Salisbury UNIVERSITY

Honors College

Honors Thesis

An Honors Thesis Titled

Addressing Environmental Injustice: The Viability of Community-Based Planning

Submitted in partial fulfillment of the requirements for the Honors Designation to the

Honors College

of

Salisbury University

in the Major Department of

Environmental Studies and Geography

by

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Date and Place of Oral Presentation: 24th Annual Critical Geography Conference Pennsylvania State University October 27-28, 2017

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Introduction

The problems posed in cases of environmental injustice, which is largely based on the disproportionate exposure of poor and minority populations to environmental harms and hazards, and their lack of influence in and access to planning and decision making, are further exacerbated by standard mainstream data collection and mapmaking. This inextricable link between environmental injustice and planning is strongly revealed even when one simply looks at the city of New Orleans, a place where post-Hurricane Katrina rebuilding and recovery seems to reflect the city's history of inequality in both the environmental and planning decision making processes. Post-Katrina New Orleans is therefore a key case study to highlight the difficulties and barriers of critical case study analysis, particularly as they relate to the limitations and bias of existing available data and maps.

The research described and analyzed in this thesis aims to answer the following question: how can community-based planning and critical GIS be implemented as solutions to address environmental injustice, using post-Katrina New Orleans as a case study? The information obtained via an applied mixed-methods study reveals that a critical approach to GIS, paired with a community-based approach to planning, is necessary for the improved collection of data that represents the multiple stakeholders and values present in cases of environmental injustices, especially those stakeholders that are underserved and marginalized. This critical and participatory approach will, in turn, lead to the development of maps better suited to assist local government, activists, and the general public in addressing the harsh realities that communities suffering from environmental injustice face.

Environmental Justice: An Overview

Environmental justice is commonly recognized as the right of all people and communities to equal protection under environmental and public health laws and regulations (Claudio, 2007). The United States Environmental Protection Agency defines environmental justice as "the fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income, with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies" (EPA, 2017). It is important to identify and understand this definition because this definition informs any government work related to addressing environmental injustice. Environmental injustice has become a world-wide phenomenon enveloping many countries, where people who are deemed to be less than by the larger society are disproportionately at risk for exposure to a variety of environmental hazards that can inflict severe harm (Claudio, 2007). Led by African Americans, Latinos, Asians, Pacific Islanders, Native Americans, working class whites, and especially women of all backgrounds, the environmental justice movement is largely aimed at fighting the statistical fact that minorities and the poor are most commonly those who live and work in the most polluted environments, and achieving high quality environmental health for all people (Skelton and Miller, 2016).

The deep roots of the modern environmental justice movement can be traced back several decades. Cesar Chavez's organization of Latino farm workers and their fight for labor rights in California in the 1960s included the fight for protection from harmful pesticides and other chemicals. Another early example is the Houston-based and African American student led protests against the siting of a municipal garbage dump in a predominately African American community. However, it is largely agreed upon that the

true beginning of America's recognized environmental justice movement was the 1982 fight against the dumping of toxic PCB waste in a landfill located in the rural and poor African American majority community of Afton, in Warren County, North Carolina. Despite being unsuccessful, the movement in Warren County fueled a rise in community-based grassroots activism against the targeting of disadvantaged communities for the siting of hazardous facilities. These early actions also fueled the environmental justice movement as an extension of the country's civil rights movement, with environmental racism identified as another facet of the overall racism that minorities face in most other aspects of life (Skelton and Miller, 2016). Other sources that shaped the early formation of environmental injustices were national transportation and housing policies, including the location and concentration of housing projects, and the construction of highways through low income communities (Hall, 2017).

It was shortly after the protests in Afton, North Carolina that community groups and researchers began to recognize the national patterns of environmental injustice. A 1983 study by the United States Congress General Accounting Office found that in eight southeastern states, seventy-five percent of hazardous waste landfills were located in low-income Latino and African American communities. The study also found that the poor and minorities in the United States suffered from not only significantly higher hazard exposure, but also from higher cancer rates, asthma rates, mortality rates, and overall poorer health, all been linked to higher concentrations of environmental hazards and pollution in these communities (Diaz, 2016). Low-income and minority communities, suffering from discrimination and economic depression, therefore have less access to safe environments and high-quality environmental protection (Claudio, 2007; Gelobter, 1993; Cutter, 1995).

The disproportionate siting of pollution-producing industries in poor and minority communities occurs for the following reasons: these communities largely lack access to and connections with the city councils and zoning boards responsible for the siting of these facilities, the residents are mostly unable to afford the legal and technical expertise required to halt this injustice, and they have limited access to information on the impacts of these industries on their health and overall wellbeing. The United Church of Christ's Commission for Racial Justice 1987 report entitled *Toxic Wastes and Race in the United States* also found that federal, state, and local land-use policies contributed to the statistical correlation between the location of hazardous facilities and race (Skelton and Miller, 2016). The United States Environmental Protection Agency's 1992 Environmental Equity Workgroup report subsequently reaffirmed the strong correlation between the percentage of minority residents living in a community and the location of commercial hazardous facilities in those communities (Cutter, 1995). Finally, on February 11, 1994, President Clinton made environmental injustice federal policy with the signing of Executive Order 12898. This directs all federal agencies to identify, address, and prevent the disproportionate negative impacts of federal policies and programs on minorities and low-income people (Skelton and Miller, 2016).

Since the establishment of the environmental justice movement, significant research has been completed to identify the factors that cause this suffering. Institutionalized networks of class and race are commonly identified as fueling the environmental injustices facing low-income and minority communities. Land speculation and the long-term investment interests of developers are also two important factors shaping how land is valued by people outside of the community (Gelobter, 1993). The discriminatory siting of

hazardous facilities is another important factor, especially because corporations target low-income and minority communities as locations for these facilities due to their limited access to political capital and other resources. The lack of community and individual access to political power and influence therefore fuels disproportionate exposure to environmental hazards. The unequal enforcement of environmental laws and regulations, market dynamics, less access to education, higher vulnerability to misinformation, and higher levels of suspicion are also all important factors that lead to environmental injustice (Diaz, 2016; Helfand, 1999).

Overall, environmental justice issues have become increasingly well-known and researched in recent decades, with the development of the following conclusions as a result. The first is that when it comes to hazardous facilities and waste, there is disproportionate exposure to several groups within society, and disadvantaged communities suffer the most from environmental hazards and degradation (Claudio, 2007). This is largely due to these population's limited access to resources such as political capital, technical expertise, and accurate information (Diaz, 2016). Disproportionate exposure to environmental hazards is therefore driven by the widespread and institutionalized discrimination based on race and class that has infiltrated social, political, and economic processes (Gelobter, 1993).

New Orleans Background

As a city within the state of Louisiana, New Orleans has a long history of environmental injustice. For centuries, the city's social, political, and economic institutions have been dominated by racism and discrimination. It is also unfortunate but true that this has resulted in the explicit and implicit forcing of minorities and the poor into settlement locations and living conditions that increase their exposure to environmental hazards and

natural disasters, with limited opportunities for precaution, protection, and recovery (Morse, 2008). Environmental inequity, throughout the city's history, has also been manifested as an uneven vulnerability landscape due to class and race segregation. This discrimination resulted in minority and low-income residents only being able to afford housing located on the city's lowest-lying and poorly-drained swamp land. Therefore, these populations were disproportionately harmed by flooding because, unlike the city's wealthy and white residents, they were not as protected by the original natural levees. This housing segregation was also fueled by municipal ordinances and deed covenants that excluded minorities, especially African Americans, from accessing housing in designated areas (Colten, 2005).

The city's poorest communities, located in low-lying and saturated land, were also most impacted by disease outbreaks, and were unable to flee the summer epidemics like their wealthier counterparts. For example, the malaria death rate for African Americans remained significantly higher than for the white population after improved drainage was achieved in several parts of the city. The people living in these highly at-risk areas also have the least access to public services and necessary resources. The Jim Crow mentality of the early twentieth century, for example, resulted in low-lying minority communities suffering a delay in their access to sewer and water service. It is therefore true that throughout the majority of New Orleans' history, the poor and minorities have been the victims of unequal suffering due to preexisting inequities (Colten, 2005).

Also, over time, the city's heavy industries began to cluster around poor and minority communities, primarily because of the cheap land and relatively limited resistance of the locals. Therefore, not only have poor and minority residents been essentially forced to live in these areas due to poverty and discrimination, but their existing communities are increasingly

becoming home to hazardous industries and facilities (Morse, 2008). One major source of environmental injustice in New Orleans historically is and continues to be the large number of hazardous sites, such as Superfund sites, Total Release Inventory (TRI) sites, and closed landfills, located within the city and follow a disproportionate geographic distribution (Morse, 2008). For example, in 1909 the city opened the Agriculture Street dump adjacent to a low-income neighborhood on poorly drained land in the city's Ninth Ward. Beginning in the 1950s, the city of New Orleans also began to establish housing developments for African Americans on the land surrounding the dump. The dump closed in 1965, was identified as a Superfund site in 1994, and despite remediation having been completed in 2002, the site continues to harm the local residents via property devaluation and long-term health problems (Colten, 2005; EPA, 2017).

Hurricane Katrina Background

Given that the city of New Orleans has a long history of environmental injustice, it comes as no surprise to most scholars that Hurricane Katrina had disproportionate impacts on the city's most vulnerable communities. On August 29, 2005, Hurricane Katrina made landfall in the United States as the third strongest and the largest hurricane to do so in the country's history at that time (Do Something, n.d.). The storm and its surge caused severe levee failure in New Orleans, and subsequently caused eighty-percent of the city to flood (The Data Center, 2016). Unfortunately, in addition to striking a city that is largely located below sea level and therefore very susceptible to flooding, Hurricane Katrina also struck a city that continues to struggle with significant social and economic disparities and discrimination, resulting in the storm's damage disproportionately harming the poor and unemployed, the African American community, and renters (Logan, 2006). For example,

the implementation of federal transportation and housing policies resulted in over one hundred and fifty thousand city residents lacking access to personal automobiles, an isolation that proved disastrous when attempting to complete evacuations (Morse, 2008). The evacuation process for Hurricane Katrina also revealed the relationship between the city's topography and the race and class discrimination. Specifically, white and/or financially stable residents had cars to evacuate, had money for emergency hotels and supplies, and had insurance policies to support them once they returned (Smith, 2006). The social groups and communities with the least access to resources however, were those most affected by the storm and its aftermath (Logan, 2006).

Racial minorities, specifically African Americans, were especially harmed by this event in New Orleans. Seventy-five percent of those living in damaged areas were African Americans, and the New Orleans Parish population was 66.7% African American at the time (Nowakowski, 2015). Also, in the Lower Ninth Ward and New Orleans East communities where most residences were damaged, over eighty-five percent of the residents were African American (Logan, 2006). This racial disparity in exposure to storm damage is the result of the city's history of African Americans, and other racial minorities, having no other option but to settle in the lowest-lying lands that have the highest risk of flooding and the least access to transportation for evacuation (Morse, 2008).

Even the recovery process in post-Katrina New Orleans reflected and continues to reflect the city's patterns of environmental injustice. Surveys have found that improvements made to the city since Hurricane Katrina have largely benefited whites, while most African Americans have worse perceptions concerning both their continuing struggles and how much progress has occurred. Also, only a small proportion of people feel that the recovery efforts

in the city have done a lot to help minorities, middle class people, and/or the poor. Residents living in poor and minority communities were experiencing already difficult economic realities before Hurricane Katrina occurred, living with significantly lower employment rates and median household incomes, and these disparities continue as marginalized communities are left behind by recovery efforts. Minorities and the poor also struggle with disparities when it comes to their concern for the future. For example, African Americans, because they are more likely to live in flood-prone areas, are more concerned about future levee breaches. They are also less optimistic about the future state of their communities, stating that not only do their neighborhoods have limited access to services and amenities, but also that now is not a good time for children to be growing up in New Orleans (Hamel, Firth, and Brodie, 2015).

Critical GIS Background

Geographic Information Systems, more commonly known as GIS, are computer systems and programs used to capture, store, analyze, and/or display a variety of geographically-related data. In the past several decades, GIS has become increasingly popular in the private, public, and nonprofit sectors, and this has subsequently resulted in a proliferation of the mainstream approach to and use of GIS. The mainstream approach to GIS is characterized by rational strategic production and the positivist model of knowledge use. It therefore argues that technocratic experts should be the ones who make politically unbiased decisions via the use of formal information and data, such as maps and statistics, in addition to claims of being value-neutral and objective. However, all decisions are made within political, social, and cultural contexts that are specific to a certain time and location, and the assumptions made by this approach to GIS are therefore problematic. It is also true that the decision making process can be harmed by this approach, because it deters non-experts, such as the general public, from becoming involved, thereby ignoring their values.

The impacts of GIS are very much based on the social and political context within which it is being used, as well as the distribution of power among different actors and types of knowledge within the given context. The increasing incorporation of GIS technology in planning initiatives also has the potential to influence and/or alter political and social relationships, relationships that structure the framework of participation in the decision making process. The use of GIS within decision-making processes, including planning, must therefore not fall prey to the assumptions of the mainstream approach, but instead take a more critical view of GIS (Holden, 2000; Elwood, 2001; Weiner, 2002).

As a whole, the field of critical GIS research first emerged as a social-theoretical debate and critique focused on the complex and contradictory character of GIS technology within the field of geography, but over time came to focus on the technology's more widespread political and social implications and hegemonic power dealings. For example, it is argued that GIS, as a tool influencing access to information, is very much linked with both marginalization and empowerment (Aitken, 1995; Elwood, 2001). These debates and research also included discussion concerning how GIS technology influences distributions and negotiations of power. Critical GIS therefore aims to challenge the assumptions of mainstream GIS, and argues that as a social construct, the use and products of GIS cannot be seen as unbiased, and because of this one must always consider the data source, collection methods, etc., when mapping (especially when it influences the decision-making process). Critical GIS also aims to make the use of GIS more inclusive. Specifically, this approach to GIS argues that professionals should not label themselves experts in comparison to the communities that they serve because this prevents them from recognizing the value of local knowledge, further relating to the concern that the mainstream approach to GIS leads to the

exclusion of non-traditional sources of logic and knowledge. The incorporation of a critical GIS framework is therefore necessary for the improvement of the decision making process because it extends the technology's representational capacities and facilitates the inclusion of non-traditional sources of information in the decision making process. Critical GIS also supports the view that this kind of work cannot be separated from the political and social settings within which it occurs. Therefore, GIS has the ability to not only mitigate social and geographical inequalities, but also enhance them if those in charge do not recognize the existing inequality in access to GIS and the information that it produces (Holden, 2000; Sheppard, 1997: Aitken, 1995; Elwood, 2001; Weiner, 2002).

The critical GIS debate and field of research has also focused on the possibility that the increasing use of GIS technology can do one of two things: consolidate the existing power of current decision makers, thereby increasing community marginalization, or facilitate the empowerment of traditionally marginalized stakeholders. Another important aspect of critical GIS, as opposed to the mainstream approach to GIS and its focus on rational strategic production, is that critical GIS incorporates communicative rationality. Communicative rationality recognizes the value of both daily processes and dialogue, and the influence of these on the decision making process. The framework of critical GIS also calls for and supports participatory planning within local communities, as this fosters consensus and mutual understanding as opposed to discourse domination. A participatory community-based approach to planning would therefore benefit from critical GIS, because the integration of these two practices would lead to not only more evenly distributed input opportunities, but also more inclusive and meaningful debate about the planning and land use projects that impact local communities. This is especially important as a solution to the harmful trend in

government of separating planning decisions from involved and impactful participation. One potential action is to establish complementary community and government GIS, which could improve communication and the opportunity for meaningful participation that actually can influence the decision making process. Overall, if integrated and implemented in a meaningful way, critical GIS has the potential to be a driver of community-based participatory planning (Holden, 2000; Aitken, 1995; Elwood, 2001).

Importance and Relevance of Research Topic and Chosen Case Study

Environmental injustice and disproportionate exposure to environmental hazards are real issues that impact millions of people across the country. This is also an issue that is harmful not only to the physical environment, but also to peoples' lives. For example, more than fifty percent of all Americans who live within two miles of a toxic waste facility are people of color, and disenfranchised low-income and minority communities are disproportionately affected by the impacts of climate change (Bell, 2016). Currently, many minority and/or low-income communities are more or less the designated location for locally unwanted land uses (LULUs). There are also many places where zoning allows for heavy industry and residential development to be located side by side, with minimal to no protective buffer. Systematic and institutionalized processes have resulted in this inequality for decades, and it is sure to continue unless people begin to act and develop real solutions. It is also unfortunate but true that our current regulatory systems do not sufficiently (or in many cases at all) protect those who are forced to suffer environmental injustices because of where they live (Lerner, 2010). This area of study is therefore significant because without this kind of research, local communities and governments will never be able to unite against environmental injustice.

The application of this research to the post-Katrina New Orleans case study is also important to the larger field of environmental justice. Environmental justice issues have been a significant part of the history of the city's poor and minority populations, primarily through inequalities associated with housing, health, and well-being that increase the vulnerability of these disenfranchised communities to natural disaster events (Allen, 2007). Hurricane Katrina is an especially excellent case study to examine for this topic, because an analysis of data collected by the Federal Emergency Management Agency revealed that the storm disproportionately impacted the poor and unemployed, those who could only afford to rent homes, and African Americans (Logan, 2006). The data also reveals that, in terms of the entire region impacted by Hurricane Katrina, communities with the least access to resources were the most affected by the storm's impacts. When considering the entire population of all damaged areas, 45.8% of the population was African American and 45.7% rented their housing. The population of all damaged areas also had a higher level of unemployment, had more people living below the poverty line, and had more people that lived in areas highly prone to flooding (Logan, 2006). The placement of poor and especially minority communities in flood-prone areas has been a historic process, occurring over many years as a result of both formal and informal discrimination. This reality has contributed to the high vulnerabilities of these communities to environmental hazards, which subsequently resulted in Hurricane Katrina's impacts being more devastating for the poor and minorities (Morse, 2008).

Introduction: A Mixed Methods Approach to Case Study Research

A mixed-methods approach was applied in the completion of this research, collecting and analyzing both qualitative and quantitative data from multiple and varied sources. This supported a better understanding and assessment of the research problem, by analyzing the

case study from more than one perspective (government, local community, academic). The following sections will provide more specific detail on and discussion of the multiple parts of the methodology that are first briefly outlined below.

This research methodology initially began with completing a thorough review and synthesis of the existing literature on the topics of environmental injustice, New Orleans, Hurricane Katrina, and critical GIS. Next, the researcher traveled to New Orleans to conduct site visits and Institutional Review Board (IRB)-approved interviews, and such approval was necessary due to the interaction with and collection of information from individuals. These interviews, and the following comparative analysis, allowed for the collection of qualitative data, the discovery of new information, and the making of direct observations about the case study.

Moving forward, the focus was to develop a critique of existing plans and a framework for a potential community-based planning approach to address environmental injustice. The first step in this endeavor was to analyze the Rebuilding New Orleans Plan, a planning document developed in the aftermath of Hurricane Katrina. This document analysis served well to supplement the interview findings and led to the development a more informed framework. The completion of a map analysis and the application of critical GIS were also important to challenging the positivist mainstream GIS and considering the political, social, and cultural contexts of the city.

Interviews with Stakeholder Representatives

The completion of interviews with case study experts is one of the key components of the methodology for this research. The first step in this process was identifying potential case study experts to interview. The selection of subjects via internet research resulted in a

list of individuals and groups with the necessary knowledge and the ability to provide insight from a variety of different perspectives. The list was further divided into the categories of government representatives/workers, representatives from non-government organizations, and academic experts, and the goal was to conduct an interview with at least one person from each of these categories. Once identified, emails were sent and phone calls were made to the people/organizations on the list, in order to determine who would be available for/interested in participating. This process occurred over several weeks, and ended with a final list of four individuals who agreed to be interviewed. Once this list was complete, the next step was to receive approval from Salisbury University's Institutional Review Board (IRB). This was a fairly involved process that required the following information in the application: who will be interviewed, what questions will be asked, the overall research topic, and how the results will be used in/contribute to the research. Overall, most questions were identical but each interview did have one or two questions that were based on the interviewee's background (government, non-profit, academia). The approval of these interviews by the IRB then triggered the final scheduling of the interviews, which took place between June 12th and June 18th during a research trip to New Orleans. The completed interview transcripts were then analyzed individually as well as comparatively. The following sections will discuss the contents, interpretation, and analysis of each interview. The first interview was with a representative of a local nonprofit organization based in the Lower Ninth Ward, the second interview was with a representative from the New Orleans Office of Homeland Security and Emergency Preparedness, the third interview was with a representative from a state-wide nonprofit organization, and the final interview was with a professor of Urban and Regional Planning from the University of New Orleans.

Interview 1: New Orleans Non-Government Organization Representative

The first interview was conducted on Monday June 12th, 2017, and it lasted from 12:45pm to 1:15pm. The interviewee was a representative from lowernine.org, a non-profit group based in the Lower Ninth Ward that was created shortly after Hurricane Katrina in order to assist residents in the process of rebuilding residential properties in the community. The main focus of this interview was to obtain information on the interviewee's experiences working with local government planners in the post-Katrina Lower Ninth Ward, and to ultimately discover how to increase and improve collaboration between local communities and the government when it comes to planning. The interviewee defined their community as the Lower Ninth Ward, an area bordered by the Industrial Canal, the Mississippi River, the parish line, and Bayou Bienvenue (including the not always recognized Holy Cross neighborhood as part of the Historic District). When it comes to environmental injustice in the Lower Ninth Ward, the interviewee identified the construction, dredging, and widening of canals as the main source, in addition to the destruction of wetlands. The interviewee also identified a lack of government culpability (both financial and other) as a major contributor to environmental injustice in the years following Hurricane Katrina, with a primary focus on the relationship between the Army Corps of Engineers and the levees.

The interviewee, given their experience working with underserved local communities, provided multiple concerns and suggestions in regards to community-government collaboration. Overall, the interviewee described current government as "not at all responsive to the concerns and/or needs of the local community", and therefore believes that stronger and more meaningful collaboration is needed. One specific concern is that some "quasi government offices" simply view mandated community engagement and outreach as

"just a box they have to check off", and this results in community input having essentially no impact on any decision making. Therefore, the interviewee believes that improved collaboration requires real community engagement that actually makes a difference. When it comes to the planning process specifically, the interviewee stated that the only communities that are really involved are those that have enough means, resources, and powerful members, and even then they still have to spend a great deal of time and energy to be heard. The interviewee went on to identify the unwillingness of decision makers as one of the main barriers to meaningful collaboration, in addition to the planners' lack of understanding about the history, values, and cultures of local communities, many of which "have been planned to death". When asked about their vision of inclusive planning, the interviewee's main focus was on the improvement of public meetings and the government's interaction with neighborhood associations. Specifically, the interviewee believes that there needs to be provision of proper notice, childcare, and food for public meetings. The government, they argued, also needs to make sure that there is no time confliction with existing and well-established neighborhood meetings.

Overall, this interviewee's experience working with the Lower Ninth Ward in post-Katrina New Orleans has provided her with insight on the failings of current government collaboration efforts. They therefore argue that several important changes need to occur. These include the following: government workers (such as planners) need to actually care about the public's input, the government needs to be accountable to the public, and the public needs to actually see evidence of how their concerns are being taken into consideration.

Interview 2: New Orleans City Employee

The second interview was conducted on Wednesday June 14th, 2017, and lasted from 2:00pm to 2:35pm. The interviewee was a Hazard Mitigation Administrator working for the City of New Orleans Office of Homeland Security and Emergency Preparedness. The focus of this interview was the relationship between planning in New Orleans and environmental injustice, as well as the impacts of Hurricane Katrina on city planning. When it comes to environmental injustice, the Office of Homeland Security primarily deals with it via ensuring that their plans and programs are in compliance with all necessary federal laws and regulations. For example, they must comply with all of the rules and regulations put forth in the National Environmental Policy Act, as well as more specific environmental justice-focused mandates. The main tenant of the relationship between environmental injustice and planning in New Orleans was described as involving the environmental justice-related rules and regulations that their work must follow. The office also takes action to integrate these rules and regulations into the following: long-term planning, hazard plans, project development, and community outreach and engagement. The representative also argued that the office prioritizes equity and inclusion very highly in the development of projects and plans. The example provided was that the process for updating the New Orleans Hazard Mitigation Plan involved a series of community meetings that were aimed at both informing the community and receiving feedback.

When asked about the impact that Hurricane Katrina had on city planning in New Orleans, the interviewee argued that the event both revealed shortcomings and facilitated improvement. The shortcoming identified as most important was the need to address the disparities that exist in the city's disaster recovery and recovery capability. The

representative also argued that the exposure of these shortcomings by Hurricane Katrina resulted in multiple policy changes at all levels of government. For example, the Department of Homeland Security established the Center for Faith-Based & Neighborhood Partnerships to address equity and community engagement. Hurricane Katrina also impacted how current plans are developed for post-disaster recovery (in both New Orleans and across the country). For example, officials no longer advise that disaster emergency landfills be placed in predominantly minority communities. The representative also argued that since the event, both planning and emergency management have become increasingly progressive and proactive, with enhanced community engagement efforts to help teach local community members what they can do as first responders.

The representative, when asked about the ability of planning to address environmental injustice, stated that addressing environmental justice issues requires an understanding of both the full landscape of plans, and the potential for different organizations and fields to contribute to achieving equity and justice. The leveraging of resources both within and outside of local communities was identified as crucial in this effort. Moving forward, the city does hope to include an increased level of community participation in their planning processes. The representative stated that the office recognizes the importance of working with all stakeholders to address community needs. One specific goal that the city hopes to achieve is a more open and constant dialogue between the government and local communities. Overall, the interviewee (as a representative of the New Orleans Office of Homeland Security and Emergency Preparedness) argued that Hurricane Katrina facilitated important improvements in the city's planning, but it is important to remember that this is an ongoing process.

Interview 3: New Orleans Non-Government Organization Representative

The third interview was conducted on Friday June 16th, 2017, and lasted from 9:00am to 9:40am. The interviewee was a representative from the Greater New Orleans Fair Housing Action Center, a nonprofit civil rights organization that serves the entire state, but does a lot of work within the city to eliminate housing discrimination. This interview focused on the manifestation of environmental injustice in New Orleans and how it was impacted by Hurricane Katrina, as well as the relationship between the planning process and local communities. The interviewee views environmental injustice, or more specifically the movement against it, as being born from the civil rights movement and being concerned with the disproportionate occurrence of hazards, toxins, and their negative impacts in low income and minority communities. Environmental injustice is manifested within the city of New Orleans in multiple ways, such as the development of Housing Authority properties (affordable housing and schools) in locations that were formerly home to landfills and dumps. The interviewee also stated that in order to understand the connections between Hurricane Katrina and environmental injustice, one must understand the history of development in New Orleans. Specifically, the low-lying and swampy lands below sea level that are prone to flooding and disease have historically been the places where the poor, minorities, and immigrants were forced to live. These discriminatory settlement patterns continue to exist today, which is why the poor and minorities (especially African Americans) suffered and continue to suffer disproportionately from the impacts of Hurricane Katrina, especially because they continue to lose access to high-ground housing options due to a new "post-disaster hip factor" fueled by many young adults now viewing it as cool to live in post-Katrina New Orleans.

When asked about the importance of community-government collaboration in the planning process, the interviewee stated that this is essential because top-down planning does not work, and "urban planners have to listen to not just the loudest voices, but also to the most marginalized". The interviewee also argued that the real question that needs to be addressed is, "how can the planning process be more inviting to the people?". Recommendations for improvement include meeting the public where they are and working at a deeper level with local community institutions that serve representative cross-sections of the community. Overall, the representative from the Greater New Orleans Fair Housing Action Center believes that the key to improving the planning process, and thereby the key to addressing issues of environmental injustice, is meeting people where they are and involving all members of a community throughout the entire process.

Interview 4: University of New Orleans Academic Expert

The fourth interview was conducted on Saturday June 17th, 2017, and lasted from 11:23am to 11:47am. The interviewee was a representative from the University of New Orleans Department of Urban and Regional Planning. The focus of the interview was the presence of environmental injustice in New Orleans and the need for improvements in the city's planning processes. The interviewee described the manifestation of environmental injustice in New Orleans as varied, including the co-location of disenfranchised communities and potentially hazardous land uses, as well as the uneven impacts of flooding and hurricanes. Hurricane Katrina was identified as having impacted communities in New Orleans unevenly. The interviewee also stated that it is important to consider differences in how recovery resources were and still are distributed, and how much both public and private mechanisms helped and/or hindered the fair and just distribution of resources.

When it comes to the topic of collaboration and community engagement in planning, the interviewee argued that meaningful partnership is essential, and that there needs to be community input in planning, so that plans and programs are informed by a combination of both professional and local knowledge. The interviewee also argued that the city needs to develop a process that facilitates the participation of all people, especially those who are most commonly underserved. In order to achieve these goals however, the government needs to be willing and eager to both receive and use local input, as well as provide any necessary resources to support participation from disadvantaged communities. Overall, while "there is no sure fire way" to develop an inclusive and community-based planning process, the interviewee argues that there must be an equitable distribution of power in terms of influencing not only the process, but also the resulting narratives and outcomes.

Interview Themes: Stakeholder Concerns and Priorities

The four above-described interviews provided important insight into the case study and overall research topic from a variety of stakeholder perspectives. The general categories of these stakeholders include local nonprofits, larger scale state-wide nonprofits, local government, and academic experts. It is important that the main findings of each interview be understood, because this will facilitate the development of a planning framework that addresses the values and concerns of all stakeholders.

The representative of the local community-based nonprofit/non-government organization was very focused on the specific problems facing the Lower Ninth Ward community and who is to blame. This stakeholder described the current state of government-community interaction as non-responsive and essentially non-existent. Currently, this stakeholder is concerned with the following: cultural insensitivity on the part of the

government (including planners), the influence of institutional racism on the planning process, the lack of government accountability, and the fact that public input has no impact on the decision making process. Improvements in public meetings were identified as being crucial, in addition to somehow ensuring that government workers actually care about public concerns and input.

The city government employee was primarily focused on how the government works to meet regulations/achieve compliance and the improvements that have been made since Hurricane Katrina. The current state of government-community interaction was described as better and continuously improving, with the process now being more progressive and proactive to enhancing community engagement. For example, programs and subcommittees now exist to increase engagement and develop a two-way conversation to inform the planning process. Moving forward, this stakeholder hopes to work with a wider variety of stakeholders and include more community participation to ensure that plans address real community needs.

The representative of the larger scale state-wide nonprofit/non-government organization was predominately concerned with the lack of true representation present in government-community interactions. This stakeholder does believe that there has been some improvement in terms of the government including knowledgeable and diverse community organizations in their planning processes. However, the stakeholder also argued that the government and planners need to: ensure that the viewpoints of the most marginalized are heard and truly considered, develop a more inviting planning process, and work with representative cross sections of local communities.

The representative from academics was mainly focused on the need for a participatory process that is fair and equitable, engaging all people. This stakeholder described the current state of government-community interaction as improved since Hurricane Katrina, but still needing more improvement. Since Hurricane Katrina, more people are aware, engaged, and participating, but there is still inequality in terms of whose participation really has influence on the planning process. This stakeholder therefore concluded that the city must have a planning process that is equitable in all parts, while still achieving the desired goals, including increased dialogue between local government and a variety of neighborhood groups.

Visualizing the Interviews

After completing the interviews and following analysis, I created visuals to provide an easy method to gain a very basic understanding of the main differences and similarities in the stakeholders' responses. These visuals are known as WordClouds, and were generated using an online tool that is free and available to the public. Simply by using these, one can draw basic conclusions about the stakeholders' concerns and can easily identify key differences in stakeholder viewpoints.

Interview 1: Local Small Scale Non-Profit

Interview 2: State Scale Non-Profit

Interview 3: City Government

Interview 4: Academic Expert

Comparative Analysis: Voices from New Orleans

The following comparative analysis of the interviews is divided based upon the main themes that were present in each of the four interviews. These key themes are how environmental injustice is defined/described, the relationship between environmental injustice, planning, and Hurricane Katrina, and the importance of collaboration between communities and the local government (especially when it comes to the planning process). The following discussion will therefore highlight the important similarities and differences that are revealed when multiple stakeholders are involved in a process.

The first theme to be addressed is the definition and description of environmental injustice. While the local nonprofit representative recognizes environmental injustice primarily as the fault of the federal government (specifically the whole situation with the canals/levees and the ACOE), it is interesting to note how representatives from the city's government mainly identify environmental injustice via the federal laws/regulations they must follow. The large scale nonprofit representative and the academic expert both seem to have similar ideas of what environmental injustice is, as both mentioned the physical colocation of marginalized communities and environmental hazards. Therefore, one can conclude that there are several main ways in which environmental injustice is identified: what it is (disproportionate exposure), whose fault it is (federal government), and what it requires (laws/policy requirements).

The next main theme to discuss is the relationship between environmental injustice, planning, and Hurricane Katrina. Again, the local nonprofit stakeholder focused on the harm caused by the ACOE and the levees (how the government-fueled injustices have been made worse by the storm). On the other hand, the city government employee discussed how

Hurricane Katrina has allowed many to recognize the disparity in disaster planning and recovery abilities, and therefore has fueled significant improvements in government planning. The statewide nonprofit stakeholder described the city's discriminatory settlement history as playing an important role, and focused more on how housing has been impacted. Similar to the city government employee, the academic expert discussed how Hurricane Katrina revealed important disparities when it comes to the availability and distribution of resources. One can therefore conclude that either Hurricane Katrina made the existing injustices worse or has allowed for much needed improvement by revealing important problems that must be addressed.

The third and final theme is the importance of collaboration between communities and the local government, especially planners. The local nonprofit representative believes it would be great to have a collaborative process, but seemed fairly pessimistic that this was possible without a fundamental change in the government that causes the government to actually care about community input. The city hazard administrator identifies this collaboration as highly important, and mentioned their desire to include more collaboration multiple times (in addition to discussing that the city has already taken steps to include more). The representative from the statewide nonprofit believes that collaboration is essential in planning, and that the planning process needs to be made more inviting to the community, as well as working to meet the needs of the public so that they can have meaningful participation. The academic expert also believes that collaboration is essential, but the collaboration must be equitable so that the outcomes are also equitable. The planning process therefore needs to ensure that collaboration is not only available to the rich and powerful. It can therefore be concluded that meaningful collaboration between community

and government (planners) is essential and requires fairly significant action to achieve. While the interviews did reveal important insight and provided crucial information for the development of framework recommendations however, this aspect of the research is limited by the fact that only four interviews were able to be conducted, and while each does represent a different stakeholder group, they can hardly be representative of all of the groups.

GIS Mapping and Critical GIS: The Case of New Orleans

Critical GIS has become crucial to the process of questioning and analyzing standard mainstream data collection and mapmaking processes. In the world of planning, GIS has become an important tool used primarily to develop maps associated with a variety of subjects and projects. The maps therefore have the ability to significantly impact the lives of people living in any given community. It is therefore crucial that a more critical approach to GIS be used in planning, so that any maps developed take into consideration the values and concerns of all stakeholders in a community (Holden, 2000; Elwood, 2001; Weiner, 2002).

The research methodology component that most significantly highlights the need for critical GIS is the GIS map development and subsequent critical GIS analysis. Creating different maps provides visual evidence of the case study's inequality, and therefore supports the argument that community-based planning, and the increased involvement of the public in decision-making processes, can be used to address the injustices revealed by the maps. However, during map development it was discovered that there is only very limited data available on these topics. Given the available and accessible data, maps were developed to highlight the following:

Figure 1

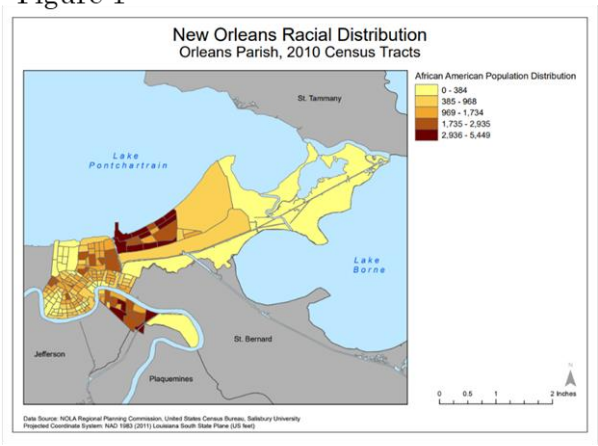

Figure 2

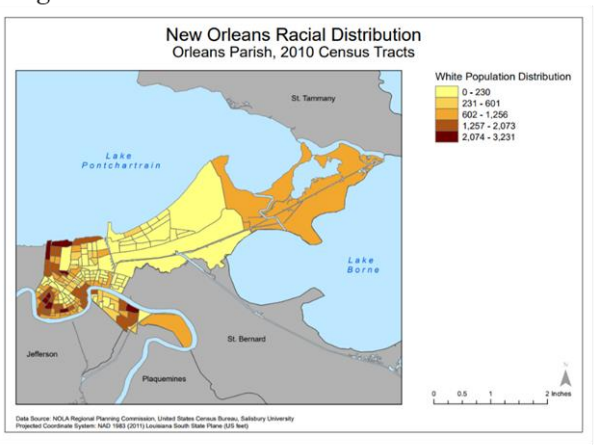

Figure 3

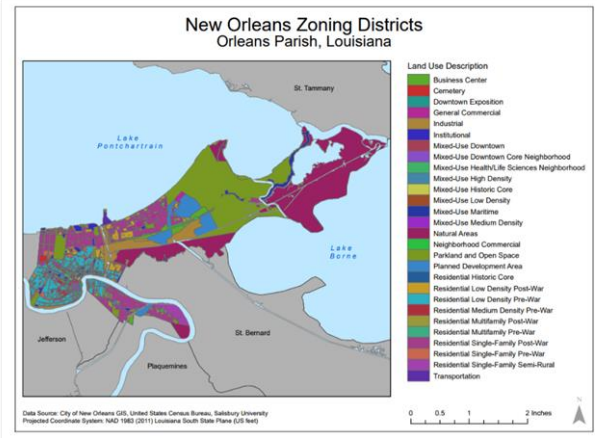

Figure 4

Figures 1 and 2 represent the distribution of white and African American populations within the case study area. Figure 3 shows zoning districts within the case study area. Figure 4 shows the location of the Hurricane Katrina induced levee breaks within the area. However, while these maps do allow for conclusions to be drawn as to the relationship between these general patterns and events, gaps in the available data isolate the quantitative information from the social, political, and cultural context of the local community. This data void suggests that maps being developed are not taking into consideration many important community variables.

Within the context of this case study, critical GIS can most effectively be applied via the intention and implications of the mapping and overall planning processes. When maps are created, they provide the user with a representation of reality. This representation of reality is often used in a variety of decision making processes, including planning. Maps are especially important in planning because they are often used to inform the setting of policy goals and action, which subsequently inform the zoning ordinance and other regulation. Therefore, if the maps used in the planning process do not represent reality as accurately as possible, then all that follows will be biased.

There are several important steps that can be applied in post-Katrina New Orleans (and potentially other locations) to improve the data collection, mapmaking, and overall planning processes. The first step to be addressed is the data collection process, as this informs the rest of the processes. In the case of mainstream approaches to GIS, data is often considered valid and therefore collected only when it comes from sources that are perceived by decision makers to be unbiased and objective experts. This, however, severely limits the amount and variety of data collected. Specifically, it often prevents local communities from contributing. In the case of post-Katrina New Orleans, this is an especially important issue because some communities, such as the Lower Ninth Ward, continue to struggle in their recovery. It is therefore likely that these people and the local organizations that work for their benefit would be able to provide crucial information that, if integrated into government plans and policies, could help provide the help they need. Examples of such information and data might include: specific locations where infrastructure is weak or not available and a variety of community needs and concerns that are unknown to the government without

meaningful interaction. Overall, critical GIS can and should be applied to this aspect of the process via the inclusion of a wider variety of stakeholders.

An improved community-based planning approach for post-Katrina New Orleans that incorporates critical GIS must also involve a shift in the map-making process. Currently, maps are often made in government offices using the data that has been collected from so-called expert sources (and the problems with this data have already been discussed above). However, a map made in a closed setting is not likely to be the best representation of the setting. Within the context of this case study, maps are crucial because they are often used to represent the damages and problems that exist throughout the city, and are subsequently referred to when government leaders are setting agendas and making policy. One must always recognize that planning decisions can have both policy and real-life implications for entire communities. It is therefore safe to assume that the maps being used should provide leaders with the most accurate representation of a community's situation. This can be achieved, at least partially, by incorporating the principles of critical GIS into the mapmaking process. Examples of suggested ways to increase and improve community engagement include: holding public meetings where community members are able to physically make and/or draw on proposed maps, developing some type of easily-accessible online interactive map program with the ability to provide feedback, or holding any kind of interactive workshop. These suggested approaches would provide the government with information on how certain projects will directly and/or indirectly impact local communities, and will allow the public to have more meaningful involvement in the planning process.

Document Analysis: Bring New Orleans Back

The plan for Rebuilding New Orleans, also known as the Bring New Orleans Back plan, is one of several planning documents that was created in the aftermath of Hurricane

Katrina. The following section provides an analysis of this document (while also considering the results of the interviews and the comparative analysis of those transcripts), with the goal of revealing important weaknesses and issues that might be addressed by the proposed participatory framework.

Beginning with the introductory letter, former Mayor Nagin expresses the desire to rebuild an equitable city for the return of all citizens. He also states that this plan combines the expertise of the Bring NOLA Back Commission with the "remarks, comments, criticisms, and recommendations of the citizens" (Bring New Orleans Back Commission, 2006). However, this does not align with the experiences of the nonprofit and academic stakeholders, all of whom argue that in most cases, the comments and concerns voiced by community members are not truly taken into consideration and essentially make no difference in the planning process. Specifically, interviewees expressed concern that the government views participation as a box that must be checked as part of federal regulation, and therefore does not take action to follow through on the community's concerns. This problem is made more apparent due to the lack of follow-up information that local communities, and the organizations that work for them, receive when it comes to their feedback being implemented. This apparent contradiction between the government's goals and reality continues throughout the document, with the message that the city will be planned with the citizens recurring several times. This message of citizen participation and engagement is however, sometimes contradicted in the same document, with the focus shifting from communicating with the public to simply giving them information via a one-way dialogue (Bring New Orleans Back Commission, 2006).

Another important critique of this planning document is the lack of attention given to defining and discussing key terminology that likely will have impacts on local communities impacted by the event. Specifically , "the plan calls for the development of safe and viable mixed-income communities that include quality multi-family housing, affordable housing, and housing to meet the needs of NOLA senior citizens" (Bring New Orleans Back Commission, 2006). While this suggests good intentions of improving the quality of life for the city's most vulnerable, it lacks definition for what terms such as safe, viable, quality, and affordable mean. By leaving these terms undefined and vague, the plan leaves these goals open to interpretation that could result in policies and programs that do not benefit those who are most in need (those who may very well have been in mind when the document was created).

This plan also highlights a concern that was a main takeaway from the expert interviews, and that is public access to the planning process. In this document, it is stated that "the neighborhood planning process will be open to all residents" (Bring New Orleans Back Commission, 2006). There is, however, a difference between the process being open and the process being accessible/inviting. Multiple interviewees, especially those that work with local communities on a regular and close basis, highlighted problems with the current public meeting/public involvement system. Specifically, these concerns include: giving proper notice of meeting time and location, transportation and child care accommodations, etc. It is also important to recognize that these concerns are primarily applied to poor and minority communities, resulting in the most vulnerable portion of the population having the least access to the process. The main issue in this situation is that as part of the planning process, the government (and this generally is true for all jurisdictions) is required to hold a

number of meetings that the public has the option to attend. It is unfortunate but true however, that this too often results in government officials seeing public participation/engagement as merely a box to check off, saying that they have achieved their goals as long as they offered a public meeting. This mentality needs to change, if the benefits of a critical approach to GIS and planning are to be gained, by focusing on making the public meetings and other avenues of public involvement more inviting and truly accessible to all local communities.

One final overall critique of this document is the recurring idea that successful redevelopment post-Katrina depends on how willing residents are to reinvest in their communities and neighborhoods (Bring New Orleans Back Commission, 2006). Not all communities have the time and resources to sufficiently reinvest, particularly those poor and minority communities that need reinvestment the most. Also, many require and depend upon outside support from not only the government, but also nonprofit groups. It is therefore necessary that planning documents, especially within the context of this case study, recognize the varying capabilities and resources of each community, so that approaches to help all of them are not based on the status of a select few.

Proposed Framework Recommendations

A framework of recommendations for community-based planning that can be implemented in a variety of contexts to address not only environmental injustice, but also other injustices present in the planning/decision-making process is necessary. In the most general sense, community based planning is a participatory process that aims to involve local communities in the development of plans and the decision making process that goes along with planning, so that local knowledge, experiences, and concerns are both included in and addressed by the plans. Community-based planning is something that has evolved over time

and can be implemented in multiple ways, such as local community action plans developed by community organizations or actual planning documents developed by a coalition of community organizations, local government, and other relevant stakeholders. Community-based planning can be highly beneficial because it can bring together stakeholders that normally do not interact, and by doing so can ensure that all stakeholder values are given consideration in the planning process, and not just the values of those stakeholders with the most power, political influence, and/or financial resources. The implementation of community-based planning can also lead to the development of plans and maps that reflect local community situations as accurately as possible, which in turn will lead to policy and programs that truly benefit the people (Community Places, 2014; Barden, 2012).

Situated within the context of the New Orleans Hurricane Katrina experience, there is great opportunity for the development and implementation of community-based planning. The following proposed framework was developed based on both the insights and experiences shared in the interviews, as well as research on general community planning techniques. The main areas of concern are the following: community, stakeholders, historical influences, public meetings, and neighborhood associations.

First, considering that these planning recommendations are aimed at increasing interaction with local communities, it is important to discuss what a community is and what this means for the planning process. In many cases, community is understood to be a spatially-fixed and homogenous group of people who share an identity and a consensus. This understanding of community however, disregards the many important differences that exists within communities, especially the power differences that often lead to conflict. These recommendations will therefore be based on the following understanding of what a

community is: a complex group of stakeholders working at multiple scales in a given location, with varying access to power and resources, in order to achieve their differing goals.

There are a variety of stakeholders that both influence and are influenced by the planning process. However, the results of the interviews suggest that the current system does not involve nor seek to involve all of these stakeholders. The recommendation is therefore to establish a planning process that actively invites and facilitates participation and input from all stakeholders, including but not limited to the following: local/small-scale non-profit groups, large-scale non-profit groups, neighborhood associations and similar community-based public organizations, academic experts, and local government organizations. The implementation of this would therefore require fundamental changes in the way that government officials and workers view community engagement, and in the overall role of community engagement in the planning process (perhaps via stricter requirements or benchmarks).

Another important concern revealed in the analysis of the interview transcripts is the influence of a city/community's history on current problems. For example, the city of New Orleans has a long history of discriminatory settlement patterns that resulted in racial minorities and low-income families and individuals settling in the most vulnerable places. This has had a long-standing impact on the city, and continues to be a concern amongst non-profit advocacy groups and academics, but unfortunately appears to be largely disregarded by government officials, as it was not mentioned in the interview when discussing both the manifestation of environmental injustice in New Orleans and the city's planning failures. It is therefore important that the improved process/system acknowledge the influence of

history, no matter the place, and take steps to mitigate the negative impacts it has on today's society.

Throughout the course of this research and the analysis of the New Orleans case study, it has been determined that public meetings are a crucial component of any planning system and are especially important for a community-based system attempting to improve participation. However, it has also been found that several things are necessary for public meetings to actually be successful and allow for the public to have an impact. The following are recommendations based on concerns and patterns identified in the New Orleans case study analysis: provide sufficient notice of the time and location of the meeting, make sure steps are taken to prevent conflicts with regular meetings/events for other community groups, provide childcare at meetings, offer transportation, support access for people with disabilities, provide food and drink at meetings, make sure proper notes are taken during meeting and are made available to public after, provide opportunities for follow-up questions and the provision of updates. Also, public meetings need to be structured in a way that supports meaningful conversation and debate, instead of only allowing community members to say something into a microphone for only a few minutes.

Another prominent concern identified in the case study analysis is the composition of neighborhood associations, a type of community group that commonly participates (or attempts to) in the planning process. Most neighborhood associations, which mainly offer their advice to the planning commission and city council, are dominated by the area's wealthy homeowners. These groups are therefore not truly representative of the neighborhoods they represent, and it is recommended that in the future, those government agencies/individuals involved in the planning process encourage, support, and work with

groups that truly represent their communities. Perhaps, this could even be supplemented with the development of some type of citizen advisory committees that work with government offices and representatives before the proposal of policies that will impact a local community, thereby allowing for collaboration earlier in the decision making process.

Conclusion

The people and culture of New Orleans are forever changed by the multi-faceted suffering inflicted by Hurricane Katrina and the recovery process, which continues still to this day, over a decade after the storm. In a city with so much pre-existing environmental injustice, an exacerbating event like this provides city and community leaders with an opportunity to implement real change. Planning is especially important in this because a great deal of the area's environmental injustice first emerged as a result of poor and prejudiced land use and planning decisions.

The results of this research can even be taken beyond the context of New Orleans, and can be applied in other settings. Multiple, varied, and often conflicting stakeholders are present in every case study, with each working to get their voices heard. However, in nearly all cases, it is true that those with the money, the resources, and the connections are the ones with the most influence in the decision making processes. The insight and recommendations provided by this research can therefore be applied, with likely some necessary case-specific adjustment, to establish a community-based participatory approach to planning in any jurisdiction.

This research and its many aspects, including site visits, interviews, and document analysis especially, truly reveals the potential power of community-based planning to address environmental injustice in New Orleans. Even though only four stakeholder representatives were interviewed, those interactions revealed the passion and commitment that local

residents and community groups have for achieving a higher quality of life. Unfortunately, their ability to do so is inhibited by limited access to the decision making process, funds, and other necessary resources. These limitations are especially constraining for marginalized communities (poor and minority particularly) that are the most subjected to environmental injustice. The government's ability to address these problems is also limited by the dominance of mainstream GIS/data mentality, which serves to exclude local residents from sharing with the decision makers their own input and local expertise. A community-based approach to planning that takes into consideration the ideals of critical GIS will therefore foster a partnership between the people and the government that, if taken seriously, can address the injustices and inequalities these communities face.

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