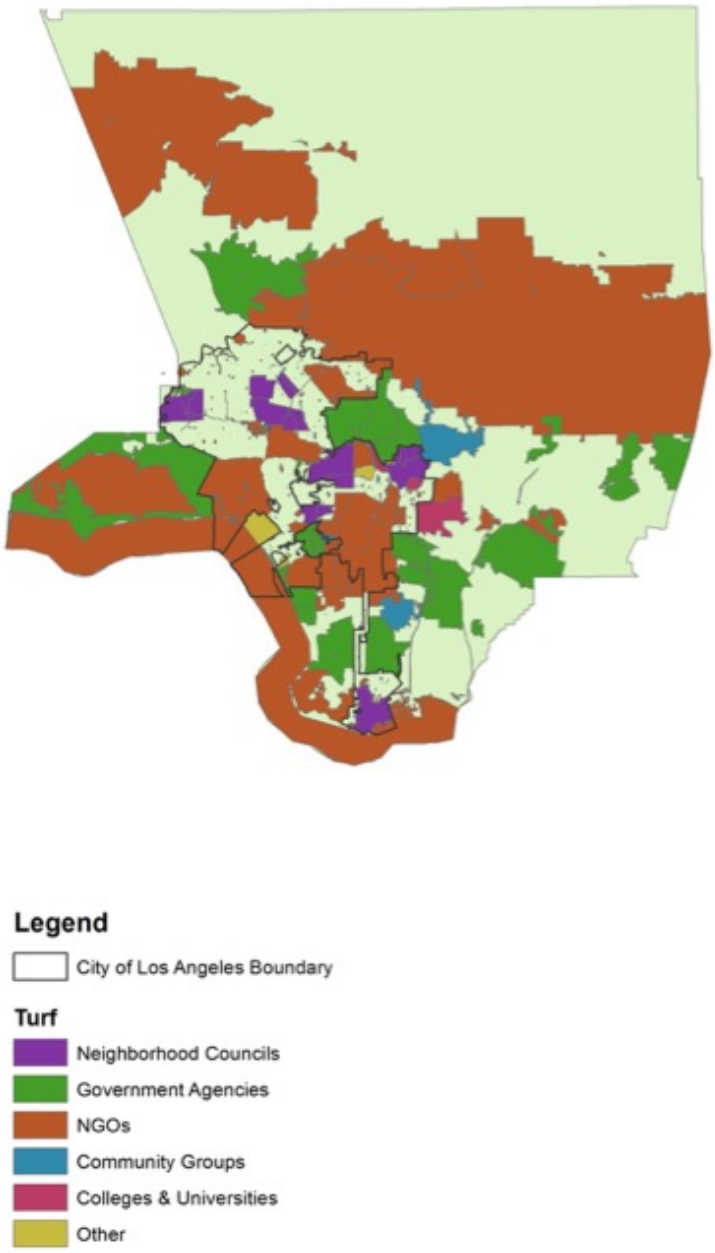

Figure 4 Turf map of ESOs in Los Angeles County. Turf boundaries that encapsulate the entire Los Angeles County or City of Los Angeles were removed for visual purposes.

Figure 4 classifies the different main categories of turfs the various ESOs provide throughout the County of Los Angeles. Turfs that are not displayed on this map are turfs whose field of service contains the entire area of the county and the City of Los Angeles boundary limits.

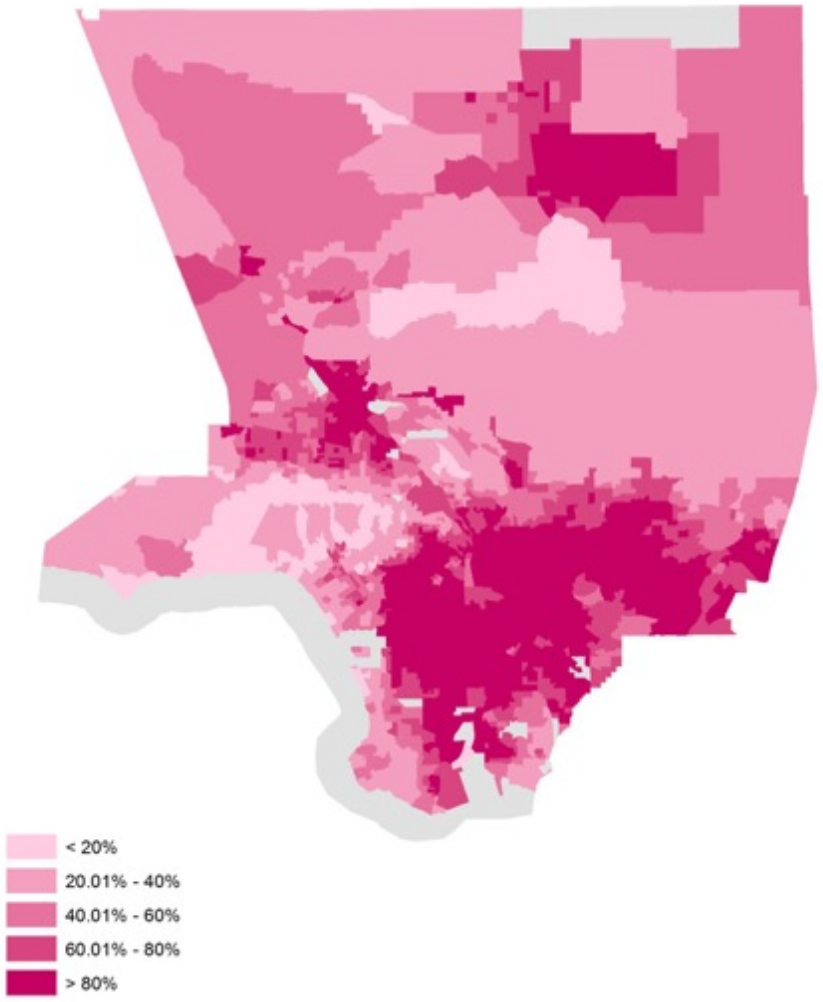

Figure 5 Majority of minority population found in southeast region of Los Angeles County

Figure 5 shows that the majority of the minority population is found in the southeastern section of Los Angeles County. Greater than 80 percent of the population populates from the center of the county towards an eastward direction. The western section of Los Angeles county is populated, but with 40 percent or less of those from a minority race.

The majority of the population is focused in the coastal or southern side of Angeles National Forest. The northern area is considered to be more rural, but slowly has developed

into more of an urban area with people migrating away from the center of the urban center out towards the fringes of the urban populated areas.

Table 3
Socioeconomic and land area of Los Angeles County and City

Attribute	**LA County**	**LA City**
Population (2015)	10,137,915	4,030,904
Median Income	$56,196	$52,024
100% below FPL	16.70%	20.50%
Land area (sq mi)	4,084	503
No. of ESOs respondents	140	

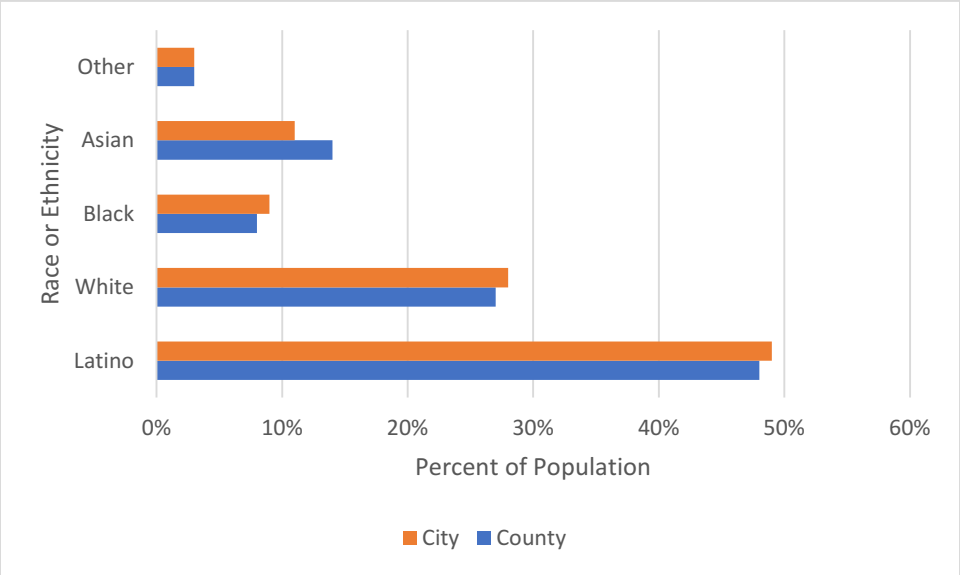

Figure 6 A comparison of percent minority of total population in Los Angeles County and City.

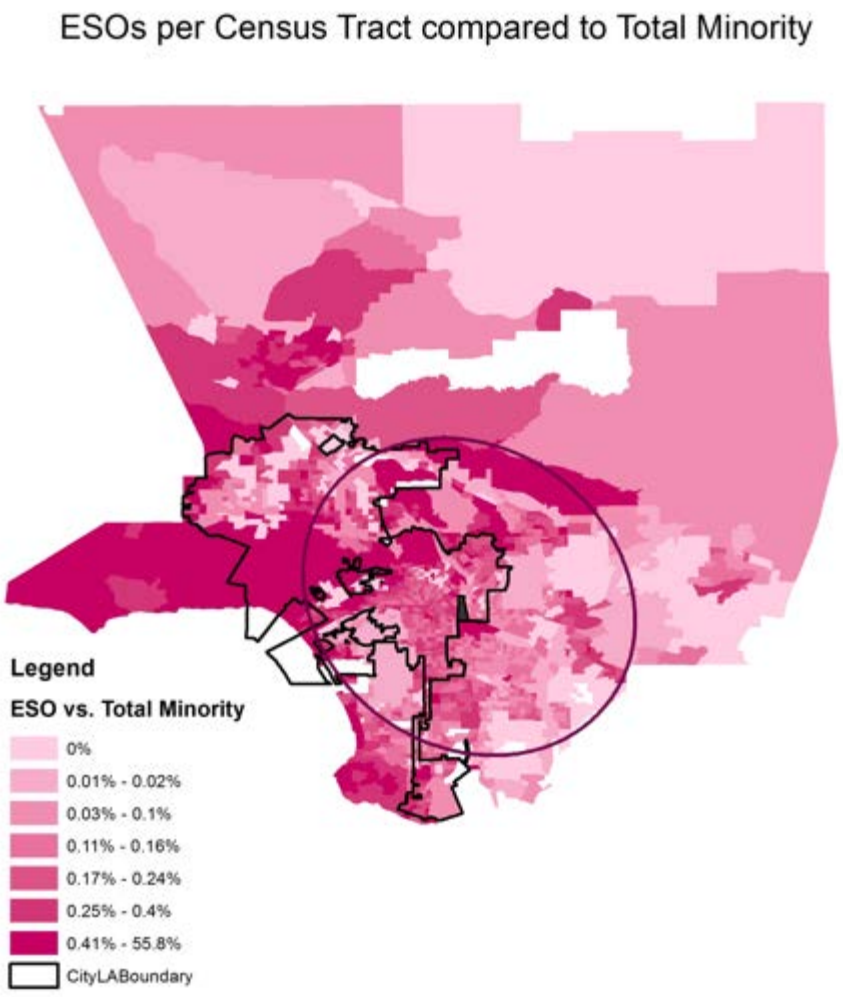

Figure 7 A comparison of percent of turfs in relation to total minority per census tract

Figure 7 shows the ESOs stewardship boundaries in correlation with the total minority population of Los Angeles County. The ellipse is the Directional Distribution Ellipse depicting the direction of the trend that the ESOs have established extending mostly into the eastern region of Los Angeles County. These are preliminary results for the initial Stewardship Mapping survey that is to be conducted for the Los Angeles region.

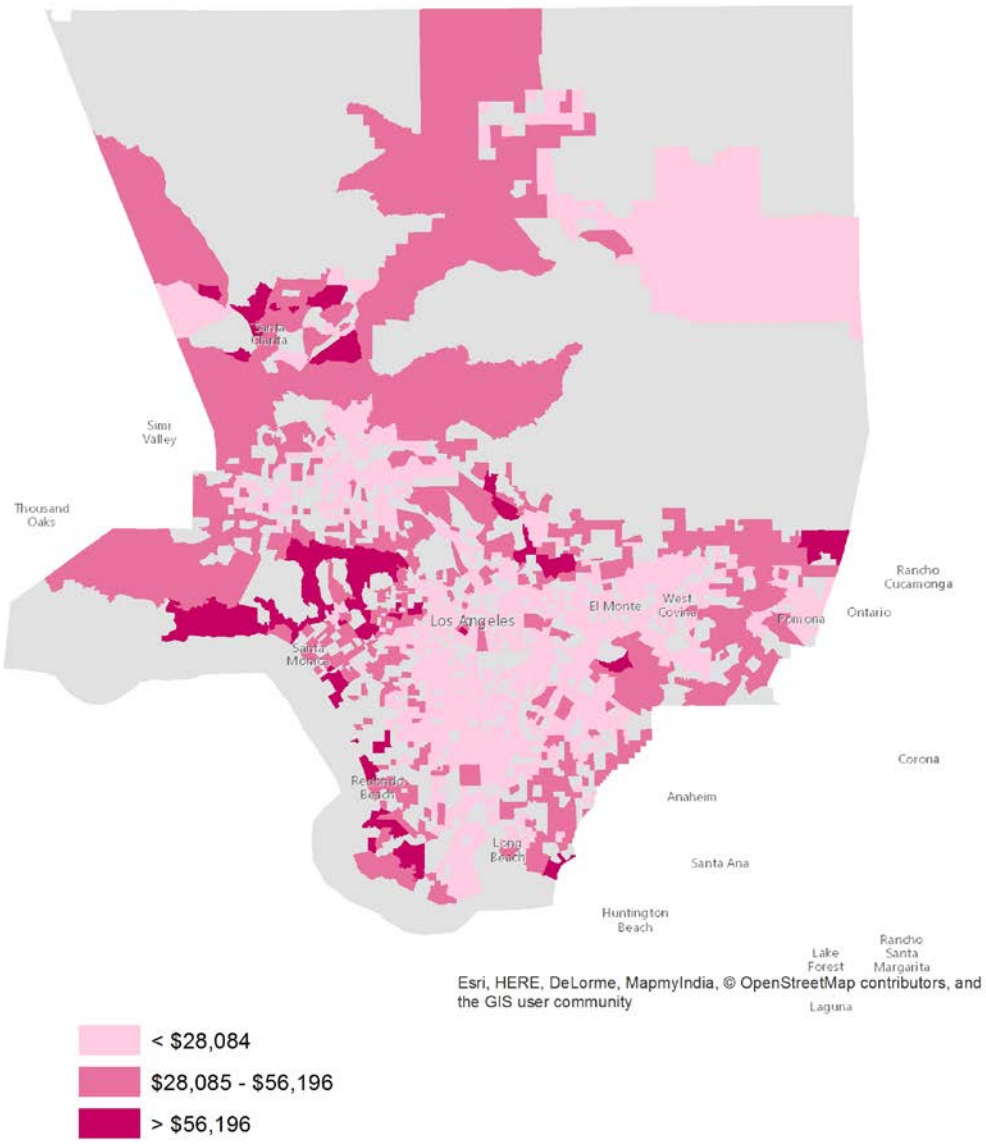

Figure 8 Median income distribution across the Los Angeles County Landscape.

Figure 8 displays the median income with no correlation to race or ethnicity across the landscape of the County of Los Angeles. The median income is classified by grouping income levels. The first tier can be considered to be FPL income below 100%. The second tier can be an assumed range of median income level starting from the dollar amount above the FPL level to

the statistical median level of Los Angeles County. The final tier is the income level greater than the median income of Los Angeles County.

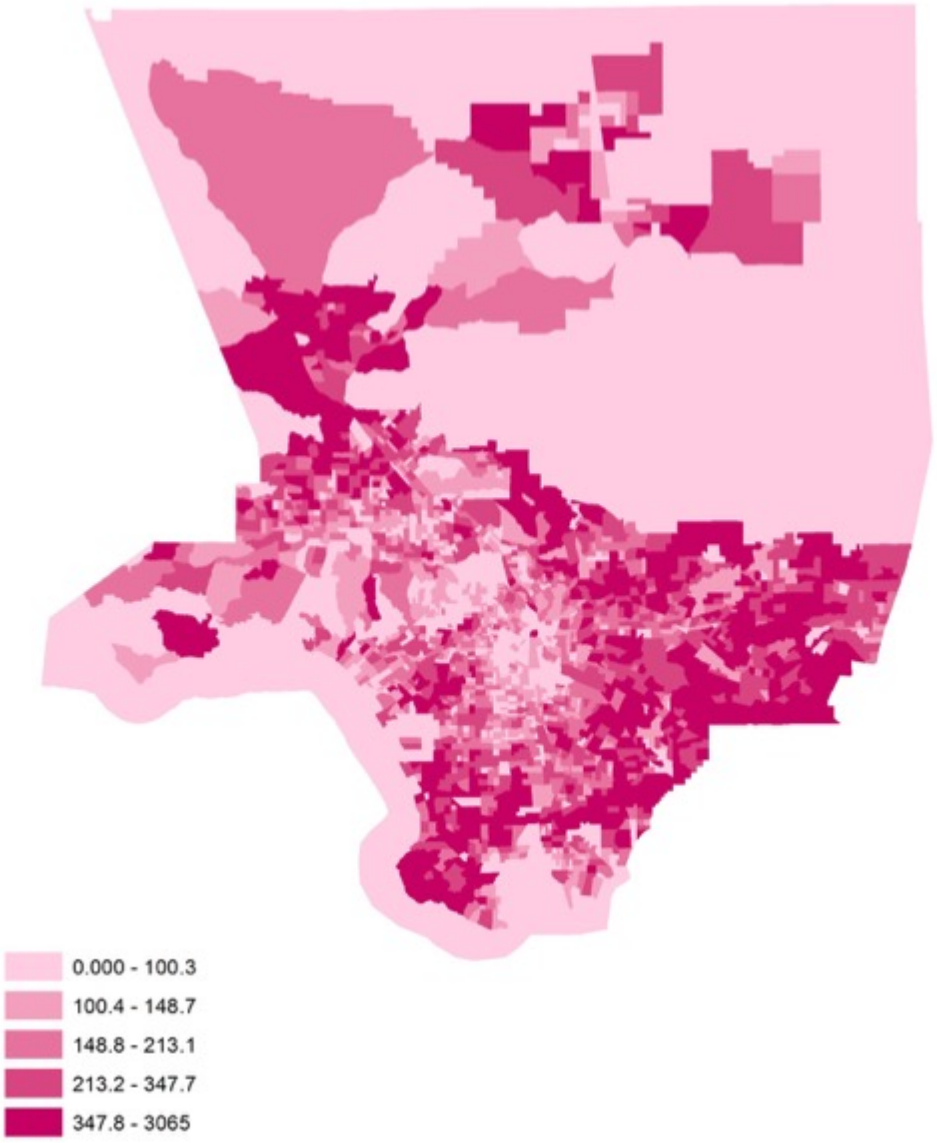

Figure 9 Minority population in comparison to poverty levels below 100%.

Figure 9 is a comparison of the total minority population per census tract in comparison to the federal poverty levels below 100%.

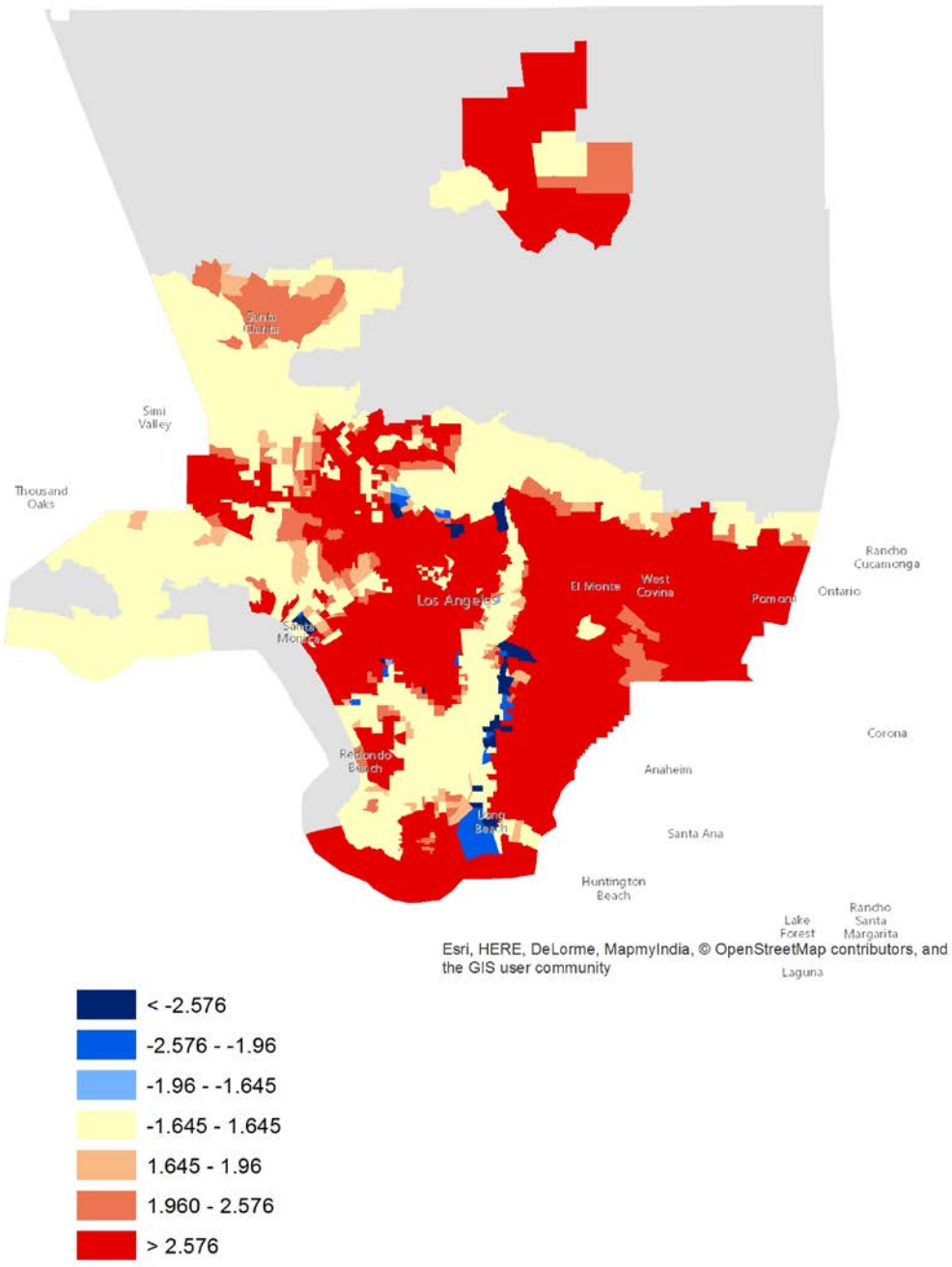

Figure 10 Z-score classified by critical values for several confidence levels, calculated from comparison of number of ESOs per census tract with the ratio of minority population to poverty levels below 100%.

Figure 10 classifies the Z-scores using Local Moran's I by critical values for several confidence levels. This assists in determining whether the values are of significance or not with the through the correlation of p value data sets.

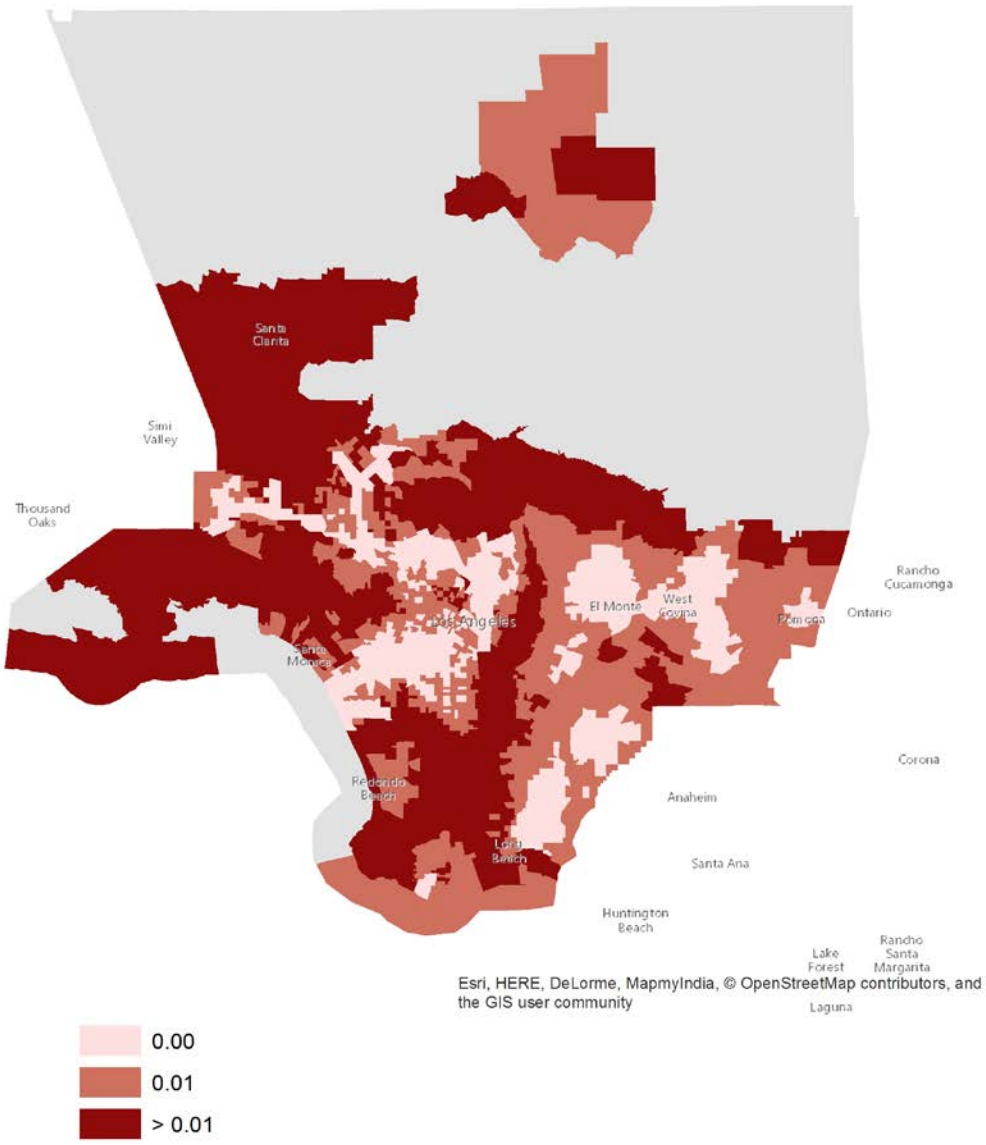

Figure 11 P values classified by significance values for confidence levels of 0.01, 0.05, and 0.1.

Figure 11 displays the p values classified by level of significance. These values in conjunction with the Z-score determine whether a null hypothesis is to be rejected or not.

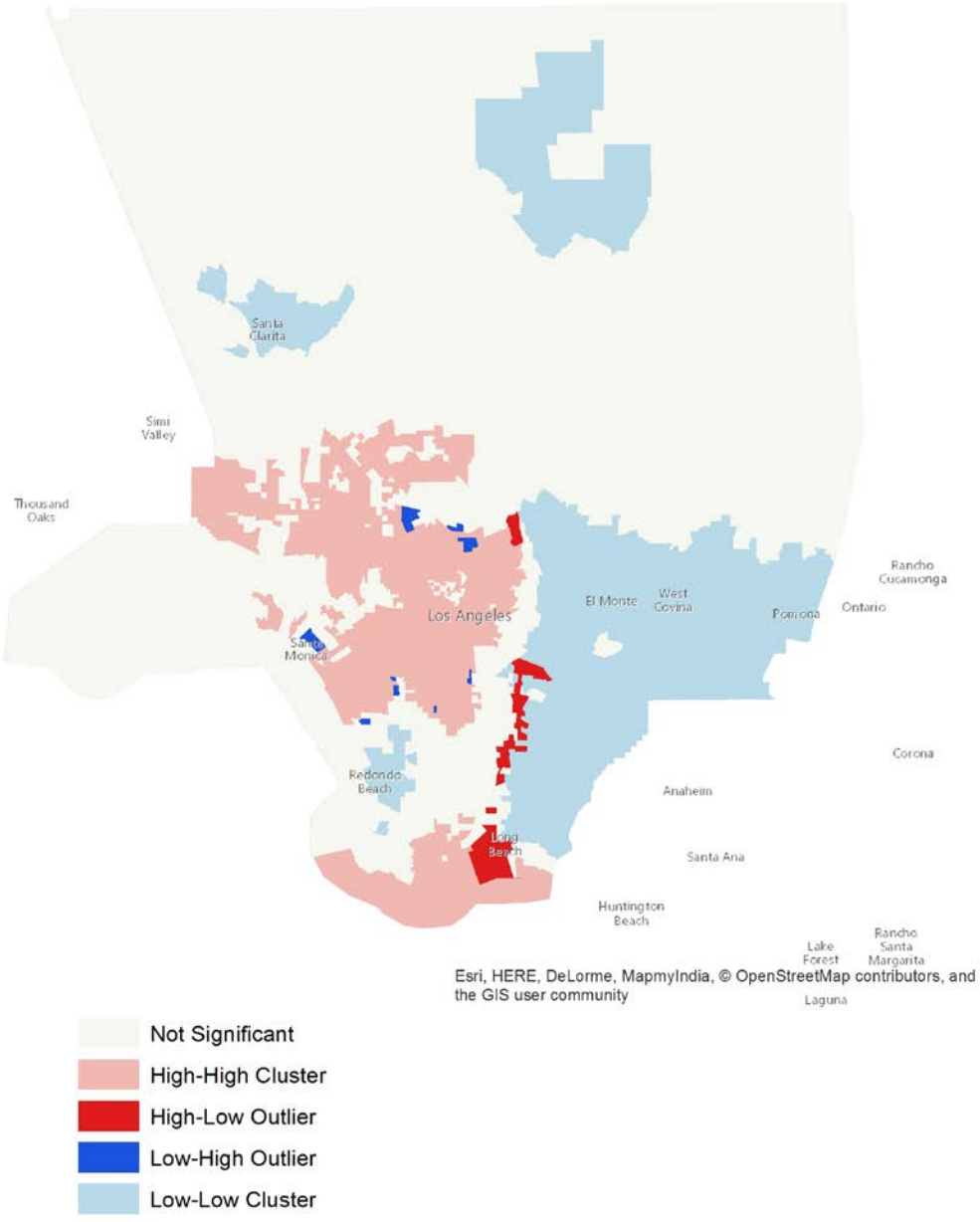

Figure 12 Cluster or Outlier Analysis of minority population in comparison to poverty levels below 100% at a fixed distance of 14,546 feet or 2.8 miles.

Figure 12 is a Cluster or Outlier Analysis in which the fixed distance band used to calculate is 14,546 feet or 2.8 miles. The HH Cluster is represented on the west side of Downtown Los Angeles and the LL Cluster is represented on the east side of Downtown Los Angeles. Small patches of LH Outliers border the HH Cluster and the LL Cluster has spots of HL Outliers crawling the border of the LL Cluster in a northbound direction. There is significantly more not significant area.

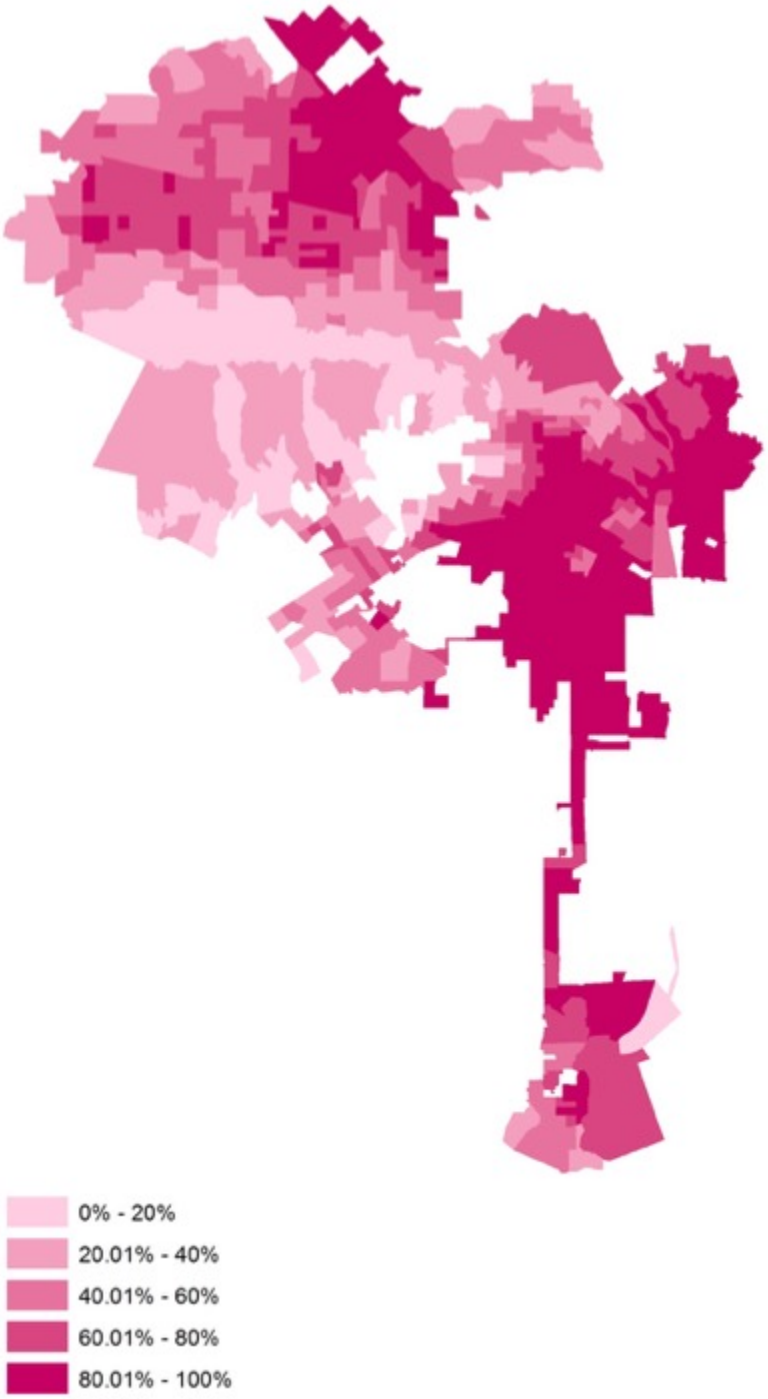

Figure 13 The percent minority population distributed across the landscape of the City of Los Angeles.

Figure 13 focuses on the percent of minority population only found in the City of Los Angeles. This close-up shows the concentration of minority population in comparison to white population to be more focused in the Southcentral area of City of Los Angeles with patches

moving in a southern and eastward direction. Some pockets of minority populations in comparison to the white population is found in the northern region of the city.

Figure 14 The median income distribution throughout the City of Los Angeles.

Figure 14 displays the median income with no correlation to race or ethnicity within the City of Los Angeles.

Figure 15 Total minority population in comparison to the poverty levels below 100% in the City of Los Angeles.

Figure 15 displays the total minority population in comparison to the Federal Poverty Levels below 100% focused only on those living within the City of Los Angeles.

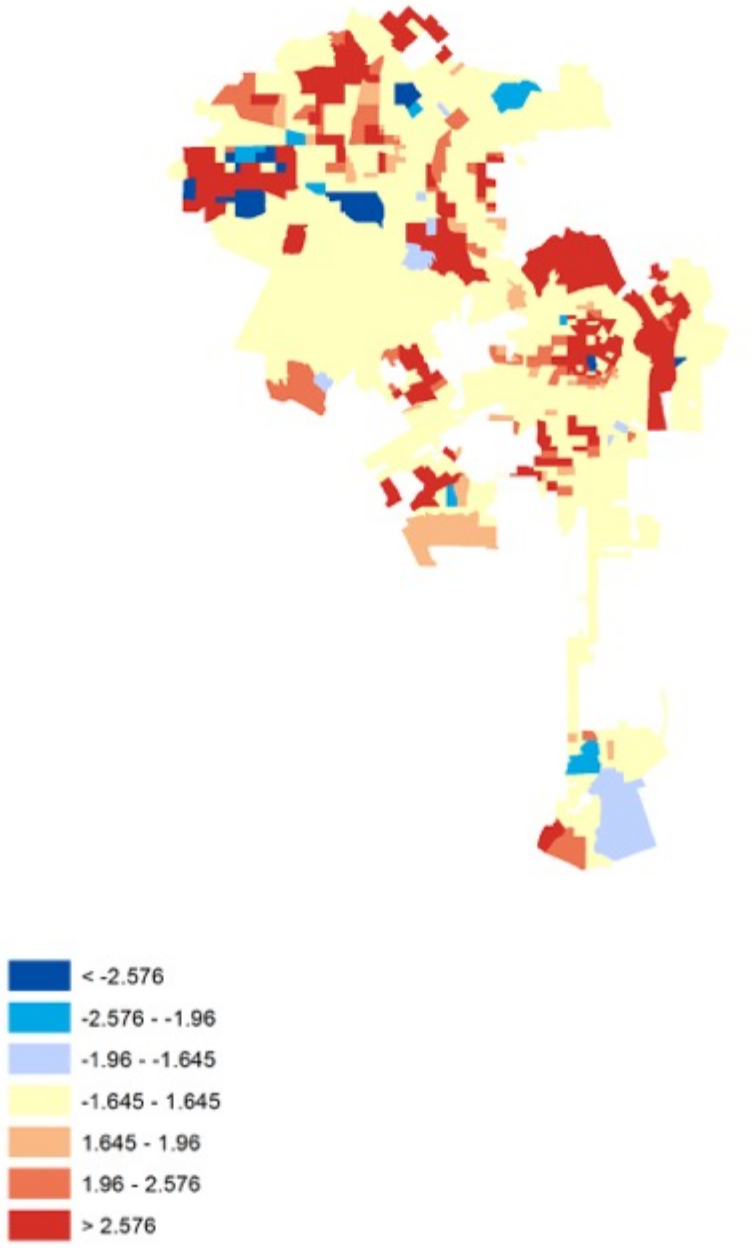

Figure 16 Z-score classified by critical values for several confidence levels calculated from number of ESOs per census tract in comparison to the ratio of minority population to poverty levels below 100.

Figure 16 classifies the Z-scores by critical values for several levels of confidence. These values in conjunction with p values assist in validating a null hypothesis or not.

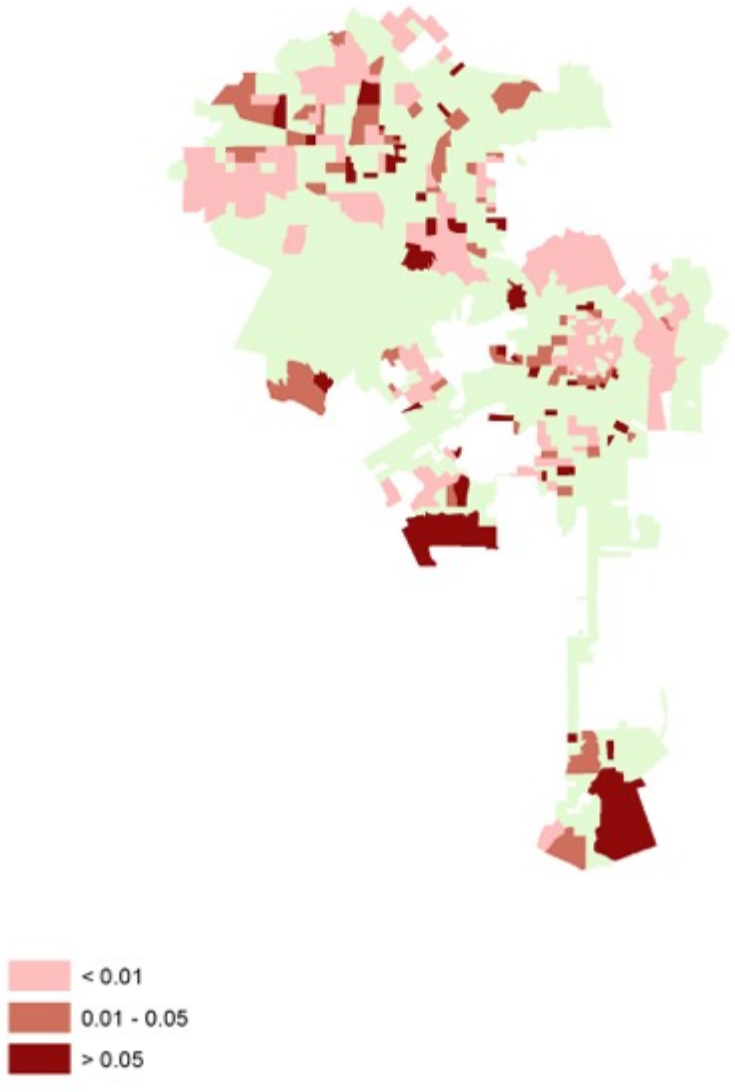

Figure 17 P values classified by significance values for confidence levels of 0.01, 0.05, and 0.1.

Figure 17 classifies p values for data at the city level.

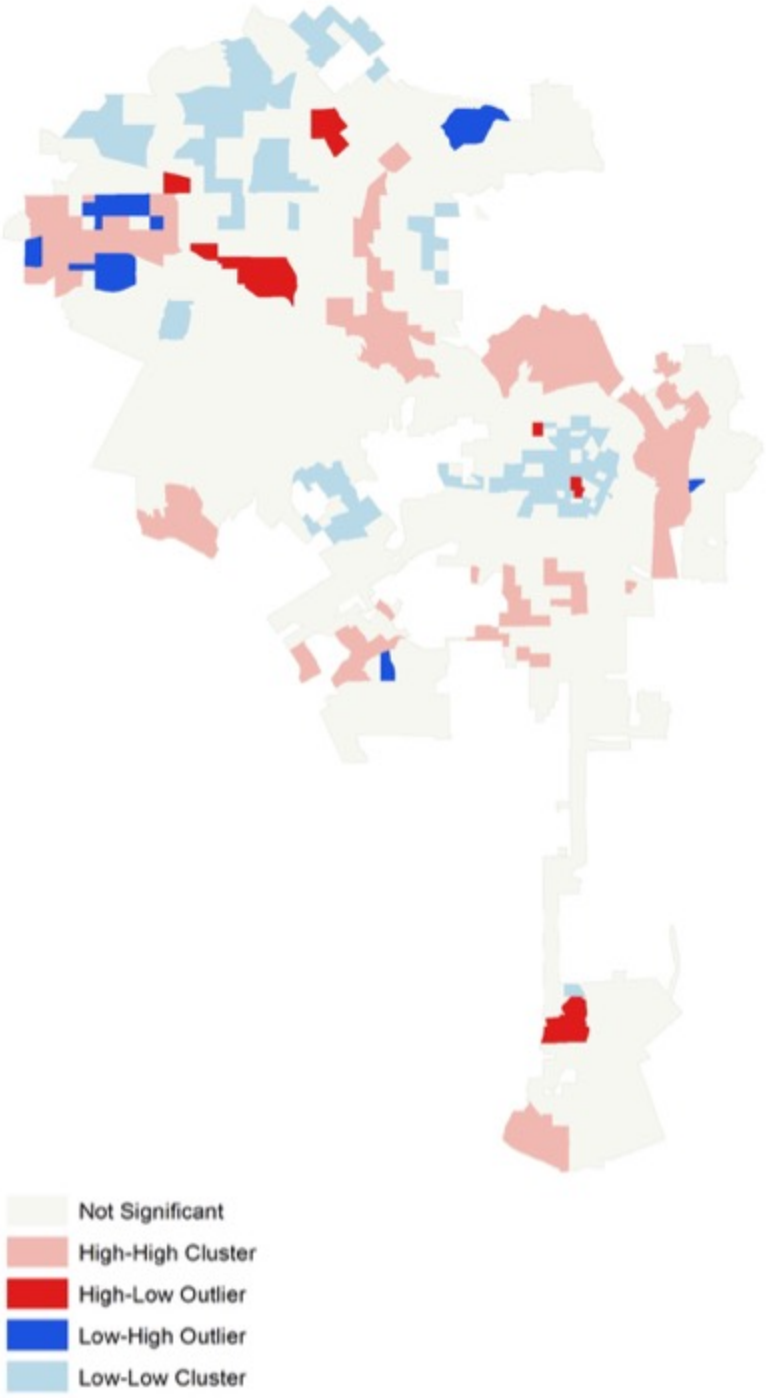

Figure 18 Cluster or Outlier Analysis of the total minority population in comparison to the percent of the poverty levels below 100% with a fixed distance of 11,116 or 2.1 miles.

Figure 18 is the Cluster or Outlier Analysis that was conducted to only focus on the Census Tracts within the City of Los Angeles. The fixed distance was reduced to 1,115 feet to

accommodate the decrease in spatial area from the vast amount of landscape available when analyzing the county and the reduced amount of landscape when the city needed to be analyzed.

Descriptive Analysis

The distribution of the ESOs throughout the County of Los Angeles is in the general direction of which the minority population appears to be mostly concentrated in. The general concentration of distribution of the minority population is located in the central and eastern half of Los Angeles County. The physical locations of the organizations that responded is focused within the smaller ellipse centralized around Downtown Los Angeles. The ESO turfs of the STEW-Map respondents provide coverage around Los Angeles County. A greater assemblage of turfs is concentrated in the western region of Los Angeles County with the greatest contribution from non-profits and non-governmental organizations.

The percent of the total minority population was compared to the Federal Poverty Level below 100% and is used as the base input of data for the Cluster or Outlier Analysis. The figures produced show the baseline data (i.e. percent minority and median income) depicting the benchmark for comparison to the Cluster or Outlier Analysis figures. The correlation of the total minority population against the Federal Poverty Line (FPL) Below 100 provides the starting point in analysis to the project.

The COType Analysis depicts the phenomenon where neighboring features that share similar features is represented as red or a hot spot while neighboring features that are dissimilar in nature are represented in blue or cold spots. This provided a general picture of

regions and communities within the county that portray positive or negative influences by ESOs within the vicinity.

The same data is magnified at the city level and should be interpreted in a similar fashion.

Reliability of Analysis

The fixed distance was calculated individually for both county and city COType. This allowed for a more accurate calculation of the COType without providing false HH and LL Clusters or HL or LH Outliers due to a vast fixed distance. By re-calculating the fixed distance using the Multi-distance spatial analysis for the city, it prevented the aggregation of features repeating themselves through space but instead produced recognizable phenomena contagious at short distances (Legendre and Fortin 1989).

Large positive values for Moran's I indicate that the feature is surrounded by similar valued features whether they are high or low. The opposite is true for large negative values of Moran's I. Large negative values for Moran's I indicate that immediate surrounding features of the feature are those with dissimilar values. These hot and cold spots can be determined whether they are statistically significant through the analysis of the Z-score calculations. High positive Z-scores for a feature indicates the surrounding values are similar values, high or low and those with very negative Z-scores are surrounded by neighbors with dissimilar values (Mitchell 2009). The p values emphasize whether there is a significance and validity combined with the Z-score deeming the ability to reject the null hypotheses or not (Esri c2017). P values provide the probability that the hot or cold spot is generated at random or not. When analyzing

the p value in order to determine the significance of the Z-score, p value that is below 0.01 is typically one percent or less probability of the hot or cold spot being generated randomly. A p value combined with either a high positive or a high negative Z-score demonstrates the area to provide a statistically significant value. Comparing the significance to the null hypothesis determines whether or not the null hypothesis is to be rejected or accepted.

Chapter 5: Discussion

Overview

Reviewing the results of basic data that was generated from the data that was gathered from the survey in comparison to the demographic data collected for the ACS 2011-2015 survey provides a clear visual snapshot of the state of Los Angeles County. A significant amount of ESOs contribute to the benefit of the county and its community members. A small portion of the ESOs that were identified were able to contribute to the data that was collected and provided sufficient information for baseline analysis of stewardship health and community engagement in Los Angeles County and the City of Los Angeles.

Discussion of results of application of method

The survey canvassed ESOs across Los Angeles County, the largest and most populated area surveyed to date under the STEW-Map project. Without the financial support and the labor pool traditionally found for the decadal Census Survey, it is challenging to canvas the terrain of Los Angeles County in order to properly identify and survey 100% of the ESOs that could possibly be found within the county. The results of the snapshot of ESOs found in Los Angeles County from 2014 to 2015 was sufficient enough to be able to provide a glimpse of the impact that ESOs have within the Los Angeles area and its communities in how the ESOs are distributed. The number of respondents who participated contributed to a project that has the potential to share a vast amount of information that included the geographical information of ESOs. The geographical information may be disseminated in order to analyze several narratives regarding ESOs and their networks. The geographical information has the potential of

developing results similar to what has transpired in New York and Baltimore while also producing its own visual story that provides it a distinctive characteristic unique to Los Angeles.

With the land area of Los Angeles County being ninety percent greater than previous land areas, surveying a vast landscape provided challenges that may have limited the possible number of respondents. However, the data that was collected has the ability of providing a benchmark of the ESOs found in Los Angeles County. Although the data may not be truly comparable to the data that has been collected for New York and Baltimore, it provides enough of a comparison among the notable cities and areas of the United States to evaluate ESO contribution and distribution.

The STEW-Map survey was the key piece in the collection of the data for LA STEW-Map. The process of collecting the data may have been challenging, but the data that was collected was able to provide an overview of the ESO makeup, their philosophy, their mission, subsistence, primary focus, and other organizational and operational questions by responding to a select open-ended questions contained within the survey. One of these open-ended questions was the questions regarding physical address that is to be referenced as the headquarters or base of operations and describing the stewardship boundary. The physical location or address was typically provided in the United States Postal Service mailing address style while some organizations provided locations that needed to be researched further in order to create a drop pin to be geocoded.

Stewardship boundaries or turfs were provided as a textual cartographical description that provided the north, west, east, and south boundaries of the turfs. These descriptions

provided the basis in the development of the turfs layer that was combined with Census tracts and provided the basis of correlation to the demographics of Los Angeles.

Discussion of descriptive analysis

The focus of this study is to analyze the spatial distribution of ESOs in comparison to the social demographics of the Los Angeles County and Los Angeles City. By looking at the two significantly different spatial areas, one produces a broad scope of the overall conditions and situations presented for the county as a whole while the other focused solely on conditions found in the city. By narrowing the focus to focus on the City of Los Angeles, the study is able to create a deeper understanding in the distribution of ESOs.

With Los Angeles County having provided a vast space with turfs that cross city boundaries and in particular contained turfs that were “blankets” across the county, the COType produced results that is able to provide the guidance necessary in which direction to focus the establishment of ESOs. The general outlook of the nature of development of ESOs within Los Angeles County is to assume that the progression of ESO development will be similar to that of the distributional ellipse. With the distributional ellipse depicting the distribution direction in the direction of the eastern region of the county and the far reaches of Antelope Valley, these areas are locations in which there is a higher than normal concentration of minority population.

Narrowing the focus to just the City of Los Angeles, the same concepts and analysis are used and mimicked. COType is able to focus within the city boundaries for the analysis where the fixed distance band is much smaller than it was for the county COtype, but produces a snapshot of locations where High-High Cluster of organizations when compared to the variants

of this study. By comparing the count of organizations with the total minority population and Federal Poverty Level below 100%, a visual of the landscape was obtained in order to display the locations in which organizations provided a presence and provided a type of steward activity that helped benefit the community.

Discussion of tests of hypotheses

The empirical research of this study is understanding the distribution of ESOs in Los Angeles County. The following null hypothesis and alternative hypothesis were tested for the purpose of this study.

H_0: ESOs are distributed in an evenly dispersed pattern across Los Angeles County.

H_1: ESOs are not distributed in an evenly dispersed pattern across Los Angeles County.

Figure 12 characterized the eastern and western halves of Los Angeles County that is depicted by the "not significant" area in which the influence by ESOs in relation to the minority demographics of Los Angeles County to not play a significant role. The distinction between the eastern half and the western half of Los Angeles County drew initial attention that H_0 contained a significantly high chance of being rejected. Under further analysis the H_0 was rejected and the H_1 was accepted.

The H_0 was rejected because of the significance of the large areas of Los Angeles County in the eastern half of the region that contained a p value of 0.01 and below. These same areas compared to the Z-score of Los Angeles County (Figure 10) provided similar areas with significantly high positive Z-scores. This same area has been classified as a Low-Low cluster in

which all of the adjacent features contain little to no influence by ESOs in relation to demographics of the eastern region of Los Angeles County.

Under closer inspection in analyzing the distribution of ESOs in Los Angeles City (Figure 18), there are less significant clusters and more insignificant space of ESO influence in relation to the minority demographics. Focusing at the bottom tip of the map where San Pedro and Long Beach are located. Most importantly these are areas in which the Port of Los Angeles and the Port of Long Beach are located.

The San Pedro-Long Beach area of Figure 18 is dominated by areas classified as “not significant”. These areas can be assumed to have little to now influence by ESOs. Through the validation process in comparing the Z-score (Figure 16) and p value (Figure 17), the San Pedro-Long Beach area provides a level of activity not replicated on the CO Type figure. This is because the Z-score for the Long Beach area was within the range of -1.96 and -1.65. In most cases this Z-score would have been considered a significant value. However, when the same area was compared to the p value, the probability that this area is random was high. The combination of an insignificant Z-score with a high p value posed this region to be classified as having an insignificant relation between ESOs and the demographics of the area. This could be due to the fact that this area is mostly industrial and may contain a significantly limited population base in relation to the rest of the study area. In comparison, the Eagle Rock area provided a significantly high positive Z-score and a significantly low p value. When the values were combined they generated a High-High cluster demonstrating a high level of influence by ESOs in relation to the demographics of the area.

Through the use of the average nearest-neighbor, distribution ellipse, and the CO type figures for both Los Angeles County and Los Angeles City, it is clear to reject the null hypothesis that ESOs are distributed in an evenly dispersed pattern and accept the alternative hypothesis the ESOs are not distributed in an evenly dispersed pattern.

Chapter 6: Conclusion

Summary

The County of Los Angles provides a mammoth of a landscape in comparison to previous STEW-Map projects. The landscape found in Los Angeles has made it possible for ESOs with various foci to be able to develop a niche for themselves. The unfamiliar landscape of ESOs lent to addressing the challenge of developing a better understanding of who they are, what they do, why they do what they do, and how do they accomplish what they do as stewards of the environment. Los Angeles will continue to urbanize in a similar fashion as global urbanization. The only difference is how the community is able to gather together in developing sustainable and resilient practices towards climate action. ESOs contribute in developing these practices and LA STEW-Map assisted by developing the benchmark that identified and located ESOs within the county. ESOs drive community action that drive community empowerment. The benchmark established in the initial LA STEW-Map will allow for a comparison to future transformations as the county is a living organism that undergoes continuous change.

Conclusions

The focus of this study was to understand how ESOs have been distributed across Los Angeles County and more specifically across the City of Los Angeles. Through the assistance of the geographical information system that provided the capability of conducting spatial autocorrelation, it is apparent that there is not an equal distribution of ESOs across Los Angeles. The needs of the community continue to expand into different areas to requiring an improvement to be made in order to improve the quality of life in various neighborhoods and

the insurance of environmental equity. Currently with the lack of a central database or a central location in which all of the ESO information is gathered and stored, it is difficult for organizations to cohesively work with one another to maximize their overlapping resources that would benefit the communities they provide services to.

As ESOs and other community groups play an important role within their community, there is a lack of knowledge regarding organizations classified as environmental stewards. With the absence of a database to collect all of the information, the preliminary results show that the organizations have been distributed in a cluster pattern. Although the direction of the pattern of identified ESOs are distributed from a northwest to southeast direction, the cluster pattern for those organizations that participated in providing data for the purpose of this study was contained in a tight ellipse focused around Downtown Los Angeles, the heart of the urban center. The turf boundary map also depicted a greater number of turfs that occupied the western region of the county in comparison to that of the eastern region of the county with a clear divide through the center of the county down through Downtown Los Angeles.

Through a broad analysis of the correlation of ESO turfs in relation to the demographics of Los Angeles County, it is distinguishable lack of ESO influence in the eastern region of Los Angeles in comparison to the ESO influence in the western region of Los Angeles. The directional distribution ellipse depicts that there may be a correlation in the physical locations that ESOs have established their physical presence within the community. This can be further compared as these results provide a benchmark for further analysis.

It can be assumed that there are more readily resources available in the affluent communities and neighborhoods where the ESO turf presence is greater in comparison to that

found in impoverished communities. There is a possibility that impoverished communities are benefiting from the presence of an ESO that is providing services locally to them; however due to the lack of participation it is difficult to determine if this is true or not.

Implications

The implications of this study suggest that the eastern region of Los Angeles County is lacking in the beneficial influence of having the presence of ESOs within those communities. With the large majority of the working minority class living in the eastern region, the benefits of ESO would help to establish an environmental mentality throughout the county. By educating the entirety of the community regarding the benefits of environmentalism and establishing a foundation of community-based action through the grassroots efforts established by ESOs, Los Angeles County can become a leader in setting climate action initiatives.

Currently Los Angeles City is establishing itself as a leader in sustainability and resiliency without the incorporation of other cities within the county. Through the incorporation of the ESO spatial stories provided by the geographical tool, county community members have the capability of establishing themselves as regional leaders for urban resilience and sustainability.

These visual stories will be able to empower the community in becoming knowledgeable in locations that benefit from the presence of ESOs and locations that they may provide their services in. Providing an instrument of communication that opens the doors for community engagement that facilitates the social bond among the various minority groups found in Los Angeles. Breaking down the racial barriers that has been the root cause of the systemic issues in the Los Angeles area uplifts community engagement that reinforces the transformation of the network allowing for the revitalization of urban ecosystems and human communities. The

diversion of exploiting the less fortunate by increasing the presence and distribution of ESOs in impoverished areas increases the advocacy for the less fortunate and decreases the probability for the existence of environmental injustice.

Limitations

The study was limited by the study area with the overall land area and the overwhelming population, the response rate was low and may not provide as thorough of a picture as had anticipated. In order to gather the most complete and thorough qualitative and quantitative analysis of ESOs within Los Angeles City and Los Angeles County, it would require ESO participation from all areas of Los Angeles County. This may require outreach and education to potential respondents so that they understand that they fit the broad definition of an environmental stewardship organization. This may also require training in best practices for survey response collection. In order to increase the respondent rate, it may include but may not be limited to the developing the capability of canvassing the terrain in order to identify the ESOs in order to ensure that the surveys are conducted as efficiently as possible. This may also allow for a greater response rate in order to produce a more thorough qualitative and quantitative results with a more appropriate sample size.

The respondents of the survey also contributed to the compounding limiting human factor of the results. Dependent on the interpretation of the questions by the respondent, determined the interpretation of the responses that were provided. The responses may or may not have contained a personal bias of the respondent and the intentions for completing the survey. The results were dependent on how clear and concise the respondent was in answering

the questions, specifically the stewardship turf boundaries, this may or may change the results of the spatial analysis conducted as a result of the scope of this study.

Suggestions for future research

Exploratory analysis that further conducts a regression analysis on the data, reported funding and funding sources. This may provide to be beneficial for ESOs interested in collaboration, knowledge sharing, or developing informed decisions.

Developing best practices when surveying a specific group or subset of a population that is dispersed across a massive landscape. These practices can then be mimicked in other areas when surveying combined statistical areas (CSAs). Combined statistical areas consist of two or more adjacent metropolitan and micropolitan areas that have substantial employment interchange (Census 2017)

LA Stew-MAP covers a vast area with a population size that is greatly significant in comparison to other Stew-MAP city projects. Educating the community about this project in order to gain an increase of willing participants will develop a more thorough analysis of the ESO turfs and participants within this area. With ESO turfs generally crossing county boundaries, perhaps a future a STEW-Map analysis that gathers data from the regionional perspective of the five-counties (Los Angeles, Orange, Riverside, San Bernardino, and Ventura) may provide a more thorough scope of the stewardship that is occurring in and around Los Angeles County and its neighboring counties.

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Appendix

STEW-Map Survey

Section 1: Contact information

Your personal information is confidential. We will not share your name, personal email, personal phone number, or other identifying information with anyone outside of the research team. We may contact you if we have questions about information you provide on this survey.

Your Name: _____

Your Phone Number: (_____) _____ - _____

Your E-mail: _____

Section 2: Basic Information about your group/organization

If you are affiliated with more than one group or organization, please fill out the survey for each group. If you are not able to answer all of the questions, please reach out to someone else in your group or organization and ask them to fill out the survey.

Group/Organization Name: _____

Website (if available): _____

Mailing Address: _____
(with city/state/zip) _____

Group/Organization E-mail: _____

Group/Organization Phone Number: (_____) _____-_____

Does your group/organization wish to be on the online stewardship map?
The information associated with your group on the map will be limited to group/organization name, website, mailing address, group/organization email, and group/organization phone number – plus your stewardship territory, which will be addressed later in the survey.

Yes _____ No _____

Section 3: General stewardship activities

Does your group/organization do any of the following? Please select all that apply.

☐ Conserve or preserve the local environment?

☐ Take care of a place in the local environment (for example, a community garden, a block of street trees, an empty lot, a riverbank, a schoolyard, a forest preserve)?

☐ Restore or transform local habitat (e.g., daylighting a stream, brownfield to prairie restorations)?

☐ Monitor the quality of the local environment? This can include monitoring air or water quality, dumping, or species monitoring.

☐ Advocate for the local environment?

☐ Educate the public about the local environment?

[In the electronic version of the survey, if none of the above are selected, a pop-up appears that says "Thank you for your interest in filling out this survey. Your group's work does not meet our definition of environmental stewardship so we have no further questions. If you feel you have gotten this in error, please go back to the survey and continue."]

Section 4: Basic information about your group/organization

What is your group/organization's legal designation?

Please choose the most appropriate response.

☐ 501(c)(3) (or has applied)

☐ 501 (c)(4) (or has applied)

☐ Community group/organization without 501(c)(3) or 501(c)(4) status (for example, a community garden group or block club)

☐ Local government agency

☐ State government agency

☐ Federal government agency

☐ Public administration district

☐ Private firm, for-profit business

☐ Other – please specify: _____

What does your group/organization work on?
Please choose all that apply.

☐ Public health (including mental health, crisis intervention, health care)

☐ Education

☐ Transportation

☐ Housing and shelter

☐ Community improvement and capacity building

☐ Environment (including gardening, forestry, ecological restoration, water and air protection, and land management)

☐ Toxics/pollution related

☐ Animal related

☐ Human services (including day care, family services)

☐ Youth

☐ Economic development

☐ Employment, job related

☐ Legal services, civil rights

☐ Arts, culture, creative practices

☐ Recreation and sports (including birding and fishing)

☐ Crime, criminal justice

☐ International, foreign affairs, and national security

☐ Research in science and/or technology

☐ Faith-based activities

☐ Power/electricity generation

☐ Energy Efficiency

☐ Private grantmaking foundation

☐ Seniors

☐ Food

☐ Other – please specify: _____

If you had to choose just one activity, what would you say is your group's *primary* focus?
Please choose one.

☐ Public health (including mental health, crisis intervention, health care)
☐ Education
☐ Transportation
☐ Housing and shelter
☐ Community improvement and capacity building
☐ Environment (including gardening, forestry, ecological restoration, water and air protection, and land management)
☐ Toxics/pollution related
☐ Animal related
☐ Human services (including day care, family services)
☐ Youth
☐ Economic development
☐ Employment, job related
☐ Legal services, civil rights
☐ Arts, culture, creative practices
☐ Recreation and sports (including birding and fishing)
☐ Crime, criminal justice
☐ International, foreign affairs, and national security
☐ Research in science and/or technology
☐ Faith-based activities
☐ Power/electricity generation
☐ Energy Efficiency
☐ Private grantmaking foundation
☐ Seniors
☐ Food
☐ Other – please specify: _____

Section 5: Your group/organization's stewardship activities

Considering all of the programs, activities, and services your group/organization works on, what percentage of your group/organization's effort has been for environmental stewardship during the past year?

Please select one.

☐0-19%
☐20-39%
☐40-59%
☐60-79%
☐80-100%

What type(s) of setting has your group/organization physically done stewardship work in within the past year?

Please choose all that apply.

Water & Water-Related

☐ Watershed / Sewershed

☐ Stream / River / Canal

☐ Waterfront / Beach / Shoreline

☐ Wetland

Land

☐ Natural / Restoration Area

☐ Prairie

☐ Forest/Woodland

☐ Park

☐ Community Garden

☐ Urban farm

☐ Playing field / Ball field / playground?

☐ Dog run or dog park

☐ Botanical Garden/Arboretum

☐ Trails / Bike paths / Greenway / Rail-trail

☐ Public Right of Way (Street ends, roadside, traffic island, greenstreet)

☐ Street Tree

Building

☐ Residential building grounds (apartment courtyard, back yard, etc.)

☐ Vacant land/Vacant lot

☐ School yard or grounds; outdoor classroom

☐ Grounds of public building other than school (e.g. city hall, library, hospital)

☐ Courtyard / Atrium / Plaza

☐ Flower box / Planter

☐ Rain gardens, rain barrels, permeable pavement, bioswales

☐ Green buildings

☐ Rooftop

☐ Brownfield property

☐ Recreation center

☐ Other – please specify: _____

Please tell us in your own words *why* your group/organization does stewardship work.

Section 6: Where your group/organization does stewardship

Please describe in detail the boundaries of where your group/organization has physically done stewardship work within the past year. You can list multiple locations.

Examples: "Griffith Park" —"Northeast corner of Kenneth Hahn State Park" —"Chavez Ravine Arboretum" —"ZIP code XXXXX" —"the Watts neighborhood" —"Los Angeles County" —"shoreline of the Santa Monica Bay" —"Statewide in California, Arizona, and New Mexico" —"the community garden at 4712 S Vermont Ave"

Does your group/organization have a Geographic Information System (GIS) file showing the boundaries of where you have done stewardship work within the past year?

☐ Yes ☐ No

Who owns the property or properties on which your group/organization has physically done stewardship work within the past year?
Please choose all that apply.

☐ Federal government

☐ State government

☐ County government

☐ City/Local government

☐ Other government (e.g. Port Authority)

☐ Individual

☐ Corporation (including joint ventures, real estate investment groups)

☐ Nonprofit

☐ Don't know

☐ Other – please specify: _____

Who is the owner of the *primary* property or properties on which your group/organization has done stewardship work within the past year?
Please choose one.

☐ Federal government

☐ State government

☐ County government

☐ City/Local government

☐ Other government (e.g. Port Authority)

☐ Individual

☐ Corporation (including joint ventures, real estate investment groups)

☐ Nonprofit

☐ Don't know

☐ Other – please specify: _____

Section 7: The structure of your group/organization

What year was your group/organization founded? _____

Note: for national or regional groups/organizations please tell us the approximate year your chapter was founded.

***Approximately* how many of the following does your group/organization have:**

Note: for national groups/organizations please provide regional information.

Full-time Staff: _____
Part-time Staff: _____
Members: _____
Regular Volunteers: _____

Note: regular volunteers are those who routinely volunteer in your group/organization's activities. This is different from volunteers who may come out for a single work day.

For those volunteers who come out occasionally, can you *estimate* the total number of hours they contribute per month?

Hours: _____

What is your group/organization's *estimated* annual budget for the current year?

$_____ ☐ Prefer not to answer

What is your primary funding source?

Please select one.

☐ Government agencies
☐ Foundations
☐ Endowment
☐ Individual memberships
☐ Fees/program income
☐ Corporate giving/sponsorship
☐ Other: _____

Section 8: Organizational Services

What types of services does your group/organization provide?
Please select all that apply.

- ☐ Educational curricula
- ☐ Legal resources
- ☐ Buildings/facilities
- ☐ Plant materials/equipment
- ☐ Technical assistance
- ☐ Labor (volunteers/students/interns)
- ☐ Grants
- ☐ Community organizing
- ☐ Computing / internet
- ☐ Public relations/outreach
- ☐ Data
- ☐ Other: _____

How does your group/organization share information with the public?
Please select all that apply.

- ☐ N/A, we don't share information
- ☐ National media
- ☐ Local media
- ☐ Direct mailing / newsletters
- ☐ Door-to-door outreach
- ☐ Flyers / signs
- ☐ Website
- ☐ Listserv
- ☐ Blog
- ☐ National conferences/meetings
- ☐ Regional conferences/meetings
- ☐ City conferences/meetings
- ☐ Neighborhood-based conferences/meetings
- ☐ Radio
- ☐ TV
- ☐ Other: _____

Section 9: Stewardship Networking

Please tell us about your group/organization's relationship to other groups/organizations. Please list one group/organization per box, additional boxes will appear if you need them.

Please list groups/organizations with which you regularly collaborate on stewardship or environment-focused projects or programs. These may be community-based groups, nonprofits, private companies, faith-based organizations, etc. You can list as many as you wish.

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

[On the electronic version of the survey, additional entry slots will continue to appear as the existing ones fill up until the respondent has listed as many organizations as they wish.]

Please list group/organizations that you go to for advice, data, or expertise related to stewardship or environmental issues. You can list as many as you wish.

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

[On the electronic version of the survey, additional entry slots will continue to appear as the existing ones fill up until the respondent has listed as many organizations as they wish.]

Please list groups/organizations/agencies from which you have gotten funding in the last two years. You can list as many as you wish.

_____ _____
_____ _____
_____ _____
_____ _____
_____ _____

[On the electronic version of the survey, additional entry slots will continue to appear as the existing ones fill up until the respondent has listed as many organizations as they wish.]

Section 9: Final Section

Is there anything else you would like to tell us about your group/organization or this survey?

This concludes the STEW-MAP assessment.
Thank you for your participation.