GRAND CALUMET: THE LINKAGES BETWEEN ENVIRONMENTAL JUSTICE,
VULNERABILITY AND ENVIRONMENTAL GOVERNANCE

BY

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THESIS

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ABSTRACT

The US Environmental Protection Agency and the State of Indiana have invested over $80 million to remove contaminants from the Grand Calumet River. The river cuts through a highly diverse urban and industrial area punctuated by nature preserves, with strong ties to Chicago and a bustling mix of races, ethnicities, cultures and histories. Once home to vibrant industry and political organizing, the region has faced a variety of challenges driven by recession, economic changes and technological progress resulting in socio-economic struggles for the resident population. Moreover, Northwest Indiana has long been considered one of the most polluted areas in the United States since the times when there was little knowledge about pollution and no adequate regulations to protect the environment and health. Using a mix-method approach based on a "vulnerability of place" model, my thesis explores how and to what extent the communities located along the Grand Calumet River face social and geographic conditions that constitutes environmental inequalities. Then, applying concepts and frameworks from different literatures on management and governance of the environment, I analyze the changes and current arrangements in place to govern the water resources and the environment overall in order to establish the relationships between them and environmental and social outcomes occurring in the Grand Calumet River area. I confirm that Northwest Indiana shows a complex pattern of environmental inequalities, characterized by the presence of socially vulnerable groups residing in close proximity to industrial facilities with permits to discharge to waterways as a first approximation. I find that environmental governance of the Indiana Grand Calumet region has evolved from the former coalition towards a complex network of partnerships and collaborative relationships. Additionally, current governance

strategies privilege interventions to restore the quality of the waterways while ignoring the

relationships between the environment and the community in order to account more

comprehensively the inequalities that remain in the memory, habits and beliefs of people.

Although the capacity to reduce overall vulnerability is limited, efforts in environmental

education and outreach offer promising opportunity to change the reality of the Grand

Calumet communities.

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CHAPTER 1   INTRODUCTION

The US Environmental Protection Agency and the State of Indiana have invested over $80 million to remove contaminants from the Grand Calumet River. The river cuts through a highly diverse urban and industrial area punctuated by several nature preserves. It has strong ties to Chicago made apparent by the large number of highways and railroads that lead to its neighbor. Northwest Indiana constitutes a bustling mix of races, ethnicities, cultures and histories inherent to community changes with a rich and complex socio-cultural heritage, such as early and later waves of immigration or the loss of job opportunities and consequent population decline. It was once home to one of the most vibrant industry and political organizing societies.

Northwest Indiana has long been considered as one of the most polluted areas in the United States. This pollution has coupled with several recession periods, economic changes and technological progress that have resulted in socio-economic struggles for the resident population. After a massive drop off in manufacturing jobs and migration of population to other cities, predominant minorities and low income groups remain in areas that have been the place of industrial facilities and hazardous waste land for decades. Therefore, the legacy of pollution and environmental degradation has placed the largest burden on those who struggle the most when facing hostile situations.

After years of unmanaged pollution, this region has been object of many regional and international efforts with the purpose of protecting and restoring the quality of the water and the ecosystems that make the Great Lakes system between the United States and Canada. Under the influence of a larger regime, Indiana Grand Calumet region has been evolving a

complex arrangement of relationships between a large number of stakeholders and governmental actors. Northwest Indiana has witnessed the rise and decline of a large environmental coalition that led the efforts of finding a restoration path to recover the quality and the value of the natural assets of the region. Changing relationships between actors, challenges to the continuity of collective actions, resources constraints, among others, have led to the existence of a complex network of partnerships and collaborative efforts between a highly diverse and large in number group of organizations from different sectors and at different levels.

In order to understand the environmental and social outcomes of the actions and processes implemented since the beginning of the Great Lakes regime, it is necessary to characterize the environmental conflicts that remain in the region as a result of differential burdens to the vulnerable sectors of the community and explore the elements of environmental governance arrangements, the interactions among stakeholders and the challenges they face in order to understand the underlying factors that reinforce environmental inequalities in the region. This study begins revealing some of these aspects operating in the Indiana Grand Calumet River region by using a mixed methods approach that addresses a variety of factors from spatiality to perceptions, from temporal changes to current challenges, in considering a complex social and natural system that requires multiplicity of perspectives.

1.A. RESEARCH QUESTIONS

The two major questions that motivate the thesis research work are:

1. To what extent do members of local communities located in the Indiana's Grand Calumet region experience environmental inequalities reflected in patterns of spatial and social unevenness?

2. How have environmental governance regimes within the Grand Calumet region leveraged environmental clean-up resources to address these social and spatial inequities?

The ramifications of the first question lead to more detailed questions of what groups of the community are the most vulnerable, what places are the most vulnerable, how vulnerability is distributed in the Grand Calumet area, whether there is a correlation between social and physical conditions, among others. The second question encompasses the identification of the type of structures and relationships that characterize the operating governance schema, which actors are part of those structures, what the main factors influencing these relationships and shaping those structures are, what kind of actions have been taken, what the results are, who benefits from them, and where those results are located.

This study focuses on water pollution and environmental justice concerns since water has been a large driver of the history and identity of communities located along the Great Lakes while it serves a connective element among social, political, economic and natural dimensions. It explores that spatial relationship by considering one aspect of the built environment: the location and distribution of facilities with permits to discharge to waterways. This aspect does not intend to represent all features of the environment that would influence environmental inequalities, although it provides a first order approximation to explore the applicability of a social vulnerability model in relation to environmental

justice issues. Considering the distribution of polluting facilities of the water resources and the distribution of social vulnerability, this study first uses spatial analysis methods to explore, characterize and identify patterns of spatial correlation between these two elements of the urban systems. To explain these patterns, I then examine regional stakeholder perceptions of community and environment to identify the contribution of historical, social, cultural and political dynamics to social vulnerability and environmental inequality.

1.B. STRUCTURE AND ORGANIZATION

In Chapter 2, I present a brief description of the area of study providing the context to understand the complexity of the case study in regards to the conditions of environmental justice concerns. In Chapter 3, I present a review of environmental justice approaches with a focus on vulnerability as a framework to understand differential burdens and conditions that communities of the Grand Calumet River region encounter. I argue that a place model of vulnerability can be used to identify environmental inequalities and I utilize concepts from other environmental justice literatures to justify that quantitative measures of vulnerability are not sufficient to fully reveal the underlying factors of vulnerability and inequalities. Chapter 4, I describe my research design while arguing for a mixed-methods approach that allows exploration of different dimensions in a case of study as the one presented in this thesis. Later in the chapter, I describe the methodologies used to identify spatial patterns of social vulnerability, and also the methods used to analyze stakeholder interviews. Chapters 5 and 6 respectively present the results of the spatial analysis and findings from stakeholder interviews. Chapter 7 explicates these evolving relationships across space and over time.

Finally, a discussion is presented in Chapter 8 which broadens the discussion of the results presented in Chapter 5, Chapter 6 and Chapter 7; Chapter 8 provides an

interpretation of the relationships between findings of both the quantitative and qualitative analysis. In Chapter 9, I conclude with a brief summary of the main findings of the study discussing its limitations and acknowledging the importance of this type of study for further research and the implications for urban planning.

CHAPTER 2   INDIANA'S GRAND CALUMET RIVER REGION

This chapter provides a brief description of the area of study in order to provide context and to support the statement of existing geographic, social and environmental conditions that constitute a case of environmental justice conflict. The geographic and socio-demographic characterization of the area of study along with a narrative of how it became an area of concern drawing attention to the need of remediation and restoration efforts helps to understand the complexity of case and set the bottom line for the development of the current research work.

2.A.   THE GRAND CALUMET RIVER SYSTEM

The Calumet region refers to the region in the proximity of Lake Michigan that extends from La Porte County, Indiana, covering the entire north region of Lake County, Indiana and beyond the state line in Illinois north east extreme or south area of Chicago land. It encompasses the Grand Calumet River system which is a network of waterways, some human-made and others that have been highly modified as a result of channelization, widening, dredging and damming. The Grand Calumet River flows from east to west, from a group of lagoons located in the Miller section of Gary jurisdiction, nearby the shoreline, to the joint of the Indiana Harbor Ship Canal and ultimately to the joint of the Little Calumet River and a canal that connects them to the Calumet River that discharges its flow to Lake Michigan (U.S. Fish and Wildlife Service, 2003).

However, this was not the case in the past. The region has been shaped by ice retreat from the last glaciation, a decrease in the lake levels, and ultimately by urban settlement and industrialization (U.S. Fish and Wildlife Service, 2003). The area exhibits great ecological

diversity, with highly rich and varied natural communities. It encompasses three biomes and large variety of hydrological regimes including lake, rivers, stream, marshes and swales (Becker Nevers, Whitman, and Gerovac, 1999/2000). Originally the Konomick River flowed from La Porte County, Indiana towards the west reaching close to Riverdale in Illinois where it discharged to Lake Michigan (Thale, n.d.). Wave action progressively filled the south end of Lake Michigan blocking its outlet. Therefore, the river make a turn east and developed its course toward the Miller section of Gary where it reached the lake shore. In the early 1800s, a channel was constructed from the hairpin turn of the river to the south of Chicago, diverging some of the flow in that direction. With a slow and weak flow and with the wave effects and dunes shifting in the shoreline, the outlet of the river was blocked again, forming a series of small lagoons and reversing the flow of the river towards the east.

In the second half of the 1800s, industrialization happening in Chicago expanded towards the Calumet region. South Works of US Steel among other industries settled in Northwest Indiana (Thale, n.d.). To accommodate the region's rapid industrialization, the Grand Calumet River was straightened and dredged, and the Indiana Harbor Ship Canal was built. Marshes were drained through new channels, low land was filled, forest and prairies were cleared out, and dunes removed from the coastline modifying the landscape in order to open room to industrial expansion and the development of transportation infrastructure throughout the region (Thale, n.d.; U.S. Fish and Wildlife Service, 2003). Consequently, the ecosystem was transformed and fragmented. Industries of all types came to the area: steel mills, oil refineries, chemical plants, packing houses, among others. The waterways were the receptors of all industrial wastewater as well as sewage from the increasing population that followed the industry seeking jobs. Although there have been regulations in place for the

prevention of water pollution, it was not until the 1970s that efforts for cleaning the rivers began (Thale, n.d.). Stronger regulations have been enforced since 1972 with the Federal Water Pollution Control Act reducing pollution loads in waterways and preventing new contamination (U.S. Fish and Wildlife Service, 2003). However, historic pollution remained locked in the sediments for nearly a century now (Becker Nevers, Whitman, and Gerovac, 1999/2000). By 2000 some sites still presented such high levels of toxicity that they were designated federal superfunds (Thale, n.d.).

2.B.   THE INDIANA GRAND CALUMET REGION: AN AREA OF CONCERN

With the environmental regulations that came into place in the 1970's and 1980's at the Federal level, limits to pollutant discharges were set for municipal and industrial wastewater. Although the water quality improved drastically, the legacy of contaminants remained for decades. In 1978, the Great Lakes Water Quality Agreement was established between the United States and Canada which led to the identification of most degraded areas based on impairments to a list of fourteen beneficial uses (Water Quality in Indiana: Grand Calumet River Area of Concern, n.d.; Grand Calumet River Area of Concern, n.d.). The Grand Calumet River and Indiana Harbor Ship Canal was designated as most polluted Area of Concern (AOC) meeting all fourteen impairments:

- Restrictions on fish and wildlife consumption
- Tainting of fish and wildlife flavor
- Degradation of fish and wildlife populations
- Fish tumors or other deformities
- Bird or animal deformities or reproduction problems
- Degradation of benthos
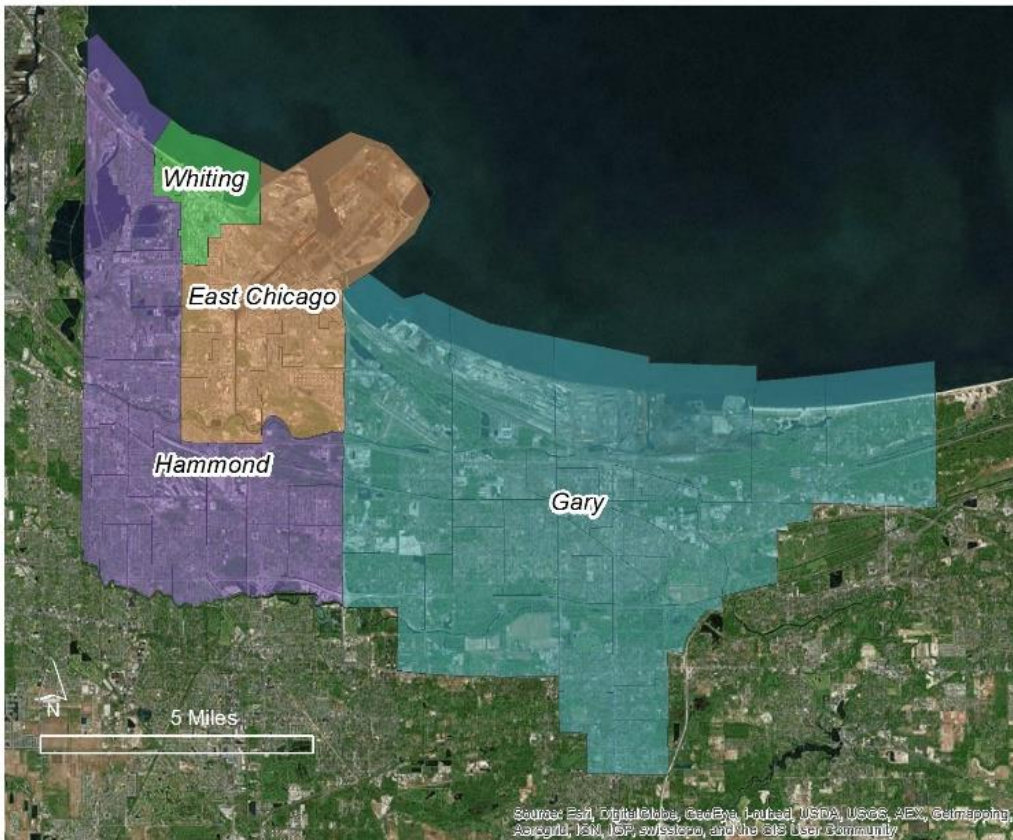
Figure 1 Area of study: municipalities of Hammond, Whiting, East Chicago and Gary.

- Restriction on dredging activities
- Eutrophication or undesirable algae
- Restrictions on drinking water consumption, or taste and odor
- Beach closings
- Degradation of aesthetics
- Added costs to agriculture and industry
- Degradation of phytoplankton and zooplankton populations
- Loss of fish and wildlife habitat

The Grand Calumet River AOC encompasses the cities of Gary, East Chicago, Hammond, and Whiting in the Northwest section of Lake County, Indiana (see Figure 1). The Indiana Department of Environmental Management (IDEM) was designated as the agency responsible of developing a Remedial Action Plans (RAP).

Two of the fourteen impaired beneficial uses have been removed already. In 2011, thanks to the efforts of the Citizens Advisory for Remediation of the Environment (CARE) Committee created under the orbit of IDEM, added costs to agriculture and industry impairment was removed from the list since it was demonstrated to comply with the removal criteria (IDEM, 2011). In 2012, the restrictions on drinking water consumption, or taste and odor beneficial use impairment were also removed as the result of a detailed examination of the processes for testing and treating for taste and odor of the treatment plants located in the area, and the determination that those processes do not differ from other treatment standards elsewhere around Lake Michigan (IDEM, 2012).

The EPA and the State of Indiana have invested over $80 million to remove contaminants from the Grand Calumet River. Cleaning-up efforts were faced as a multi-phase project (Grand Calumet River Legacy Act Cleanup, n.d.). The West Branch portion of the cleanup was completed in 2012, including the area known as Rossana Marsh (denominated zone A in the Remedial Action Plan, see Figure 2). Restoration and remedial efforts in the East Branch of the Grand Calumet River are in progress expected to be finished in 2016 (zone E in Figure 2). A portion was charged to U.S. Steel, a dredging project that was completed in 2007. Future phases include other segments of the river such as Hohman Avenue to state line (zone C), from Cline Avenue to the terminus of the U.S. Steel dredging project (zone D), and parts of the Indiana Harbor Ship Canal (zone E).

Figure 2 Aerial view of Grand Calumet River showing work zones A - E.

2.C. AN ENVIRONMENTAL JUSTICE CASE

The scope of this study comprises the municipalities of Hammond, Whiting, East Chicago and Gary, located in Northwest Indiana (Figure 1). **Error! Reference source not ound.** summarizes the major demographics for these four municipalities. Figure 3 shows the 2010 population density at the census blocks. The area comprises a total of 62 census tracts as defined for the 2010 Decennial Census. With a strong legacy of pollution and environmental degradation, plus the persistent socio-economic struggles that local governments have not been successful enough to overcome, this area offers an opportunity to explore the spatial and non-spatial relationships behind environmental inequalities.

Table 1 Demographic profile of the area of study.

Demographic	Hammond	Whiting	East Chicago	Gary
Total Population	80,830	4,497	29,698	80,294
% Female	51.55%	51.56%	54.02%	54.05%
Age < 5 years	8.54%	8.40%	9.03%	7.58%
Age > 65 years	11.70%	14.44%	9.80%	14.38%
African-American	19.81%	3.60%	43.47%	82.73%
Hispanic or Latino	34.22%	38.66%	49.39%	4.19%
Families below Poverty Line	17.35%	6.72%	31.18%	28.14%
Unemployment Rate	7.12%	5.22%	6.69%	10.11%
Population age > 25 years with no High School Diploma	22.21%	20.06%	30.00%	17.36%

Note: All variables correspond to 5 years estimates from the American Community Survey 2006-2010, except for Total Population which is 2010 Census data.
Data retrieved from Social Explorer.
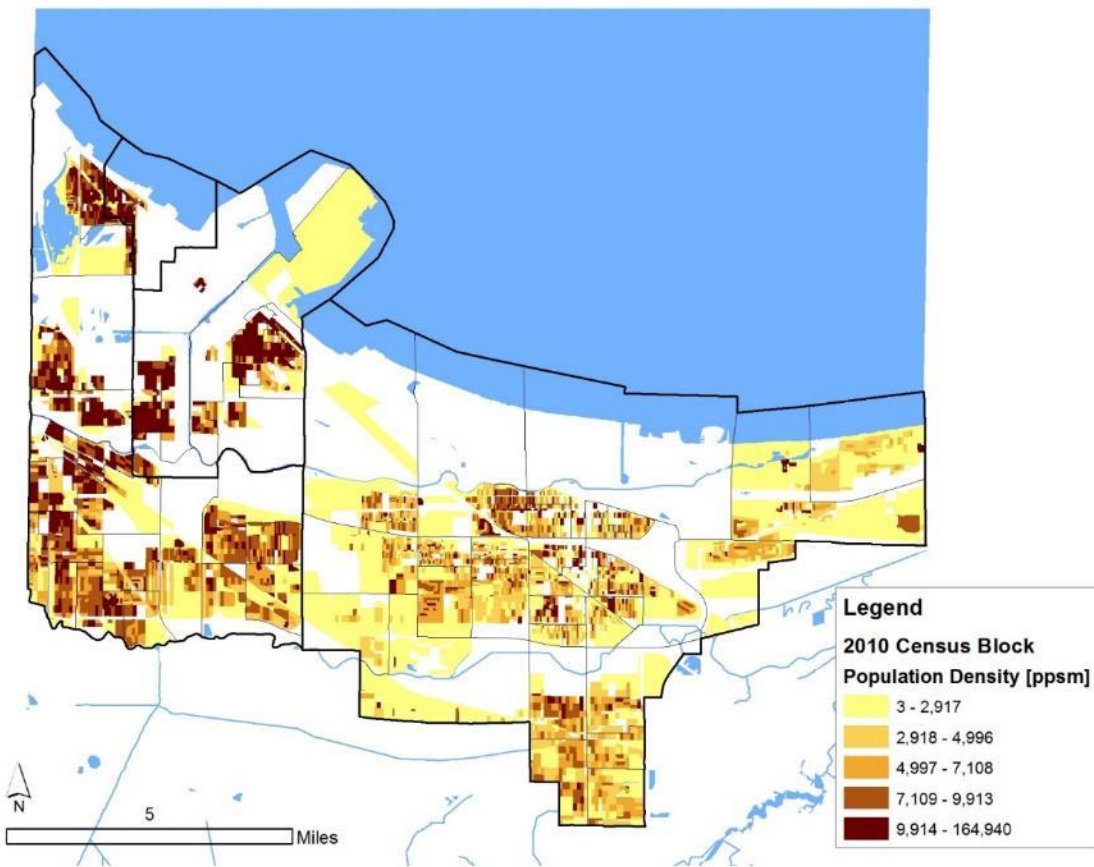
Figure 3 Population density at the 2010 census blocks in the area of study.

Given the predominance of low-income and minority communities within the region (**Error! Reference source not found.**) and the legacy of pollution associated with local ndustry, it is important to understand social and environmental changes as they reflect patterns of vulnerability and regional equity, as reflected within the broader literature on environmental justice. Given the unevenness of the region's population (Figure 3) and the unevenness of legacy pollution within the region, taking an inherently spatial approach to this analysis is valuable in showing distribution of differential burdens across the region.

CHAPTER 3   LITERATURE REVIEW: LINKING ENVIRONMENTAL JUSTICE,
VULNERABILITY AND ENVIRONMENTAL GOVERNANCE

This chapter discusses the academic literature that frames my analysis of environmental justice and governance within the Grand Calumet region. I draw ideas and concepts from environmental justice, social vulnerability and sustainability research in order to understand the burdens that communities encounter in challenged areas as the Indiana Grand Calumet region. I contrast this literature with that on environmental governance to develop a framework for understanding how collective action has the potential to influence both environmental quality and the structures underpinning social inequality. I connect literature on environmental justice, vulnerability and environmental governance in order to frame the scope and methods of my study in Indiana.

3.A.   ENVIRONMENTAL JUSTICE THROUGH THE LENS OF A VULNERABILITY MODEL

An Environmental Justice Review

In the United States context of the 1970s of civil rights and grassroots activism, the concept of environmental justice emerged as a way to refer to unequal distribution of environmental burdens (Colsa et al., 2014). Early studies have pointed out that race was the most influential factor in order to predict the location of hazardous facilities and sites. The burdens of environmental hazards were often identified in relation to the location of hazardous sites, facilities or land uses but also in terms of the lack of accessibility to green space and amenities. On the other end, people in poverty experience uncertainty about daily existence that severely constraints their freedom of choice (Hilhorst and Bankoff, 2004). However, as Colsa et al. (2014) argue, environmental justice is not only a fair distribution of environmental burdens but also a right to voice opinions and be heard.

The environmental justice movement emerged as a self-conscious movement in the early 1980s that ultimately influenced environmental policy and regulations (Kaswan, 2013). Environmental justice conflicts inspired community members to organize themselves to seek justice outcomes among low income communities and people of color (Lashley, 2010; Colsa et al., 2014). According to Lashley (2010) community-based organization was the form in which people came together and developed a collaborative mechanism that allow them to participate of problem-solving and decision-making processes. Not surprisingly, grassroots participation was preferred among environmental justice advocates.

In the mind of many of these advocates environmental protection was part of broader social agendas that should incorporate environmental justice and sustainability principles for more comprehensive and inclusive visions of social struggles. Over time, the movement matured gaining legitimacy and attracting a more diverse group of participants seeking for new strategies to address environmental justice conflicts (Lashley, 2010). Advocates have included community members, industry representatives, public officials, and leaders of different fields. Past expressions of the environmental justice movement included demonstrations, protests and lawsuits, which helped to bring attention to the problem and set the communication channels, while recent years have seen more of partnerships and collaborative efforts among organizations with similar interests in order to achieve shared goals.

The environmental justice movement emphasized the idea of environmental and social interconnectedness (Kaswan, 2013). Environmental justice problems are rooted in human rights and are fundamentally related to the interconnections between social inequalities and ecological conditions. Human-environment systems is a way to refer to the

interdependency of human and environment subsystems (Turner, 2010; Zahran et al., 2008). The relationships between elements of both subsystems determine conditions, functions and responses to events of either subsystem. In understanding environmental justice conflicts it is fundamental to consider that burdens and impacts on particular social groups are the result of processes or dynamics influencing the environment subsystem in relationship to the human one.

According to Lashley's analysis (2010) of the nature of environmental justice conflicts, there are different types. Some of them involve procedural justice by limiting the experiences and capacity of participation generating distrust from those who are excluded or marginalized in the process. Other conflicts are driven by inaccessibility to information a fact that diminishes transparency. Discrimination, differential power and location of social groups also limits participation and creates distrust. Locational differences influence affiliation and identity, requires logistic considerations, and generates apathy to recognize issues of others. All of this contributes to low network ties and consequent limited communication channels. Inequalities are largely a function of power relations operating in the society (Hilhorst and Bankoff, 2004). Having considered these factors, we can recognize that environmental justice could be achieved by appropriate governance arrangements.

Mapping Environmental Inequalities

The complexity of issues of poverty and marginalization has encouraged researchers to develop models and tools for analyzing and providing insights about them. Since environmental inequalities were identified regarding geographic distributions of the burdens to the population residing in an area or location, its study has focused on tools and

approaches of correlations and spatial analysis. If we are to solve or reduce inequalities, identifying people in need of interventions is fundamental (Hilhorst and Bankoff, 2004).

It has been broadly recognized the applicability of Geographic Information Systems (GIS) to map and analyze environmental justice issues (Maantay, 2002; Sadd et al., 2011). GIS as a tool of analysis and visualization offers the potential to better understand spatial relationships and has been increasingly used to map the disproportionate exposure of certain populations to environmental hazards. Several studies have already revealed disproportionate environmental burdens for low income groups or racial minorities. However, there are still unresolved major issues that range from lack of comprehensive databases of hazards or impacts, inadequate indexes of exposure to risk, and underdeveloped methodologies to estimate exposure of affected populations (Maantay, 2002).

Although maps are effective in showing the distribution of hazardous sites or facilities, they are also social constructions that could be inaccurate or misleading. Measures of proximity to specific land uses or facilities do not necessarily describe the differential levels of exposure to a hazard, an impact or any other burden. Therefore, spatial analysis should consider different levels of analysis, incorporate more than one type of sources of exposure and impacts, as well as other non-spatial factors of disproportionate burdens (Maantay, 2002; Sadd et al., 2011).

On that regard, spatial analysis adds a new dimension to how distributions can be assessed with statistical methods suggesting correlation between environmental impacts and demographics. Spatial analysis has been long applied to justice issues with diverse focuses such as on accessibility. For examples, some studies have estimated density as a

measure of accessibility to health care centers (Charreire and Combier 2009; Schmiedel, Blettner and Schuz 2012). Other studies have used spatial methods to determine accessibility to open space and amenities (Weiss et al., 2011; Moore et al., 2008). Not much work (although some) has been done in order to estimate density as a measure of exposure to impactful or hazardous locations and/or as a detrimental factor of the built environment. Mirzaei et al., (2014) used kernel density estimations and Local Moran's I to asses hot spots of soil polluted with heavy metals measured with a pollution index and a potential ecological risk index. Boone et al., (2014) studied whether environmental burdens happen in neighborhoods of Baltimore where demographic and housing variables can predict them in relation to the density of the industry. These studies among others have shown that people in poverty and ethnic or racial minorities are more likely to live near toxic facilities, brownfields or polluted waterways (Boone et al., 2014).

The Concept of Vulnerability and Related Approaches

Cutter, Emrich, Morath and Dunning (2013) argue that traditional evaluations such as cost-benefit analysis are limited in estimating social effects and benefits. I will argue throughout this thesis that one way to consider environmental justice is through the concept of vulnerability. This argument builds on the findings of some researchers like Zahran et al., (2008), who found that communities with socially vulnerable populations experience more causalities under stressing circumstances such as in a flood event. Vulnerability refers to the inability to face hostile conditions. The concept of vulnerability has been used in different streams of research among different disciplines generating a diverse set of definitions. Most commonly, it has been defined in existing literature in relation to natural hazards as the

potential for loss. Nevertheless, vulnerability encompasses aspects of sensibility to harm, exposure, and adaptive capacity (Abson, Dougill, and Stringer, 2012).

Vulnerability of natural systems to human impact has been a long object of study. Environmental vulnerability is a function of the fragility of natural systems and their continuous change over time (Birkmann and Wisner, 2006). Many scholars have used vulnerability to refer to ecological memory, biodiversity and regenerative capacity of ecosystems (Adger et al., 2005). Some examples of the field are studies on soil vulnerability to pollution (Batjes and Briedges, 1993), and groundwater vulnerability to pollution (Lobo-Ferreira, 2000; Collin and Melloul, 2003; Gemitzi, Petalas, Tsihrintzis and Pisinaras, 2006; Mao, Zhang and Wang, 2006). This definition implies that impacts to human systems are secondary consequences of disruption of the environmental services which are essential for human well-being.

On the other hand, vulnerability "of people" opens a wide range for potential research. For instance, Morello-Frosch et al. (2011) studied vulnerability related to health, and they found that vulnerability is given by the combination of biological factors (person's characteristics), socio-demographic factors and factors of place such as proximity to polluting land uses, toxic emissions, hazardous waste sites, industrial facilities, among others. The exposure to pollutants, the neighborhood environment and the social stressors all act cumulative in people's vulnerability to environmental impacts. They used vulnerability to refer to social constructs of race and class that can amplify the effects of environmental exposures. These social aspects have been presented in the literature as social vulnerability. Social vulnerability has also been applied to the analysis of toxic risk and health (Rogge, 2008; Sadd et al., 2011). When analyzing toxic risk many scholars argue that

source and chemical specific assessments of potential health risk do not account for environmental and social stressors (Sadd et al., 2011). Therefore, tools such as environmental justice screenings and cumulative impact approaches are best suited to identify disproportionate burdens of exposure to pollution or hazardous land uses. Sadd et al., (2011) have shown that people living near industrial and/or hazardous waste sites experience increased risk of psychological stress or mental health impacts. Additionally, there is evidence that cumulative impacts of environmental and social stressors have a greater influence on minorities and low income communities (Morello-Frosch et al., 2011).

Some may argue that, in recent years, two schools of vulnerability research emerged (Vincent, 2004). The first focuses on natural hazards for which studies are performed using place-based approaches for looking at one particular stressor or hazard. The second school is more concern with human ecology and economy which develop from interpretative social science paradigms based on relativist and constructivist ontologies. Natural hazards, such as flooding events, requires taking into account the social context in which those events occur accounting for place inequalities, community characteristics and features of the built environment (Cutter, Buroff and Shirley, 2003). Cutter (1996) introduced the concept of vulnerability of place in an attempt to integrate the geographic context, which includes variables such as elevation or proximity to a hazard, and the social fabric which includes perceptions, experiences and the built environment.

Dimensions of social vulnerability are human and political capital, discrimination and features of the built environment (Morello-Frosch et al., 2011). For example, analysis of vulnerability to climate change have been highly focused on biophysical vulnerability (Vincent, 2004). However, it has been increasingly recognized as the influence of social

vulnerability because of the complex interrelationship of social, economic, political, cultural, technological and institutional factors. Ultimately this kind of research can help identify areas that need aid and building capacity to deal with climate change impacts such as lack of water availability. According to Cutter, Buroff and Shirley (2003) factors that influence social vulnerability are lack of access to resources (which could range from information, knowledge to technical resources) limited access to political power and representation, social capital, networks and connections, beliefs and customs, building stock and age, frail and physically limited industry, types and density of infrastructure and lifelines. Although there have been already well accepted factors of wealth and demographics in the literature that capture those socio-economic conditions of the communities and the place (Cutter, Emrich, Morath and Dunning, 2013), there is no agreement among scholars about all the variables to be used in the construction of the index of social vulnerability for comprehensive analysis of social and place vulnerability. Regardless of the selected variables in an index, social vulnerability is a multi-dimensional concept that helps us to better understand the characteristics and experiences of communities and individuals that have more influence in the ways they are able to respond and recover from environmental hazards (Cutter, Buroff and Shirley, 2003).

Rogge (2008) argues that social vulnerability varies according not only to the source of the risk or exposure but also to the visibility or perception of the risk: "The frequently observed discrepancy between the lay public's perceptions of environmental and technical risks and those of scientific and policy experts has long been a cause for concern and even perplexity among those responsible for the management of such risks." (Bickerstaff, 2004, p.827) She argues that perceptions of and responses to risk and hazards are formed in the

context of a range of social, cultural and political factors. In that same line, Hilhorst and Bankoff (2004) explain that people learn about or perceive risk based on the knowledge gain from three different sources: science, governance, and local customs.

Drawing from air pollution cases, Bickerstaff (2004) points out that locality and place perceptions are related to particular geographic situations and conditions related to urban and industrial problems, as well as to the everyday people's experience in how they come to know about pollution. Observation of smog or water pollution, associations of pollution with fume stacks and industrial facilities, or smells, among others, shape people's knowledge about pollution. These perceptions can remain in the local memory and create stigmas because of the historical associations of environment and human harm. Perceptions of pollution are likely to drive choices about location and migration explaining shifts of population. Warner (2009) found that migration could be an adaptive response to environmental factors as well as an indicative of a failure of the ecological-social system to adapt to changing conditions. Under the light of these findings, Warner argues that current governance frameworks are not, or are partially, equipped to deal with human mobility. This presents challenges for environmental governance while offers opportunities to enhance resilience for those who move as well as those who stay.

Agency and power influence to what extent social groups feel they have the capacity to change these realities, a reason for what democratic processes are significantly important for dealing with environmental problems (Bickerstaff, 2004). Trust on controlling and regulatory agencies and effective communication are also important in shifting social and cultural perceptions about environment and risk. Therefore, interpretations of risk are jointly constructed from physical experience and the local social context. Moreover,

Bickerstaff (2004) argues that "the meanings that people attached to environmental risk were not shaped solely by the distribution of pollution but largely by the distribution of socio-political or economic opportunities to act in an efficacious manner." (p. 835) Therefore, perceptions of risk are multidimensional including place, power, values and trust factors, which results in different patterns of social/environmental inequalities and exclusion. Correlations between demographic characteristics and pollution for measuring environmental inequalities tells only a portion of the story. Environmental justice research and practice require democratic processes to assess public perceptions to validate communities concerns in order to incorporate social values of risk perception into decision making.

There are several reasons to consider social vulnerability as an indicator of environmental inequalities. Social processes generate unequal exposure to risk (Hilhorst and Bankoff, 2004). Social vulnerability is the product of social inequalities, social factors that influence or shape the susceptibility of groups to harm and that govern their ability to respond (Cutter, Buroff and Shirley, 2003). In other words, social vulnerability combines the risk to what people and communities are exposed with their social, economic and cultural abilities to cope with the impacts (Hilhorst and Bankoff, 2004). Social vulnerability could include inequalities of place such as level of urbanization, growth rates, and economic variables. The location of people in more vulnerable places is the result of social, economic and political processes.

Analysis of vulnerability as the kind of health risk from pollution or hazardous land uses (Sadd et al., 2011; Morello-Frosch et al., 2011) or of the type of risk to natural disasters (Cutter, 1996; Cutter, Mitchell and Scott, 2000; Cutter, 2010) at local and regional scales has

implications for environmental and land use planning which may result in the identification of regional interventions. Birkmann and Wisner (2006) also agree and links vulnerability to physical and land use planning. He introduced the idea of institutional vulnerability defining it as the set of arrangements for risk assessment, management and mitigation. Institutional vulnerability reveals mismatches among institutions, in cases where there is a lack of coordination between organizations, and mismatches between the body of institutions and the stakeholders because of different perceptions and interests. Vulnerability is the result of complex social relationships rather than just peoples' characteristics, demanding multidisciplinary approaches and considerations of spatial and organizations qualities and scales. With implications in policy and governance, Hilhorst and Bankoff, (2004) argue vulnerability requires community-based management and multi-stakeholders platforms. It is important to acknowledge that all actions, even the well intentioned ones, always create new vulnerabilities (Hilhorst and Bankoff, 2004), thereby, policy should account for cumulative impacts of hazards and vulnerabilities encountered (Morello-Frosch et al., 2011).

Lastly, it is important to note that, during the early 2000s, social and ecological vulnerability research emerged almost simultaneously with resilient approaches (Adger et al., 2005). Turner (2010) argues that vulnerability and resilience are overlapping research themes embracing sustainability science. Both share the appreciation of complex human-environment systems though they differ in the extent to which they address what Turner describes as environmental services, tradeoffs and outcomes. Sustainability functions as an umbrella for addressing human-environment systems with substantial questions about vulnerability and resilience. It approaches human provisioning in relation to nature functioning and processes. While vulnerability pays more attention to identifying the

weakest groups or places, resilience looks at the characteristics that makes those groups or places more robust. The concepts of vulnerability and resilience have been increasingly used to better understand social-ecological systems in many disciplines (Folke, 2006; Turner, 2010). Human-environment systems is a way to refer to the interdependency of human and environment subsystems. The relationships determine conditions, functions and responses to events of either subsystem. Examining those relationships allows to reveal qualities of the most vulnerable or less resilient.

The concept of resilience has its roots in ecology, and it was used to emphasize non-linear dynamics, thresholds, uncertainty, periods of gradual change interplay with rapid change, and interaction across temporal and special scales (Folke, 2006; Lebel et al., 2006) Resilience is the capacity to absorb disturbances (Adger et al., 2005). It requires self-organization, capacity for learning and adaptation. Therefore, the term has been used for referring either to social systems comprises aspects of institutional structures, contingency systems, planning, governance and management frameworks, social capital and memory. The concept lead to considering social learning, social memory, mental models, knowledge system integration, visioning, scenario building, leadership agents and actors, social networks, institutions and organizations change, adaptive capacity, among other social processes (Folke, 2006). Although social-ecological resilience research is still exploratory, it has large implications for policy suggesting rethinking governance approaches based on human-nature systems, rejecting ideas of steady-state thinking and design, and promoting adaptive governance (Folke, 2006).

Adger's research (2005) focuses on issues of dependence of communities on natural resources acknowledging that this influence their capacity to cope with shocks or stressors

either human-induced risks or natural hazards, offered insights about the linkages between vulnerability and resilience, and between social resilience and ecological resilience. He argues that using either a resilience or vulnerability approach provides a frame for environment and natural resources management since they link institutions, economies and communities to the ecosystem elements. Reducing vulnerability, and creating resilience, is a desirable social goal and a sustainability one.

Since first concepts of vulnerability, resilience and adaptation were defined in early 1980s, a wide range of paradigms, theories and methodologies have been developed (Vogel, Moser, Kasperson and Dabelko, 2007). These concepts have been central to issues of climate change and disaster risk management, among others above mentioned. Vulnerability and resilience are critical factors of sustainability. The sustainability of social-ecological systems presents issues of governance (Lebel et al., 2006). Enhancing the capacity to manage vulnerability is critical for sustainable development. The politics of vulnerability and resilience are related to questions of who decides what configuration, and when and how to intervene. Adger (2005) advocates for an approach of ecological-social resilience noting that resilience is eroded in more vulnerable and marginalized societies, revealing social and environmental justice issues. He also states that the resilience concept offers incentives for incorporating ecological knowledge plus social capital into governance processes: "Better understanding of the linkages between ecosystems and human societies can help to reduce vulnerability and enhance resilience of these linked systems." (Adger et al., 2005, p. 1036) It is clear that findings have been drawn from a variety of disciplines and different approaches which have influenced each other leading to a deeper understanding of the processes behind vulnerability, resilience and adaptation dynamics (Vogel, Moser, Kasperson and Dabelko,

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2007). Nevertheless, applying either a vulnerability or resilience approach, researchers and practitioners should first define vulnerability (or resilience) of what, to what, of whom, and for what purpose (Birkmann and Wisner, 2006; Lebel et al., 2006).

Vulnerability indices and Mapping

Many scholars have illustrated some disproportionate exposure, impacts or burdens on communities using vulnerability research. For instance Burton and Cutter (2008) studied a case of levee failures using the existing social vulnerability index (SOVI) methodology from Cutter, Buroff and Shirley (2003) to assess relative vulnerability to better understand spatial relationships between vulnerable populations and areas of highest risk in regards of a levee failure. This study resulted in an examination of social characteristics that are likely to contribute to vulnerability and uneven distribution of capacity to preparedness, response, recover and mitigation in the case of a catastrophic event. In their study, SOVI was used as a way to better understand the underlying social characteristics and built environment aspects of the communities that contribute to vulnerability while looking at its spatial distribution. A fair amount of research has shown how physical systems interact with social conditions to produce vulnerability to hazards (Cutter, 2010). Vulnerability indices have been also applied to climate change analysis (Cutter et al., 2014). The insights of using a vulnerability framework reinforce some of the above mentioned concepts. First, impacts on the system or any of its subsystems affects human well-being. Second, urban settings do also fall into human-nature systems presenting a wide range of disruption cases to be analyzed. Third, social conditions and adaptive capacity are crucial in facing natural hazards including climate change. Last, institutional capacity is also a factor of vulnerability.

Indices encapsulate complex realities in a single construct, summarizing or reducing the totality of a number of complex and intangible processes (Vincent, 2004). They are useful for decision making because they allow us to compare across units and scales of space and time. Indices have been shown to be useful in roughly assessing distribution of hazards and impacts (Cutter, 2010). Indices such as SOVI are exploratory and diagnostic in nature trying to reveal underlying drivers and differential conditions. Different indices have been created to identify vulnerable areas or groups, although not comparable when considering different sources of vulnerability (Adger et al., 2005). Therefore, aggregation or reduction approaches, such as principal component analysis, to obtain a single index score reduces the complexity of the information and provides an indication of interaction of multiple spatially distributed indicators. These kind of simplifications are appropriate for benchmarking, establishing baselines and tracking changes over time. SOVI is a descriptive that allows for a representation of a multi-dimensional phenomena (Cutter, 2010). Additionally, aggregated measures that capture multiple aspects of social-ecological vulnerability in a single or a small number of indices can be used to create maps that allow us to identify the most susceptible areas to environmental change (Abson et al., 2012). In a complex social-ecological system it is likely that multiple types and sources of vulnerability are operating simultaneously across population groups and/or across geographies. In particular, principal component analysis have been frequently used to create vulnerability maps to show areas or groups that were most susceptible to harm (Adger et al., 2005; Abson et al.., 2012; Cutter, Buroff and Shirley, 2003; Cutter, 2008; Cutter, 2010).

SOVI has shown to be robust in variable selection and scale when a "full" set of variables is considered or when it is performed at larger scales of analysis (Schmidtlein et

al., 2008; Cutter, Emrich, Morath and Dunning, 2013). Therefore, it is useful for multi-dimensional study of social vulnerability and for cross boundaries analysis under certain considerations. However, indices may not accurately represent the intended condition or process since they are case and scale dependent which requires transparency on the methodological approaches and choices (Vincent, 2004). Some of the contradictions in results generated through spatial analysis and mapping inequalities are related to the modifiable area unit problem (Maantay, 2002). SOVI, for instance, is sensitive to the area of study, the unit of analysis and geographic location (Schmidtlein et al., 2008). Context has an important impact on SOVI behavior. Moreover, it is sensitive to the construction of the index and the selected variables (Cutter, Emrich, Morath and Dunning, 2013). Therefore, the data frame used has to match a decision frame. The results of a SOVI analysis are only relevant if those components are selected based on the purpose, the scope and the focus of the efforts to be implemented. Without proper methodological and interpretative considerations indices and maps generated with them could be misleading or inaccurate (Cutter, 2010; Cutter, Emrich, Morath and Dunning, 2013).

Another consideration to take into account is that reductionist approaches have tradeoffs given by a loss of detailed information while an increase in the possibilities for communication and interpretation (Adger et al., 2005). PCA based vulnerability maps should be considered a starting point for further analysis in order to inform policy and interventions (Abson et al., 2012). Therefore, qualitative data can inform what indicators to use, methodological choices about the aggregation/reduction method, and how to interpret some of the results. Additionally, considerations about scale of analysis and cross scales analysis are required. Expert judgement is fundamental in the creation and analysis of social

vulnerability indicators (Schmidtlein et al., 2008; Sadd et al., 2011). Additionally, it requires stakeholders or community input in order to reflect perceptions and concerns (Sadd et al., 2011), allowing for a broader reflection on the linkages between qualitative and quantitative approaches to vulnerability (Schmidtlein et al., 2008).

Cutter (1996, 2003, 2010), among other scholars, has developed models in which the natural system, the built environment and the social system are integrally influencing vulnerability of places and communities. However, this body of research has not considered how these vulnerabilities talk about environmental and social justice issues. The distribution of vulnerabilities either across space or time, or among and within communities represent a series of differential burdens in regard to hazards which more widely can be seen as potential risks or existing impacts.

A Place Model of Vulnerability

Cutter (1996) developed a model based on vulnerability and exposure assessment concepts. She took from Alexander (1993) the assumption that vulnerability is primarily a function of the proximity to the source of the hazard. Cutter (1996) developed a hazards of place model of vulnerability integrating the concepts of risk exposure, hazards, mitigation with the influence of a geographic context and the social fabric. The social fabric is the complex combination of socio, economic and demographic aspects of the population which plays a role in determining its capability to face the impacts of environmental hazard. The model is a conceptual framework that incorporates both biophysical and social indicators to provide an assessment of vulnerability to natural hazards at the local scale (Cutter, Mitchell, and Scott, 2000). They showed that biophysical vulnerability not always overlaps with social vulnerability.

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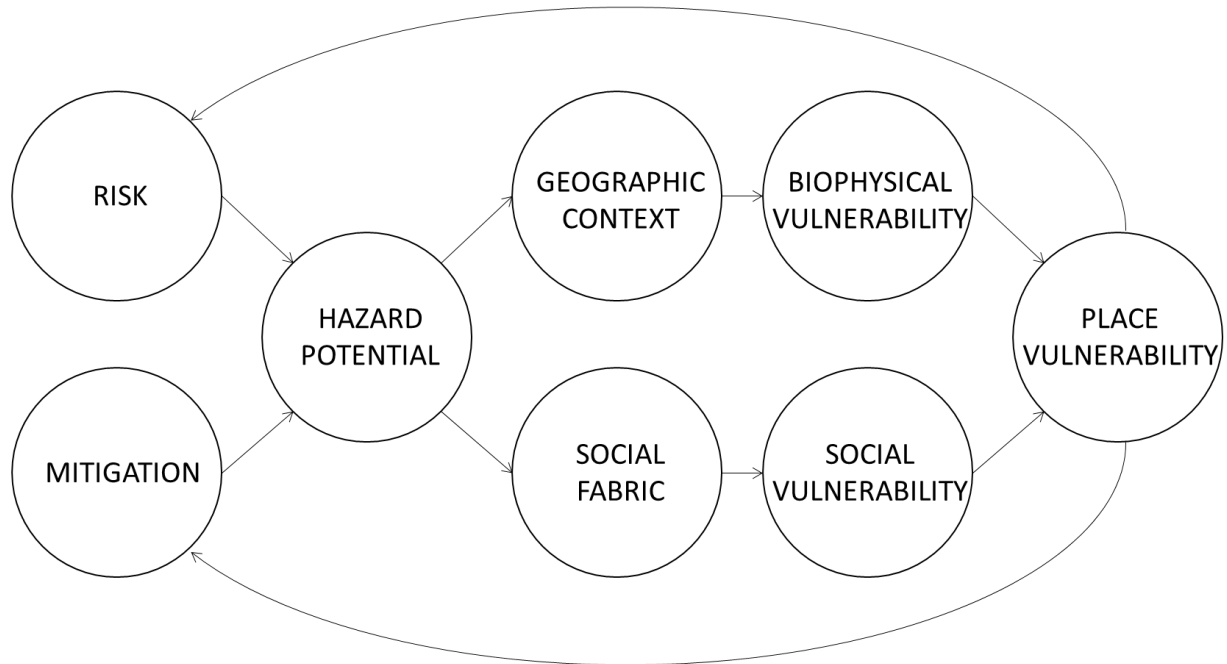
Figure 4 Hazards of place model of vulnerability (Cutter, 1996)

This model (Figure 4) some has framed research that incorporates risks of environmental phenomena and pollution with social vulnerability in the form of combined indexes or measures. Cutter, Mitchell and Scott (2000) developed a composite index that combines 12 different environmental hazards (including chemical spills) with an 8 socio-demographic variables constructed social vulnerability index for a case study in Georgetown County, California. Burton and Cutter (2008) studies spatial variability of resident's vulnerability to levee failures in the Sacramento-San Joaquin Delta Area, California by integrating the social vulnerability index with flood risk and exposure. Koks et al. (2015) examined hazard, exposure and social vulnerability with focus on flood risk management in Rotterdam, Netherlands.

3.B.   ENVIRONMENTAL GOVERNANCE AS A RESPONSE TO ENVIRONMENTAL
        INEQUALITIES AND VULNERABILITY OF PLACE

A Governance Definition

Governance is commonly defined as what governments do, such as functions of legislation, administration and adjudication (Paavola, 2007). However, governance is a much wider concept that refers to a set of arrangements, formal or informal, adopted in order to deal with issues of public interest (Balsigera, and Debarbieux, 2011). Governance could be also defined as the set of "rules, understandings and institutions that guide public and politic action to implement (…) public policies." (Bressers and Rosenbaum, 2003) Although the literature presents a diverse set of definitions of the term governance under different contexts, many definitions are closely related to each other within the policy science field. Governance can be also defined as the structures and processes by which society share power and shape individual and collective action (Young, 1992). The common factor among different definitions is given by a search of forms of coordination that does not fit in market-based distinctions.

Governance emerges from the interactions or interplay between multiple actors, different in nature and interests, including the public, the private and the non-profit sectors (Lebel et al., 2006; Bressers and Kuks, 2003). These interactions are to happen at different levels and across sectors which implies the integration of sectors in a long term horizon, and the coordination at different scales (Bressers and Rosenbaum, 2003; Bressers and Kuks, 2003). Bulkeley (2005) defines governance as the "continuum of systems of governing, in which state and non-state actors play a variety of roles." (p. 877) Governance ends up being a multi-level, multi-actor, multi-faceted, multi-instrumental and multi-resource based arrangement or system where all these elements (levels or scales, actors, perceptions and

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objectives, strategies and instruments, responsibilities and resources) have mutual influence on each other. When changes in the governance take place mutual adjustment of elements occurs (Bressers and Kuks, 2003). Having said that, governance should be understood too as the arenas where interaction occurs and the instruments used for resulting collective action (Paavola, 2007).

"Governance of the Environment"

The concept of governance is challenged when it comes to environmental management and sustainability. Environmental governance is a term that has been mostly used to refer to efforts in policy making and implementation in response to environmental issues of global and regional scale such as climate change and loss of biodiversity (Bulkeley, 2005; Lemos and Agrawal 2006). However, it is a term that has increasingly been applied to local scales where actors might have direct influence on environmental practices, standards and regulations. It comprises all "regulatory processes, mechanisms and organizations through which those actors influence environmental actions and outcomes." (Lemos and Agrawal, 2006)

Environmental issues and policies are placed within a complex system of social relationships and territorial structures (Gibbs and Jonas, 2000). On the one hand, most environmental problems such as the management of natural resources do no respect political boundaries crossing established jurisdictions and/or link discontinuous regions (Meadowcroft, 2002; Sthepherson, 2013). Cross boundary issues may make multiple jurisdictions, affecting entire regions and at more than one scale. On the other hand, governmental institutions cannot restrict social and economic behavior within frontiers of ecological systems. Meadowcroft (2002) argues that we tend to related spatial scales to

existing territorial delimitations rather than recognizing the complexity of the territorial and politic matrix existing at a particular moment. In other words, environmental governance necessarily comprises a multi-scalar system of politics, social and physical elements.

Paavola (2007) suggests that environmental governance comprises a permanent "establishment, reaffirmation or change of institutions to resolve conflicts over environmental resources." It encompasses state actors as well as communities, businesses and NGOs. According to Gibbs and Jonas (2000), non-state local organizations have been increasingly participating in environmental policy making. Political and economic relationships between these multiple actors shape identities, actions and outcomes (Paavola, 2007). Therefore, local and regional environmental governance should be analyzed in terms of the type of groups and interests involved in environmental policy formulation (Gibbs and Jonas, 2000) – and the resulting implemented actions. Moreover, the different ways in which actors participate of the decision-making processes and the ways in it is conducted impact the environmental conditions producing different outcomes (Biddle and Koontz, 2014).

The cross-boundary and multi-scalar nature of environmental issues has caught the attention of many scholars who have focused on the analysis of multi-scalar or multi-level governance (Sthepherson, 2013). Bulkeley (2005) and Lemos and Agrawal (2006) have noted that environmental governance entails the creation of new institutions driven by decentralization processes. Bulkeley adds that these new institutions are accompanied by the emergence of networks and a more intense participation of the civic society. In particular, horizontal governance structures have developed as a complement or replacement of territorial and hierarchical arrangements. Networks have significant influence in shaping

environmental action, in particular when institutions gain authority and legitimacy beyond territorial boundaries and/or scales.

The governance for sustainability demands the creation of new perspectives or new cross-scale arrangements, the acknowledgement of existing multi-level governance structures under a vision of sustainability, and the development of scientific, regulatory and economic infrastructure capable to support governance arrangements. (Bressers and Rosenbaum, 2003). Innovations in environmental governance need to happen in order to properly address multi-scale social-natural systems, providing new ways to create, either formal or informal, relationships among different social levels.

Framing the Grand Calumet River within the Great Lakes Regime

The Great Lakes contain a fifth of the world's surface freshwater, is home to a huge population that relies on the Lakes as a drinking water source, but it also offers a location for steel production and manufacturing goods. Additionally, the lakes have an enormous recreational value for local and regional communities (Muldoon, 2012). However, historical urbanization and industrialization have threatened the quality of its water and ecosystems with toxic pollutants releases, invasive species, nutrient loading, land uses changes in shorelines and up land, and hydrologic regimes alterations. The Grand Calumet region is framed geographically and politically under the Great Lakes governance, a regime constituted as a result of the agreements between the United States and Canada to protect the quality of the lakes water. These agreements led the United States to pass the Great Lakes Act driving efforts in all the lakes basins, including Lake Michigan. In sum, this regime is characterized by bi-nationalism but also by a complex mosaic of different jurisdictions at different scales and a large and diverse group of stakeholders (Muldoon, 2012).

Regimes exist when international institutions affect the behavior of states and/or actors within an area or system. Regime theory assumes that cooperation is possible in anarchic systems of actors (there are no additional levels of authority over countries; this is the maximum hierarchy of government). Therefore, there are no doubts that the Grand Calumet case comprises layers of environmental regime. The governance of the environment in the region comprises an anarchic system of actors, such as non-profit actors or private organizations, while all government layers are present from local to Federal. Although acknowledging the influence of the higher environmental regime in place, this study is looking at the ground level of implementation far from the international sphere. Chaloux and Paquin (2013) have recognized that under the light of environmental regime theory, there has been a lot said about the agreements between United States and Canada, including the States and Provinces of both Nations. However, little has been studied about the implementation stages of those agreements and the tools in particular at the subnational level. Regime comprises a multi-level governance schema.

The Great Lakes Water Quality Act was attempted to address ecological issues categorized into pollution (toxic releases, disease pollutants and nutrient loads), habitat loss (coastal, wetlands, oligotrophic lakes and benthic habitats), and invasive species (Fryefield, 2013). The consequent policies and regulations developed to address those issues generated a complex body of rules with overlaps, duplicates and gaps. Additionally, the Great Lakes Water Quality Act has been reactive to emerging issues while vague in the instrumentation of subnational policy, laws and implementation tools. It was not until 2012 that the Act incorporated a section about tools for coordination. (Fryefield, 2013) Because the Great Lakes Water Quality Act is mostly oriented to address quality issues of the water and

ecosystems of the Great Lakes, the actions drawn from it are not meant to address local socio-economic and cultural issues related to the pollution heritage of the communities located along the lakes basins.

On the other hand, The Great Lakes Water Resource Compact and Agreement was created in order to preserve the water resources preventing the loss of water exported outside the system of the Great Lakes (Karkkainen, 2013). The Great Lakes Quality Agreement between the United States and Canada is a policy instrument created to reverse the environmental declined of the Great Lakes ecosystems and water resources (McLaughlin and Krantzberg, 2011). These instruments prompted the creation of institutions for the ecosystem governance. The agreement encourages cooperation and harmonization of policy across states and provinces with trans-boundary regional institutions with real decision making authority. However, this has left room for implementation deficits related to inefficient coordination and lack of agreement on priorities.

McLaughlin and Krantzberg (2011) argue that some of the implementation deficits are also related to the conceptualizations of the human-nature interactions. Interactions between the social and ecological subsystems are not under our control, they are characterized by complexities and uncertainties. Under the lens of a human-ecosystem approach, governance is one human element of the system. Competing political authorities, tensions between different interests and priorities, multiple perspectives on the same issues are difficult to conciliate. The Great Lakes governance demands inclusion, in other words, strengthen the sense of community that has been growing for 40 years (Muldoon, 2012). The integration of such a basin wide community among governmental agencies, environmental organizations, scientists, funding institutions, and industry among others, presents some

challenges in terms of notions of scale, information exchange and accountability mechanisms (Muldoon, 2012).

Different Ways of Governance drawn from Water

Water governance history is rooted in conflicts between and among different jurisdictions, such as between States or the States and the Federal government. Water management policies and regulations were originated around the concept of water rights (Enzler, Sutro Rhess, and Swackhamer, 2013). However, former water laws lacked considerations of hydrology, ecology, climatology, culture, economy and social justice (Davis M., 2014), setting a shallow framework for water governance. Conflicts among different entities created the need for expanding the understanding of boundaries for a wider view, a more comprehensive view of water related issues. Then, water is the central element of a complex and interconnected system, involving different domains that range from ecological, agricultural, industrial, social, economic, and heath, among others. Therefore, it is within the interests of many stakeholders with different perspectives and ways to approach the wicked nature of water problems. Although the issues are interconnected, the institutions and procedures are oftentimes fragmented. Therefore, Edelenbos, Bressers and Scholten (2013) argue that water management needs to evolve into water governance by developing connective capacity. They define connective capacity as the ability to build capabilities in individuals, instruments and institutions, by crossing boundaries and establishing linkages between different actors. Boundaries here do not refer to mere physical delimitations, but temporal and geographical scales as well as definitions of social and cultural values and interests (Davis M., 2014). Similar arguments are presented by scholars in Environmental law, like Biber (2013) who recognized that regulation has to be reformed in order to allow

managerial and more comprehensive approaches, such as connective and adaptive governance, to occur.

Connectivity is a way to overcome fragmentation and integrate approaches, actors, and frames, focusing on layers, sectors and domains, time frames, perceptions and approaches, and public and private spheres (Edelenbos, Bressers and Scholten, 2013). Connectivity is an inherent part of the problem as it is of the solution. Connective capacity has to be adaptive since this capacity should constantly reassess values and problems and reconsider connections in order to adapt to evolving circumstances.

While making a case for integrating watershed and land use planning in Minnesota with a watershed-based approach, Swackhamer (2013) illustrates how water resources are often times central to the geography and landscape of a region, accounts for its economic activities and constitutes part of it identity. The Grand Calumet Region is not an exception to that. Apart from political drivers at the time, the availability of water resources are, no doubt, part of the reasons that led the steel industry to settle in Northwest Indiana. Water is an inherent feature of the landscape characterized by the lakeshore and the wetlands that extends towards the south of the basin of the Michigan Lake. Resilience of hydrologic systems has been compromised by urbanization, built infrastructure, and land use changes. Therefore, Swackhamer (2013) argues for a watershed-based planning approach, providing a framework for addressing a full range of water-related environmental and social issues by actively involving stakeholders and applying strategic management practices that integrates land use planning with water resources governance.

In settings of fragmented governance and/or decentralized governance, the responsibilities are allocated to multiple actors and agencies, producing overlaps,

duplication and/or gaps of authority (Cook, 2014). Because of the significant differences in those actors, integration is not feasible or effective leading to seek for cooperation, coordination and/or collaboration arrangements. Different patterns of governance can be produced depending on the existence of a leader institution facilitating coordination, the level of clarity in roles and responsibilities of each actor, and the level of agreement in the definition of the issue, its scope and the strategy for addressing it. The outcome patterns vary from "piecemeal management," null or inactive management, to the most innovative management approaches (Cook, 2014). Therefore, decentralized governance of the environment requires a level of collaboration between different agencies and organizations which comprises challenges of integration, coordination and data availability (Bakker and Cook, 2011). When analyzing arrangements for the governance of the Grand Calumet region, it is important to recognize and assess to what extent these intergovernmental coordination is happening and which agencies are actively part of efforts for the integration, coordination and data availability.

On the other hand, decentralized governance approach puts faith in the fact that less powerful actors may come to exercise greater voice in how they and their resources are governed (Lemos and Agrawal 2006). However, without effective safeguards against arbitrary exercise of localized power and clear relations of accountability, decentralization my lead to forms of regulation more suffocating than centralized control. Governance arrangements and institutional choices are certainly motivated by the values and interests of those who exercise the most power to make those choices (Paavola, 2007).

In managing natural resources such as water resources in the Great Lakes that trespass political boundaries and involve interested and active parties at different scales

from local to international jurisdictions, there is no clear authority because of shared, overlapping and even contradictory visions and responsibilities implying the need of intergovernmental coordination and collaboration. It is important to understand that multi-level governance can happen in two ways (Hooghe and Marks, 2003). The first type happens when governance is organized based on territorial considerations resulting in a limited number of jurisdictions, mutually exclusive at the same level and nested in different scales. The second type is task driven when governance is organized around a policy issue, thereby, one actor may be part of several overlapping and intersecting jurisdictions. Trans-boundary (water) governance requires to establish and maintain exchange agreements and networks for data and information sharing among stakeholders (Paisley and Henshaw, 2014). This ultimately leads to greater cooperation regarding this and other shared resources. Whether it is at the international scale of the Great Lakes governance or at the regional scale of the Grand Calumet river, starting from water and pollution related issues, there is need to integrate socio-economic, environmental, technical and engineering issues since water is the connector element between these different dimensions, relevant for the development of the communities, business and industry, and the functioning of the ecosystems. Therefore, more comprehensive data sharing and exchange is necessary in order to better address holistically the issues of the region.

Securing ecosystems capacity to support societal development in the future requires adaptive governance (Dietz, Ostrom, and Stern, 2003). Since disturbances create opportunities to develop new approaches which leads to or requires to innovate in order to mitigate impacts or adapt to new conditions (Folke, 2006). Boundary spanning is an adaptive approach developed within the water governance field in order to consider the linkages

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between different sectors, scales and timeframes (Lulofs and Bressers, 2010). Since boundaries are inter-subjective constructions of demarcations between different social worlds, this approach attempts to break traditional boundary demarcations, building bridges to solve complex challenges and creating a converging domain of interpretations of them among a wide range of actors. Moreover, Bressers and Lulofs (2010a) have advanced a contextual interaction theory to explore motivations, cognitions and resources of stakeholders and explain with their course of action and the outcomes. In environmental governance these concepts and frameworks are relevant since there is a large number of actors actively involved in different efforts and decisions.

Relationships for Governance: Coalitions and Partnerships

Governance of the environment and natural resources have evolved into different forms and involve different type of associations or relationships between the interested parties. Regimes, coalitions, and partnerships are formed when same or similar interests bring actors together and collectively exercise influence on the public agenda. Urban regimes can be defined as the informal arrangements under which public and private interests function together in order to make governing decisions (Gibbs and Jonas, 2000). Coalitions emerge as the result of a specific common agenda, which represents common values and interests. The capacity to produce results is constrained by the resources of the members of the coalition. In the local scale, many coalitions have formed as the result of citizens' activism encouraging progressive approaches in planning, environment and economic development.

Rios (2000) argue community environmental activist moved towards NGOs seeking to share strategic knowledge, building up networks in order to secure resources. The evolution of many environmental justice groups is characterized by moving from local and

narrow strategies to partnerships and networks of higher sophistication levels. Colsa et al. (2014) see this evolution as in response to the need of working more effectively "within the system" rather against it. This strategy brings to major benefits. First, government may see increased the legitimacy of organizations that have followed this path, expanding their influential capacity. Second, organizations wiling to partner with government and private sectors are likely to have access to funding and other resources. However, organizations still compete for resources within a partnering and collaboration framework challenging those relationships. Different actors may value differently the different stages of this evolution: for some the original community based organizations are crucial in the success in addressing environmental justice issues, while others may consider that the more sophisticated and organized networks of NGOs, government and private actors are responsible for positive outcomes. On top of changing political and social priorities and interests, the Great Lakes regime also evolves since new ecological stresses are recognized and incorporated in the agenda (Muldoon, 2012).

Many scholars recognize the importance of partnerships (Leach and Pelkey, 2001; Lemos and Agrawal, 2006; Newell, Pattberg and Schroeder, 2012; Simona and Ioana, 2013). Partnerships are commonly defined as arrangements, either formal or informal, between two or more stakeholders (Leach and Pelkey, 2001; Macdonald and Chrisp, 2005). These associations are created in order to join forces to accomplish a specific task or/and to discuss and decide about the management of, for example, resources. Partnerships might offer a space to communicate and negotiate, seen as useful at earlier stages of planning and project management. Although it is true that many organizations come together in order to join efforts and/or resources to perform a task, Macdonald and Chrisp (2005) argue that this

definition assumes the existence of a task or at least a similar commitment level among partners to perform the task. Partnerships offer wide range of benefits making them attractive for different organizations for different reasons (Lemos and Agrawal, 2006). Interests are frequently uneven, are likely to change over time and are not necessarily focused on the accomplishment of a task (Macdonald and Chrisp, 2005). Reputation and image frequently motivate organizations to partner with others better positioned in a particular field. Other motives are related to getting access to particular sectors, to communities, to specific information or resources. Power relationships are usually shaped by the creation of partnerships and associations between organizations of all types. Additionally, partnership functions could include education and training, public outreach and funding. It is imperative to establish and strengthen partnerships for local administrative and organizational arrangements to complement or substitute centralized interventions (Lemos and Agrawal, 2006).

In recent decades, partnerships and collaborative efforts have gradually came to refer to a wide variety of institutional arrangements that include informal associations, ad hoc coalitions, formally structured interagency agreements, loosely configured citizens-dominated efforts, and formally incorporated non-profit organizations (Genskow and Born, 2006). This diverse nature in partnerships and collaborative associations makes them a fundamental part of governance structures since this kind of relationships have been building up in order to address issues of interest of also wide and diverse group of stakeholders. According to Stalker Prokopy et al., (2014), collaboration is oftentimes triggered or catalyzed by an event that changes the baseline conditions modifying the status quo. This catalytic events could either be intentional actions by the government, for instance,

regulations, mandates or funding opportunities; intentional non-governmental actions; or unintentional such as natural disasters or incidental consequences of a project. In natural resources governance, in particular in water management settings, this has been the case frequently (Stalker Prokopy et al., 2014) and the Grand Calumet Area of Concern efforts are not the exception. Moreover, US EPA has been encouraging collaboration in regards to the efforts done for remediation and restoration of polluted ecosystems. Collaboration and partnerships seem to be the trend of environmental governance arrangements as a natural result of intentional and unintentional events that encourage different actors to build stronger relationships.

Environmental Justice Implications of Environmental Governance

Some research has suggested that weak governance and geographic vulnerability can account for crisis levels of pollution in developing countries and cities (Dasgupta, Hamilton, Pandey and Wheeler, 2004). Traditional economists that use the Environmental Kuznet Curve to predict pollution based on income and status levels assume that environmental governance is poor in developing countries and cities. Although governance is statistically correlated with income, governance has strong independent effects on environmental quality. Dasgupta, Hamilton, Pandey and Wheeler (2004) proposed a cross sectional model that incorporates governance, geographic vulnerability, sectorial pollution intensity and urban population showing that environmental outcomes are more significantly affected by economic activities and geography than by income level. Focusing on air pollution they found that air quality does not necessarily diminish during the first face of growth and development while poor countries or municipalities may be also able to improve air during that phase (Dasgupta, Hamilton, Pandey and Wheeler, 2004). It is shown that policy reform

in order to improve the level of governance can increase the quality of the environment even in overcrowded and geographically vulnerable cities of low income.

With the establishment of the linkage between governance and environmental pollution, and since minorities and low income communities suffer of higher exposure to multiple environmental hazards and social stressors (Morello-Frosch et al., 2011), many researchers have developed frameworks to analyze environmental governance in relation to environmental justice and sustainable outcomes. According to Gibbs and Jonas (2000), environmental issues are the result of social conflicts, inadequate regulations and state incapacity to exercise governance over natural resources. They recognize that discursive practices and material-social structures are the elements that affect environmental outcomes on the local scale. They argue that conflicts around environment require a combative negotiation, where environmental policy making capacity is built through coalitions and collaborations. In highly functional and political fragmented conditions governance of the environment fails.

Environmental justice issues are singular since they provide opportunities as well as barriers for problem solving, demanding collaborative strategies (Lashley, 2010). The existence of opportunities for collaboration and building capacity are essential for that collaboration to happen. In their study about collaborative governance and setting specific goals, Biddle and Koontz (2014) argue that collaborative partnerships produce positive environmental outcomes when they are supported by sustained participation, information sharing, collective documentation, specific goals and best management practices. Their study also suggests that identifying partnerships and assessing at what extent there is true

collaboration is part of analyzing to what extent environmental governance could actually reduce pollution and improve environmental conditions.

Trade-offs and priorities among social and environmental objectives are political in nature, therefore the governance system should address them rather than technical experts and narrow models (Lebel et al., 2006). As Paavola (2007) points out, decisions over environmental resources are a matter of social justice. Using an institutional approach, he/she analyzes governance arrangements in the resolution of environmental conflicts. In his/her approach, social justice plays an important part, where environmental problems are characterize by interdependency relationships instead of seen as externalities of the market dynamics. Interdependency implies that the choices or actions of one might influence the choices or actions of others. Therefore, in managing natural resources it is important to consider whose interests are prevailing and at what extent. Moreover, in the context of environmental justice conflicts, leaders are essential in building bridges, taking opportunities to participate in problem solving and decision making processes and influencing others' perceptions on those opportunities (Lashley, 2010). Balsigera and Debarbieux (2011) recognize the importance of the distribution of responsibilities since environmental conflicts and governance rise challenges of democratic accountability, transparency and legitimacy. This reinforces the idea that environmental justice is inherent to environmental governance structure.

On the other hand, environmental benefits and impacts have been historically seen as externalities of actions within the market context. However, economists failed in recognizing the inherent interdependency, what present conflicts such as "the tragedy of the commons." (Paavola, 2007) Conflicts over the environment are related to who gets to use

what, in other words, it is an issue of distribution rather than of economic efficiency. Therefore, governance arrangements for dealing with environmental issues are fundamentally a matter of social justice. Moreover, concerns about the degree to which increasing resources are destined to market actor and processes undermines social goals related to democratic participation, unequal access to resources and lack of accountability (Lemos and Agrawal, 2006). Concerns about producing more equitable outcomes are related to environmental governance mechanisms that emphasize only collaboration for greater efficiency. It has to focus not just on efficiency, but also in equity and long term sustainability. Interdependence of actions and decisions drives the conflicts between multiple uses and users of natural resources and environmental services. That is another reason for environmental governance to include others than the central state actor, since the environment and natural resources policies can be considered as forms of collective ownership (Paavola, 2007). Therefore, Gibbs and Jonas (2000) argue that environmental intervention has to be done at more than one level as a matter of social regulation. Without layers that allow for accountability inequalities and power differentials are to be exacerbated. According to Paavola (2007), governance solutions should be designed (and could be analyzed) in terms of functional and structural tiers, the organization of governance functions and the institutional key rules. It is important to acknowledge that all actions, even the well intentioned ones, always create new vulnerabilities (Hilhorst and Bankoff, 2004), thereby, policy should account for cumulative impacts of hazards and vulnerabilities encountered by the communities (Morello-Frosch et al., 2011).

Elements of Good Governance

Governance of the environment and natural resources requires considering sustainability as the center of policies and regulations (Enzler, Sutro Rhess, and Swackhamer, 2013). In addition to what was mentioned in previous subsections of this chapter, the literature offers some other insights about good governance for sustainability. According to Lebel et al., (2006) the ability to manage resilience and vulnerability resides in the capacities that actors, networks and institutions have for self-organizing, adapting and integrating knowledge and learning.

In that line, Lebel et al., (2006) identifies some fundamental attributes of sustainability governance. First, he found that participation is necessary to build trust. Public participation and deliberation broaden interests and lead to a shared vision and mutual understandings required to mobilize and organize. However, it is important to be aware of sensitivities of other actors, since it is likely that different stakeholders have different perspectives and interpretations; their motivations and cognitions may be significantly different (Van Tilburg, 2010). Information has to be presented by legitimate and accepted actors, and there should be space for deliberation on the subject, acknowledging that other actors may be experts too. In summary, stakeholders should have the opportunity to develop a share vision for the future of the environment, with common social, economic and environmental goals (Enzler, Sutro Rhess, and Swackhamer, 2013).

Public participation is fundamental to good governance. Scholars have recognized the social value of public participation (Beierle and Cayford, 2002; Enzler, Sutro Rhess, and Swackhamer, 2013). Without public participation democratic governments are not possible nor sustainable governance. Public participation allows to define what the public interest is

(Beierle and Cayford, 2002), contributes to create awareness about the private and public interests linkages, and strengthens a sense of justice and supports the mutual recognition of members in a community (Laird, 1993). In defining the public interest public participation is capable to influence policy and regulations on environmental matters. Transparency and public participation do not necessarily require consensus but it does requires inclusiveness and representation of multiple voices and multidisciplinary approaches (Enzler, Sutro Rhess, and Swackhamer, 2013; Davis C., 2014). In environmental interventions as the ones taking place in the Grand Calumet region, public participation is fundamental in incorporating public values into decisions and improving the process of decision-making, resolving conflict between competing interests, building trust and informing the public.

Second, institutions which are polycentric and multi-layered are likely to respond adaptively and at proper levels since they have the capacity to manage scale dependent scale challenges and provide opportunities of context heterogeneity (Lebel et al., 2006). Sustainable development becomes a multi-scale issue since it requires an organization of governance across scales. Therefore, Bressers and Rosenbaum (2003) state that multi-level governance is just a consequence of a commitment to sustainable development. The interplay of research and practice in these fields also comprises a multi-level system of governance and knowledge production among a range of actors engaged in understanding and managing environment-society interactions (Vogel, Moser, Kasperson and Dabelko, 2007). On this line, sustainable governance demands acknowledging the interrelationships between natural and human systems (Enzler, Sutro Rhess, and Swackhamer, 2013; Van Tilburg, 2010). Nature science-based knowledge facilitates governance since a better

understanding of the system allows for better decisions and could be used to better inform all stakeholders (Van Tilburg, 2010).

Tacer (2010) emphasizes the role of the temporal dimensions in peoples' perceptions and decisions. Time delay and discounting affects motivations, interests and basically the value given to the expected outcomes of particular actions. This temporal dimension affects peoples' perceptions of changes of the environment, the community and the issues faced over time. Not managing adequately the temporal framework could create expectations that are not meet, frustration and discourage commitment. Temporal frames should be flexible and compatible with different stakeholders' time frames (Tacer, 2010).

Third, authority accountability, which comprises transparency, report and monitoring, communication and stated social justice goals, leads to improve the capacities of vulnerable groups as well as the society as a whole (Lebel et al., 2006). Good governance based on effective collaboration between and among key actors, requires collaborative and participatory decision-making processes while making accountable all actors by implementing incentives and penalties as well as by communication and transparency for a better social regulation. Additionally, environmental governance should include the monitoring and evaluation of policy outcomes with consequent adjustments to policies and regulations according to the observed results. Enzler, Sutro Rhess, and Swackhamer (2013) argue that good management requires identifying what decisions are more effective to be taken at different levels, whether it is a the ground local scale or higher tiers of governance. Young (2003) adds that better governance outputs are also produced with the implementation of sensitive monitoring systems, privileging adaptive responses, and the identification of critical features of specific problems. Lastly, some recognized that

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management and governance should rely on the best available science and knowledge of the field building upon policy (Davis C., 2014, Enzler, Sutro Rhess, and Swackhamer, 2013).

Finally, as I mentioned earlier, a proper arrangement of relationships between stakeholders are significantly important in determining environmental governance outcomes. Partnerships and coalitions represent significant benefits with compromises, shared responsibilities and shared resources (Bressers and Lulofs, 2010b). However, they may also have limitations. Although necessary, compromises can diminish legitimacy within represented organizations and groups; shared responsibilities could dim accountability; and shared resources create dependencies among parties (Bressers and Lulofs, 2010b). Therefore, overcoming barriers for environmental governance requires cooperation, though it needs to be established with an adequate arrangement of partnerships and coalitions, having spanned the boundaries to the appropriate scope of sectorial, geographic and temporal dimensions.

Green, Daniel and Novick, (2001) argue for applying the concept of community to the governance arrangement. Community refers to localities but also to groups that have a common interest, cause or identity. It is the foundation for relationships built between and among organizations and individuals that shared perceptions of a common place, interest or cause. Community partners refers to all volunteers, agencies and organizations including local governmental agencies, voluntary agencies, local institutional networks, different sectors of the development of the community, private sector and foundations (Green, Daniel and Novick, 2001). In order to achieve transparency and public participation there is a need to treat the community as full partners and allow time for change to happen in the complex system of communities. Horizontal community coalitions and partnerships must be

established based on strong vertical relationships between local entities and their state and Federal counterparts (Green, Daniel and Novick, 2001).

Again, establishing an effective governance schema requires to create institutional arrangements that are appropriate for the environmental problems to be tackled. Young (2003) suggests that the institutions that constitute environmental governance not only confront issues of environmental regimes but also cause issues. First, there are issues of a misfit between the properties of the ecosystem and the attributes of the institutions. Examples of this are cases of jurisdictional fragmentation with challenging coordination between different levels of governance and/or competing authority, situations of limited managerial vision, or when technological changes produce obsolete institutional arrangements. Second, issues of interplay are related to how institutions within the same level or at different levels interact with each other. In this regard, governance requires considerations such as about roles of academia and practitioners in creating knowledge, or about international and national factors affecting local actors' capacity to face pressure and tensions. A third type of issue comprises the scope of institutions' action. Issues of scale are common since not every scope does fit "all" environmental problems scopes. Fit, interplay and scope are fundamental in determining how a particular governance schema deals with particular environmental problems. However, misfits, tense interplays, inadequate scopes are likely to create or exacerbate environmental problems which the governance schema is intended to solve.

Lebel et al., (2006) have pointed out that governance attributes have not been systematically assessed. However, Xi et al., (2014) proposed a way to assess environmental governance by looking at the Hudson River case. Their model is presented as an algorithm

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that incorporates whether there is a weak or strong regulator, what type of polluting enterprise is operating, whether there is effective NGO influencing regulation, and whether the court is involved and rules in favor or against environmental values. The result of the algorithm is intended to assess cases of good or poor environmental governance. Although this approach simplifies the complexities of a governance schema, it allows us to identify major parties and their roles. Moreover, this model does not account for different geographical scopes and the interactions and interdependencies of human-nature systems.

3.C.   SYNTHESIS ABOUT LINKAGES

The literature review presented in this chapter basically builds on three major bodies of research: Environmental Justice, Vulnerability and Environmental Governance. I argue first that environmental justice could be analyzed under the lens of vulnerability models. Second, justice could be achieved through an appropriate arrangement of environmental governance. During the review I have presented elements that fall in the intersection of those bodies, revealing a series of relationships in terms of concepts and theoretical models, as well as evidence of the interrelations between them in real cases. Figure 5 is a representation of the interrelation of these fields. The literature shows more clear relationships between vulnerability (and resilience) fields of study and environmental justice, as well as between environmental justice and governance. However, few scholars have pointed out the interconnection between vulnerability and resilience with environmental governance schemas and approaches. In all three intersections, research presents room for expanding on the implications that governance has over vulnerability, resilience, sustainability and justice, while managing for vulnerability, resilience, sustainability and justice requires of environmental governance approaches because of the political, cultural and social

dimensions of all three. Looking at environmental governance under the light of a place model of vulnerability may answer part of the questions stated by Cutter (2008) of seeking a way to balance theoretical and applied perspectives in order to integrate pragmatic and public policy dimensions of vulnerability in the search of more just distributions of burdens and impacts within communities and regions.
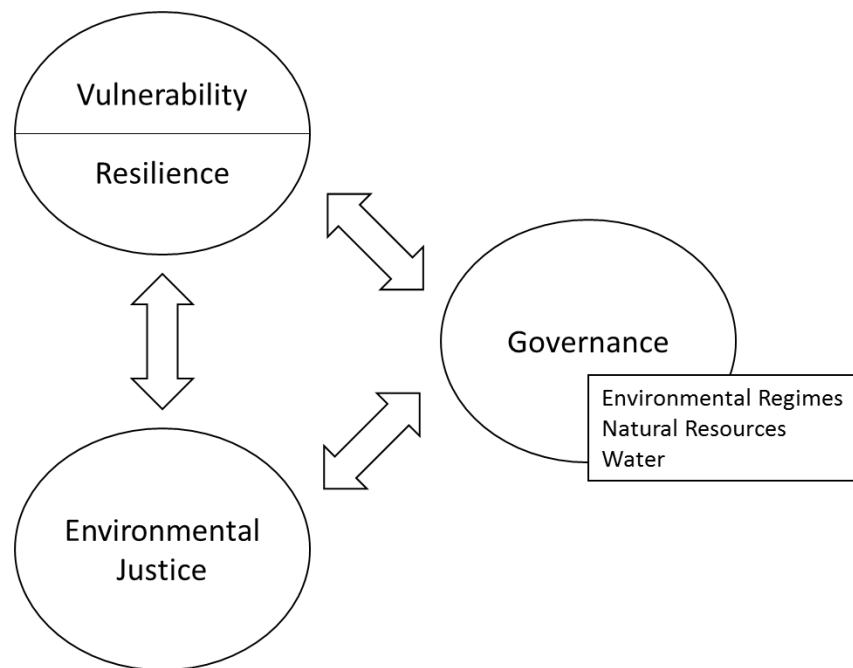
Figure 5 Linkages between three bodies of literature.

Figure 6 presents a synthesized framework that includes the major aspects and elements drawn from the literature. Environmental conflicts have been defined by considering differential vulnerability of place and people as well as differential environmental and health impacts on particular social groups, which could be also identified as more vulnerability groups. However, environmental inequalities also encompass the lack of inclusion and/or representation of community voices in the power and governance structure. Environmental governance is seen as the means to achieve better outcomes in terms of burdens distribution, vulnerability reduction (resilience improvement) and

representativeness of stakeholder interests. Governance schemas have been described as regimes, coalitions, collaborative arrangements and partnerships and democratic processes. However, there are different approaches of governance. Multi-scales, multi-levels, and multi-actor are some of the arrangements that help to understand the governance of complex human-environment systems, while approaches that recognize interconnectivity and adaptive capacity are fundamental in order to better plan, decide and intervene in those systems. Elements of all these approaches are considered elements of good governance with respect to govern complex human-environment systems.
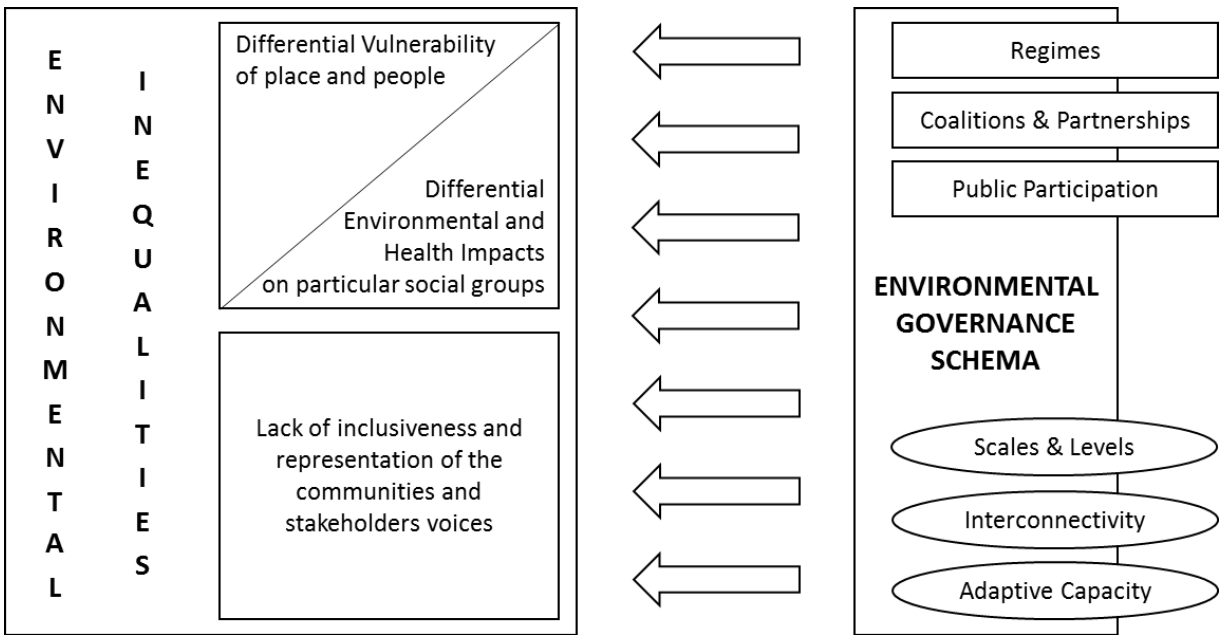
Figure 6 Synthesis of the literature review: environmental inequalities given by differentials in environmental impacts, vulnerability, inclusion and representation are to be shaped by the influences effected by the operating environmental governance arrangement.

This study makes use of the model of vulnerability of place to understand spatial relationships between the community and the existence of facilities with permits to discharge to waterways as an approximation of environmental impacts related to industrial pollution. Vulnerability models provide a framework to determine to what extent

communities in the Indiana Grand Calumet region experience social and geographic conditions that represent environmental inequalities. In the literature review I highlighted the limitations that quantitative approaches have in terms of revealing a comprehensive picture of the underlying factors of vulnerability, in particular non-spatial ones, justifying the use of qualitative methods to explore other aspects of environmental justice conflicts. Environmental governance literatures provide a set of concepts and models that help to interpret the current schema operating in Northwest Indiana, and identify the connections of particular past experiences, evolving patterns, challenges encountered and aspects of success to the type of arrangements present in the region and the environmental outcomes of this complex natural and social system.

CHAPTER 4   METHODOLOGY

4.A.   RESEARCH DESIGN

I choose to conduct a case study applying a mix of methods. This research comprises an inductive approach in order to analysis a case that would identify general concepts oriented towards theory development regarding the relationship between social vulnerability and environmental governance as a way to talk about environmental justice. According to Yin (2009), case studies are adequate for answering questions of the how and why types, but also when the researcher has no control over the actual behavioral events and conditions when analyzing contemporary phenomena. Although this study is not conclusive in giving a feel for the exploratory, it is driven by questions of the types of how and why. Understanding how social vulnerability and environmental inequalities are distributed in space in Northwest Indiana communities and how those relationships are related to the way environmental governance operates is an examination of a contemporary reality over which I do not have any control nor can I manipulate. Additionally, looking at communities in Northwest Indiana requires us to take an area of interest, which is a sort of general unit of analysis at a collective or communal level. This empirical inquiry of real life has no clear contextual boundaries because of the interplay of elements and processes that often times go beyond any selected boundary.

This study is based on a set of propositions which guide the analytical process. I formulated two types of propositions for the study: theoretical propositions, and case study specific ones. First, I assume that the place model of vulnerability is an appropriate way to analyze spatial relationships of environmental inequality, and that environmental governance can be analyzed through the lens of a vulnerability place model as an approach

to assess environmental justice. Then, I assume that the Grand Calumet area experiences social and geographic conditions that constitute environmental inequalities regarding historical and current discharges of pollutants to waterways, and that the interventions implemented have not significantly attenuated environmental inequalities since they have not integrally addressed mitigation with the improvement of the social and geographic context.

This research design comprises a holistic, single case of analysis, assuming that the Indiana Grand Calumet region is able to make a critical case for existing theories of social vulnerability, place models, environmental governance, partnerships and coalitions, and environmental justice. I depart from Cutter's place model of vulnerability considering that the quantitative measures derived from it are valuable to assess environmental justice of a group of communities. However, these measures does not allow to analyze the elements in the model for which planners, policy makers and regulators among with all active actors can introduce actions and interventions to reduce vulnerability of place, or in other words, reduce existing environmental inequalities. For that reason, I push the place model of vulnerability beyond the quantitative analysis by applying an interpretative qualitative analysis approach.

I combined quantitative and qualitative analysis in an integrated mode for one single study. According to Yin (2009) mixed methods provide the means for addressing the broader and more complicated implications of the place model of vulnerability within which the interventions are the result of a particular environmental governance schema. Although this case study is far from being conclusive and rigorous leading to a well-developed analytical generalization, a mixed methods approach provides the opportunity to start answering

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questions about the linkages between vulnerability, environmental justice and governance. The spatial analysis (quantitative) piece is meant to answer some of the questions while the qualitative piece allows us to answer complementary questions with data capable to add a different layer of interpretations on the reality of these communities.

This is a constructivist inductive approach in which the quantitative and qualitative methods interplay with the purpose of building theory. Building theory means to "transcend reality towards the thematic, conceptual and theoretical": "it requires to move upwards from the diversity of data to the shape of data, the concepts" (Saldana, 2009). Although theory can mean a formal set of propositions and axioms that explain how a part of the world operates, it also can refer to any general set of ideas that guide action (Mills and Flinders, 1993). This research aims to start building theory and concepts of the second kind, that include beliefs, assumptions and suspicions derived from intuitive and interpretative processes about the linkages between vulnerability of place, environmental justice and governance of the environment.

4.B.   SPATIAL ANALYSIS METHODS

Based on the place model of vulnerability, I propose a different approach to assess differential impacts of pollution legacy on the residents of Northwest Indiana. Figure 7 presents the areas in the model that are object of spatial analysis in this research. The purpose of the spatial analysis is to explore the spatial relationships between the geographic context and the social fabric as I understand these relationships can represent environmental inequalities when focusing in particular aspects of the built environment that represent impacts or burdens imposed by the geographic context to the local communities. I argue that the spatial distribution and relationships of vulnerability and aspects of the built

environment are one measure of environmental inequalities. I focus on the municipalities of Hammond, Within, East Chicago and Gary, looking at the socio-demographic factors that contribute to social vulnerability and the distribution of the facilities which have permits to discharge to waterways. The unit of analysis used in this analysis is Census Tracts as defined by the 2010 Decennial Census.

The information about facilities discharging to waterways was obtained from the U.S. Environmental Protection Agency (EPA) Integrated Compliance Information System (ICIS). The dataset included all facilities whose locations fall within the four municipalities and a buffer area of 5 Km around the study area. The buffer is intended to avoid edge effects in computing spatial estimations. The facilities dataset included 157 facilities which have permits to discharge to waterways and are subject of monitoring and report. In order to account for the distribution of vulnerable populations this study considers the Social Vulnerability Index (SoVI) as developed by the University of South California Hazards and Vulnerability Research Institute (SoVI®). SoVI is a metric generated as a result of a Principal Component Analysis conducted with socio-demographic variables and an additive model that accounts for cardinality of factors to obtain a final index score. SoVI values for the State of Indiana computed for the 2010 Census Tracts using socio-demographic data from the American Community Survey 2006-2010 and 2010 Decennial Census was obtained from the Digital Coast repository, NOAA Office for Coastal Management. The dataset comprises twenty-seven variables available at the census tract level, and the computed standardized values for each variable, the factors scores and final SoVI scores for each census tract. Complementary information used in this study comprises Census Bureau TIGER shapefiles

such as water features, place boundaries, census tracts, and 2010 census blocks with population counts.
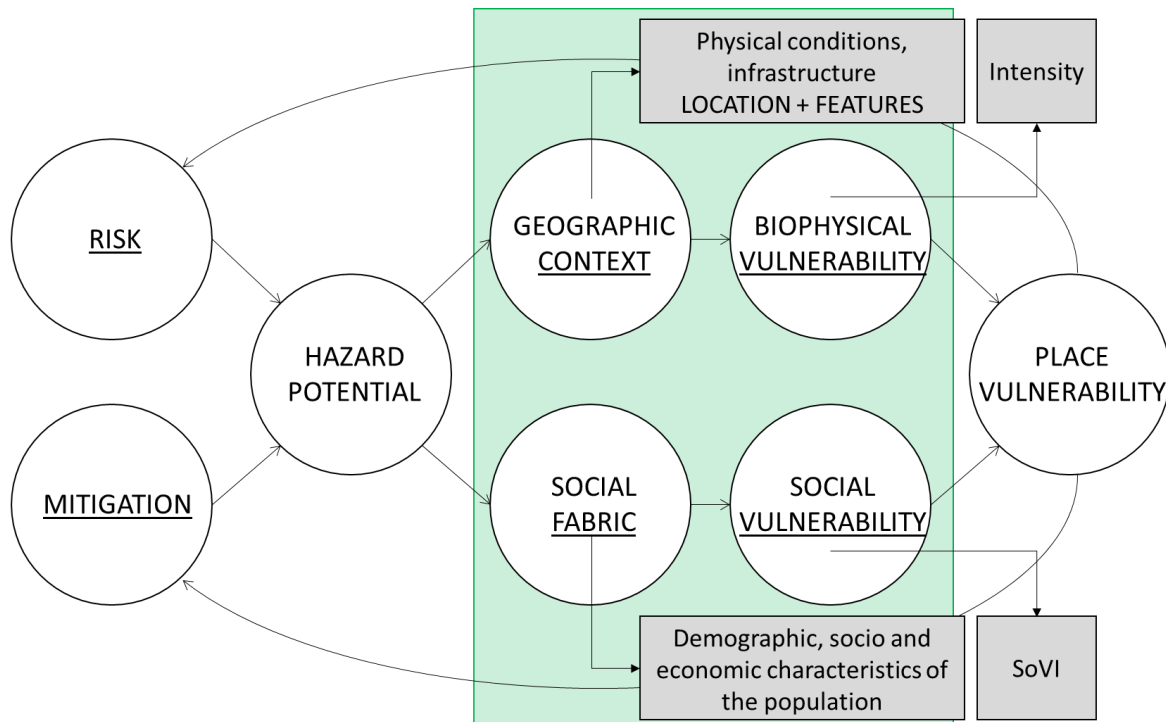
Figure 7 Spatial analysis focus within the place model of vulnerability.

The goal of this quantitative piece is to analyze the spatial distribution of socially vulnerable population in relationship to the distribution of facilities that have implications for surface water pollution in Northwest Indiana. Kernel Density Estimation (KDE) offers a measure of the spatial distribution of point data (Silverman, 1986) allowing estimation of intensity at all locations including those where there is no event (Lloyd, 2011). A local measure of the density of facilities which have permits to discharge to waterways provides a way to account for a higher level of detriment of the built environment. Regarding the legacy of water pollution in the area, I assume that locations with higher density of polluting facilities have experienced higher burdens because of the past and remaining pollution generated prior to the enforcement of limits to discharges, as well as the inherited perception of environmental detriment that impacts not only on measurable factors such as

property values, but also causes an stigma to the residents of the surrounding areas to those facilities and polluted waterways.

I computed a KDE of the facilities located within the study area and the 5 Km buffer using ArcMap 10.2.1. I tested bandwidths of 1, 2.5, 5 Km and ArcMap's default. A bandwidth of 2.5 Km was the most adequate for the purpose of this study since it produces a smooth surface that still accounts for the local variations across the area. Computations were done using a resolution of 50 meters and the surface results were displayed only for the study area. A density field was calculated for the census tracts by a sequence of steps that includes extraction of the field values to census blocks centroids and the estimation of population-weighted facilities' density for each census tract.

SoVI calculated for the State of Indiana was re-classified to show a scale of vulnerability from the most vulnerable census tract to the less vulnerable within the area of study. I first look at the spatial distribution of vulnerability in order to identify specific patterns of special interest for the further analysis of spatial relationships between the polluting facilities and the vulnerability of tracts. I conducted a Local Indicators of Spatial Association (LISA) or Local Moran's I analysis. This statistic indicates the level of statistically significant spatial clustering of similar values around each observation in the sample (Anselin, 1995). A global Moran's I is obtained indicating whether there is a positive spatial autocorrelation, a negative spatial autocorrelation or spatial random distribution. LISA results allow us to identify hot spots and cold spots of social vulnerability.

The spatial relationship between the social vulnerability and the distribution of polluting facilities can be assessed by applying a Bivariate LISA, which is derived from the original Local Moran's I (Anselin, 1995). This statistic also provides metrics of positive,

negative or no spatial correlation between the distributions of two variables. All LISA analysis were conducting in GeoDa 1.6.6.1 using queens distance for constructing the spatial weight matrix and a randomization approach of 999 permutations. A significant level of p = 0.05 threshold was set. The displayed results show clusters of high values of one variable surrounded by high values of the second variable, low values surrounded by low values, high surrounded by low, and low surrounded by high. A regression model allows us to analyze spatially distributed dependent and independent variables. I conducted a spatial error model in order to assess the relationship between the SoVI distribution (dependent variable) and the density of facilities as independent variable. The model was computed in GeoDa 1.6.6.1.using the same queen distance matrix used for LISA estimations.

4.C.   QUALITATIVE ANALYSIS METHODS

While the spatial analysis offers a measure about environmental justice distribution, the reality of these communities is way more complex to be simply assessed by quantitative metrics. Reality is to be constructed by residents and actors that have stakes in the communities and operate within them. Therefore, the social fabric and the geographic context can also be seen through the lens of those who personally and collectively experience socio-demographic dynamics and interact with the built environment within that context. Then, biophysical and social vulnerability could be refined or redefined through the social constructions of people that work and live in these communities. Additionally, questions of how and why outcomes of environmental governance are linked to the improvement of those social and biophysical conditions for a more just distribution of impacts and burdens within the community and across the space are better answered through perceptions and interpretations of the actors involved in such governance scheme. Inquiring about these

social constructions involve looking at experiences, feelings, behaviors, organizational functioning, social movements, and interactions between organizations, among others, all aspects that are not to be analyzed with statistical procedures or any means of quantification (Corbin and Strauss, 2008). Moreover, the nature of these questions suggests the need of an adequate qualitative approach that complement the quantitative character which the place model of vulnerability developed by Cutter (1996) has had so far.

In my attempt to answer the research questions, I identified three major areas in which environmental governance has the ability to intervene or modify the conditions using the place model of vulnerability framework (Figure 8). The first is mitigation. In the case of the Grand Calumet Area of Concern, considering that hazard potential can be replaced by the concept of impact to the ecosystem and the human health, mitigation correspond to actions taken to reduce the pollution exposure by remediating the waterways, restoring natural areas and controlling new and existing sources of pollution. These actions are regulatory, controlling and remediation functions of the environmental governance structure. The second and third areas are the geographic context and the social fabric. The geographic context can be intervened, for instance, by zoning and or establishing incentive programs that relocates polluting industry, but also by developing infrastructure or modifying physical conditions of the natural and built environment. The social fabric can also be object of intervention in the form of programs that provide social and economic support for the improvement of socioeconomic conditions of the communities that reside in the area. Having said that, a qualitative approach provides an opportunity to capture the social constructions of community and environment as they talk about social and geographic/biophysical layers of place vulnerability, as well as the social constructions of environmental governance,

including who makes up the governance structure, how these actors interact and what are the outcomes for the community and the environment as constituents of place. The qualitative piece purpose is to identify matches and mismatches between quantitative metrics and perceptions, ideas and beliefs about place vulnerability and environmental justice relationships, while exploring who and how intervenes, in which areas of possible intervention.
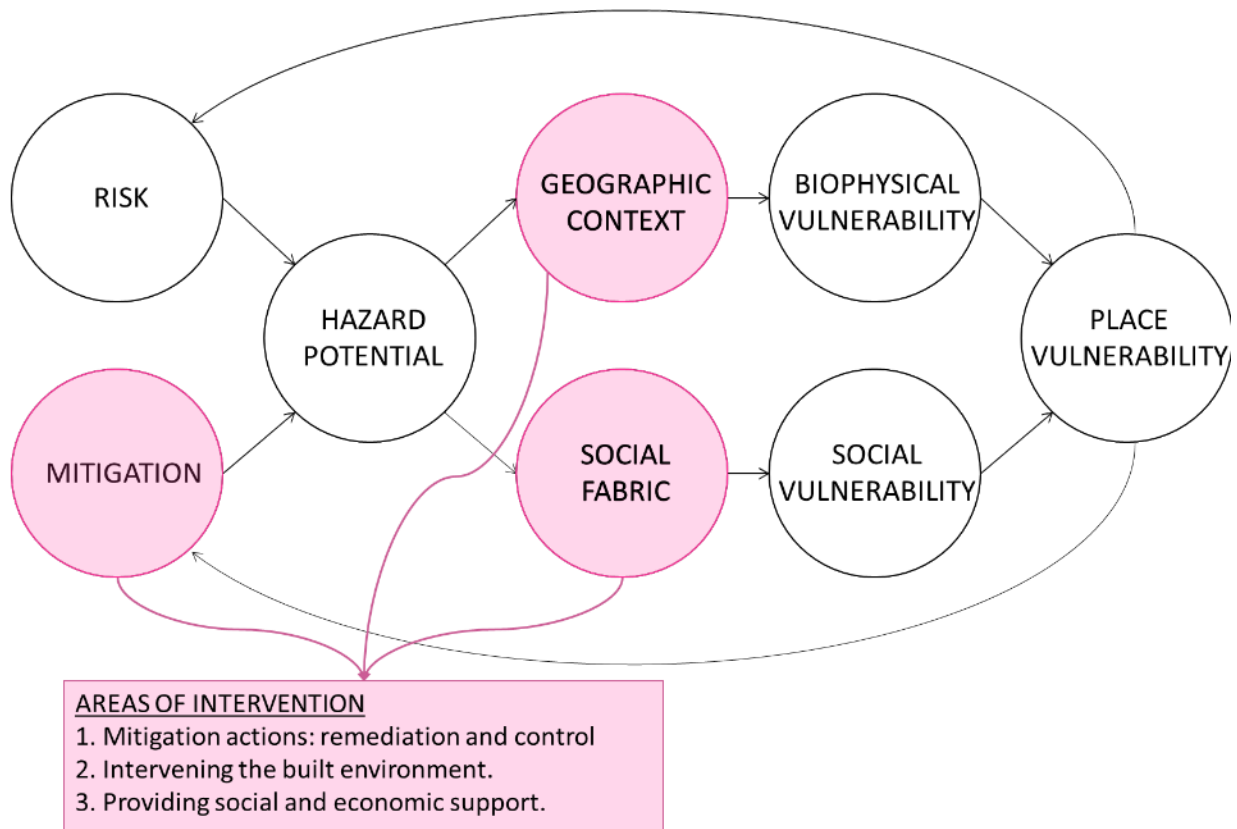
Figure 8 Areas of potential intervention within the place model of vulnerability.

I conducted a series of semi-structured interviews with key actors and stakeholders in the area of study in order to capture local perceptions and different perspectives about these historical and geographical relationships. The questions were oriented to characterize: i) the environment and the communities of the area of study, identifying aspects of vulnerability and defining at what extent there is a relationship between degraded

environment and vulnerable populations; and ii) the environmental governance structure while establishing the linkages between environmental governance and the characteristics and relationships of space and community previously identified. The questions were meant to explore local perceptions of how the environmental governance influence the extent to which highly vulnerable communities are located in degraded environments, focusing on how different entities intervene in the area, what kind of relationships are established between them (for instance, public-private partnerships), what changes they are promoting, what standards of environmental protection are enforcing, and if all these together contribute to the improvement or the decline of the vulnerable communities. The questionnaire and complete protocol used for the qualitative research involving human subjects was object of submission, revision and approval of the IRB Board and is included in the Appendix.

The initial recruitment of research subjects comprised a preliminary institutional stakeholder analysis focused on environmental remediation projects in the Grand Calumet EPA – Designated Area of Concern as well as local governmental agencies related to environmental protection, management and planning. Other organizations belonging to the civic or private sector that represent interested (affected) parties of the clean-up projects were also considered. This primary identification of potential entities was based on an online research and official documents review. This initial recruitment was followed by a word-of-mouth and snowball sampling in order to reach additional potential research subjects. A purposive snowball sampling ensured a diverse range of responses to include both genders and people identified with different races and ethnicity groups while it reinforced the qualitative piece by including the self-reflection of interviewees about who else may have a

relevant vision of the topic. This contributes with the identification of collective perceptions and social constructions about environment, community and governance. The target population were adult subjects age 18 or older who currently live or work in the EPA-designated Area of Concern of the Grand Calumet River or its surroundings (primarily but not restricted to Gary, Hammond, East Chicago and Whiting, IN).

I interviewed a total of sixteen key informants. Table 2 shows the summary of self-identification given by the interviewees. Only one has been living and/or working in the area for less than five years, four have done it for at least ten years and less than twenty years, and nine of them have been in the area for more than twenty years, from which 4 of them identified this area of study as their hometown. Nine of the interviewees have a strong stake in the area of study since they have identified themselves as born and raised in either Gary, East Chicago, Whiting or Hammond or because they have been leaving in there long enough. The other three identified themselves as from surrounding communities within Lake County, and the rest three have come to the area from outside of Northwest Indiana. Eight of the interviewees identified themselves as agents of governmental offices, from the local governments, strict regional agencies or regional instances of state and federal levels. Six informants represent non-profit organizations, from which one of them plus other two interviewees represent the business and industry sector.

Table 2 Summary of the interviewees' self-descriptions.

Affiliation		Time living/working in the communities (area of study)		Other factors of stakes in the communities	
Government	8	Less than 5 years	1	Born and raised within the area of study	4
Civic Society	5	Between 10 and 20 years	4	From surrounding communities within Lake County	3
Industry and Business	3	More than 20 years	9	From surrounding communities out of Lake County	6
				Come from outside Northwest Indiana	3

According to Saldana (2009) coding is an interpretative act. As he cites from Merriam (1998) findings from qualitative research are derived from our own analysis and interpretation reflecting constructs, concepts, language, model and theories that structured our study in the first place. The analysis seek to identify patterns in the data that help to explain why those patterns exist, using my own classification reasoning and intuitions to determine what is alike and what is not. I follow guidelines from grounded theory approach presented by Corbin and Strauss (2009) considering that the qualitative inquiry is the result of a critical and creative thinking. The coding process responds to the purpose of building theory while it provides analytical tools, alternative meanings, systematic and creative ways of looking at the data and discovering underlying concepts. Inspire in the governmental impacts framework developed by Hardy (2010) to analyze the impacts of convergence of governments, group membership, and watershed partnerships in the Lake Erie basin, a developed a simple framework to look at the three areas of the place model of vulnerability. Figure 9 presents the framework used to analyze the interviewees' responses during the coding process and the later conceptual order and categorization.

The interviews were documented by audio records and/or hand written notes with the consent of the participants. I conducted thirteen audio recorded interviews with fifteen participants, while the other one person did prefer not to be audio recorded. For all interviews I took notes about the responses. Audios were transcribed entirely, and then notes and transcriptions were coded as follow. The first cycle of coding comprised selecting segments of the interviews that were relevant to the research questions while informed by the theoretical framework of this study. This first step is called pre-coding (Saldana, 2009). The second round was focused on using either in vivo, descriptive or value codes for classifying those segments into specific topics, while identifying useful quotes or pieces of information that could be useful for exemplifying emerging categories or themes. During this cycle, an underlying analytical process started to develop, and intuitively I started to identify those general categories or themes that would constitute the foundations for explaining the phenomena under study. The final cycle encompassed putting words to those categorical themes, while recoding some data as a result of reiterations of reflective and analytical processes.

The non-mathematical process of interpretation for discovering concepts and relationships in raw data involved developing descriptions in order to convey images of the reality (Corbin and Strauss, 2009). In this case, these descriptions are social constructions depicted in the interviewees' responses. Those descriptions are selected under my own interpretation, driven by the propositions and purpose of this study. Then, descriptions are conceptually organized into categories, under certain properties or dimensions. Corbin and Strauss argue that both descriptions and conceptual ordering are essential for building theory. Chapters 5 and 6 present findings from the qualitative analysis as a descriptive

narrative organized under two major categorical themes (Community and Environment first, and Environmental Governance later) including a series of subcategories. The final stage of the qualitative analysis is oriented to organize those categories into a theoretical explanatory scheme (Corbin and Strauss, 2009). Therefore, the descriptions which start revealing some of the underlying concepts are further developed in Chapter 7 (Discussion) under an explanatory schema that tries to discover the relationships between those concepts and the larger phenomena of environmental justice and governance through the lens of the model of place vulnerability.
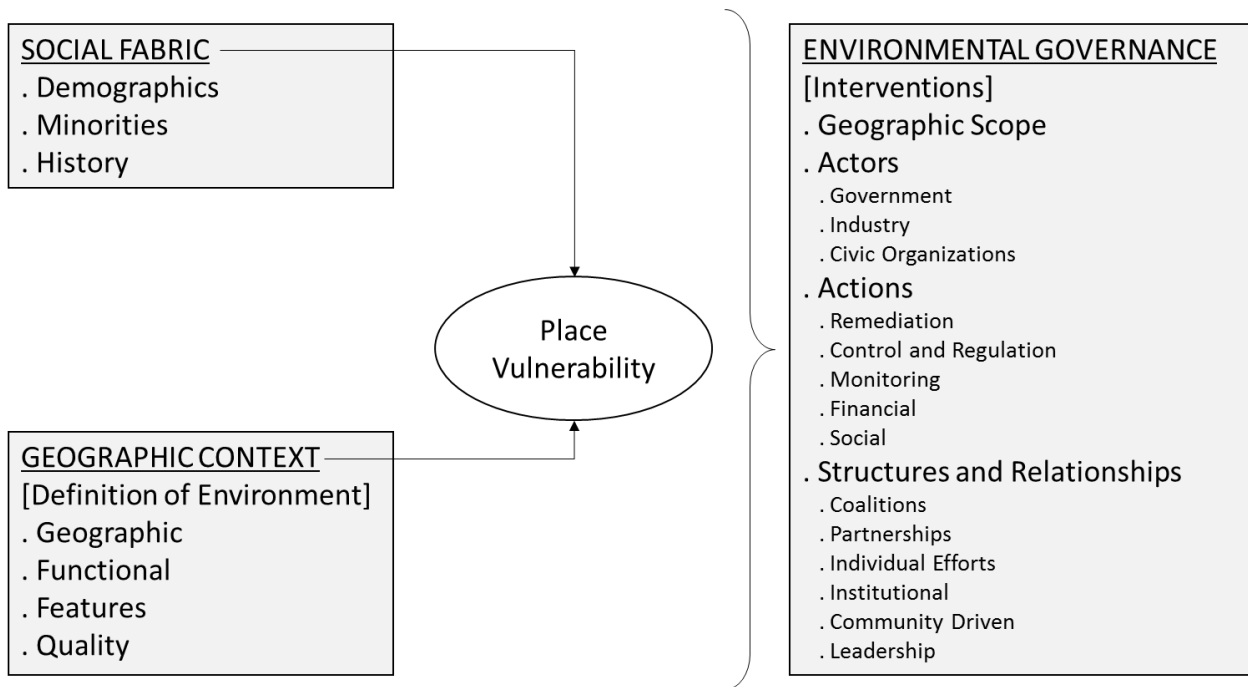
Figure 9 Place vulnerability framework to analyze qualitative data inspired in Hardy's Governmental Impacts Framework (2010).

CHAPTER 5   SPATIAL RELATIONSHIPS OF PLACE VULNERABILITY AND ENVIRONMENTAL JUSTICE

This chapter presents the results of the spatial analysis performed using a social vulnerability index value as a representation of socio-demographic factors of vulnerability and the location of existing facilities with permits to discharge to waterways. Exploring these spatial relationships and distribution patterns helps to answer the question of to what extent these communities experience environmental and social inequalities regarding the proximity to industrial and hazardous facilities and land uses.

5.A.   THE BUILT ENVIRONMENT: DISTRIBUTION OF POLLUTING FACILITIES

KDE provides a surface of intensity values at all locations of the study area. Figure 10 shows the KDE field generated with the location of the facilities that have permits to discharge to waterways with a 2.5 Km bandwidth. The density surface shows a high concentration of facilities within East Chicago limits in the proximity of Indiana Harbor Ship Canal. A smaller hot spot is visible in the middle area of Gary's lakeshore. The pattern is mostly preserved when converting the field values into population-weighted values of the facilities' density for census tracts geographies (Figure 11). The tracts with higher values of polluting facilities' density are those on the north and west side of the study area. Medium values are displayed in the lakeshore tracts, and most of tracts with low values are located towards the south of the area.
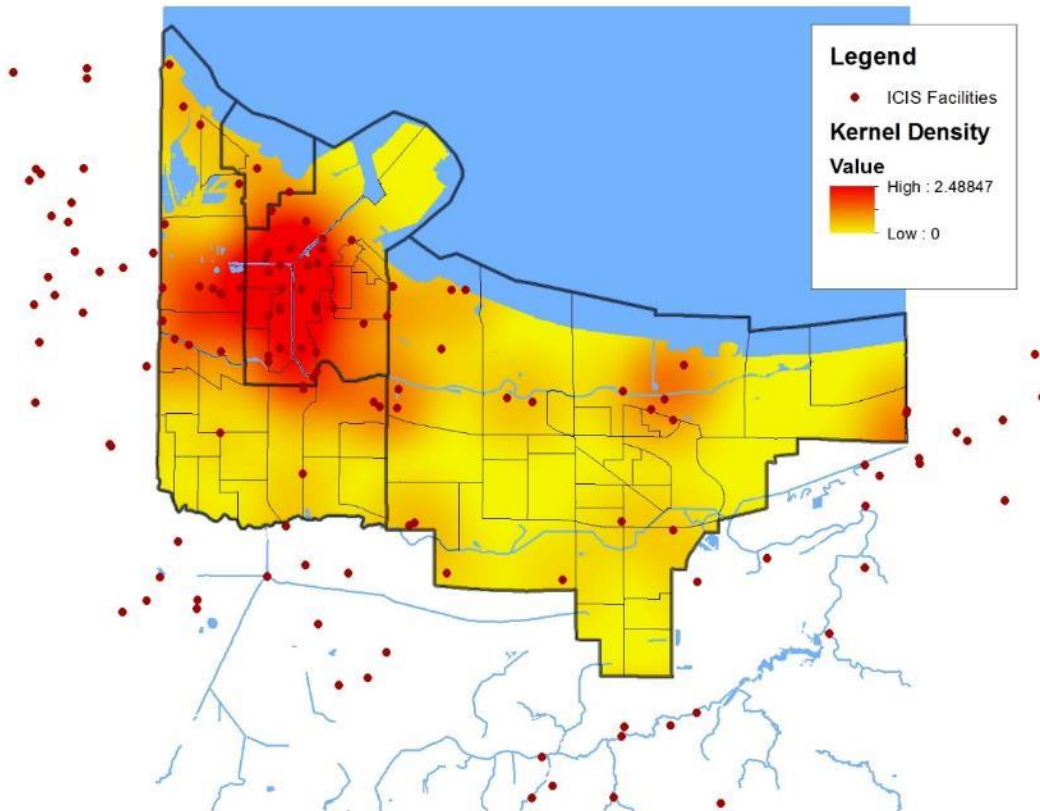
Figure 10 KDE of ICIS facilities located within the area of study and a 5Km buffer.
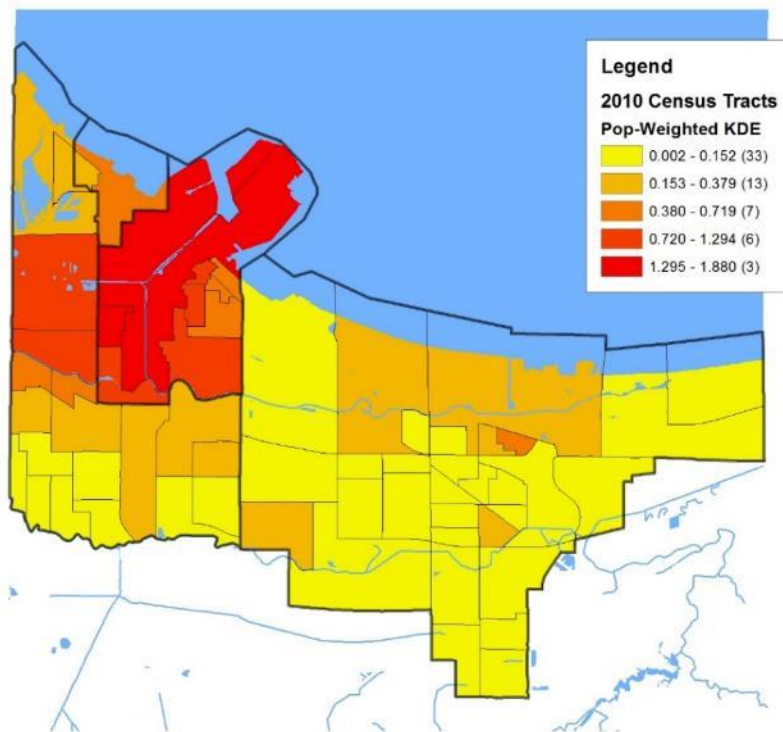
Figure 11 Population-weighted value of the polluting facilities density.

5.B.   THE SOCIAL FABRIC: SOCIAL VULNERABILITY DISTRIBUTION

According to the place model of vulnerability the social fabric comprises the demographic, socio and economic characteristics of the population, which in combination gives as a relative measure of social vulnerability. Figure 12 shows 5 classes of Census tracts 2006-2010 SoVI values within the study area, which were calculated from the universe of census tract of the State of Indiana. Five quantiles classification is meant to show which tracts in the area of study presents the higher levels of social vulnerability as a way to draw attention to neighborhoods that faces larger difficulties and where the relative risk of losses is higher. From simple observation we can identify that East Chicago tracts and the central area of Gary present the highest social vulnerability levels.
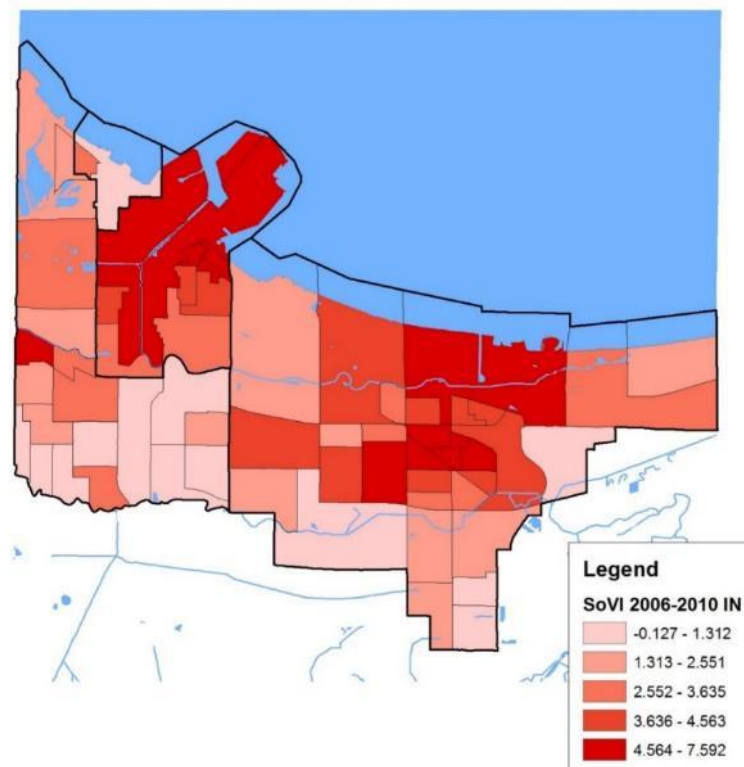
Figure 12 2006-2010 SoVI values of the census tracts as calculated for the entire State of Indiana. The higher values indicate the most vulnerable tracts.

In order to understand better these SoVI spatial patterns, the Moran's I statistic reveals statistically significant clustering and the LISA (local Moran's I) statistics shows the existence of statistically significant clusters. The global Moran's I indicates a positive spatial autocorrelation (0.412) with a significance level p-value 0.001. In simple words, this statistic shows that there is a global trend for which tracts with similar values of SoVI are located near each other (low values close to low, and high values close to high). LISA statistics generate six significant clusters (Figure 15). There are two high-high clusters which are of great relevance for the present study. One of them comprises the tracts east the ship canal in the municipality of East Chicago. The other one includes the tracts of central Gary. The Bivariate Moran's scatterplot shows also a positive spatial correlation between the SoVI values and the density of polluting facilities (Figure 13). The correlation coefficient is 0.226 with a significance level of p-value < 0.004 of 999 randomizations. The significance map is shown in Figure 14.
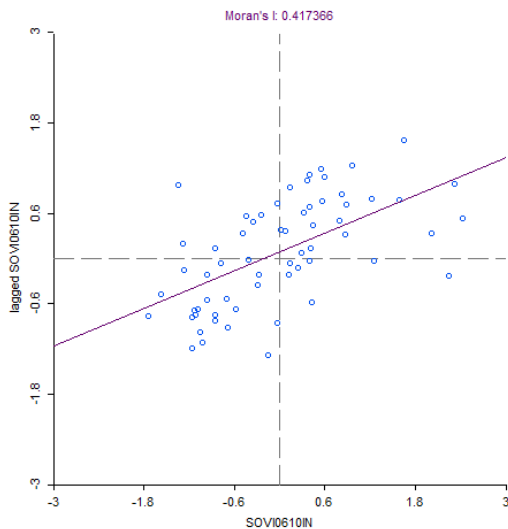
Figure 13 Moran's scatterplot showing the correlation between 2006-2010 SoVI and its spatial lag.
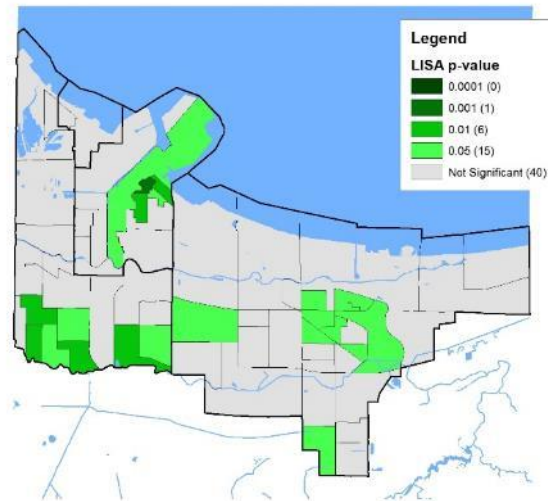
Figure 14 Significance map of the local Moran's I results for the analysis of 2006-2010 SoVI.
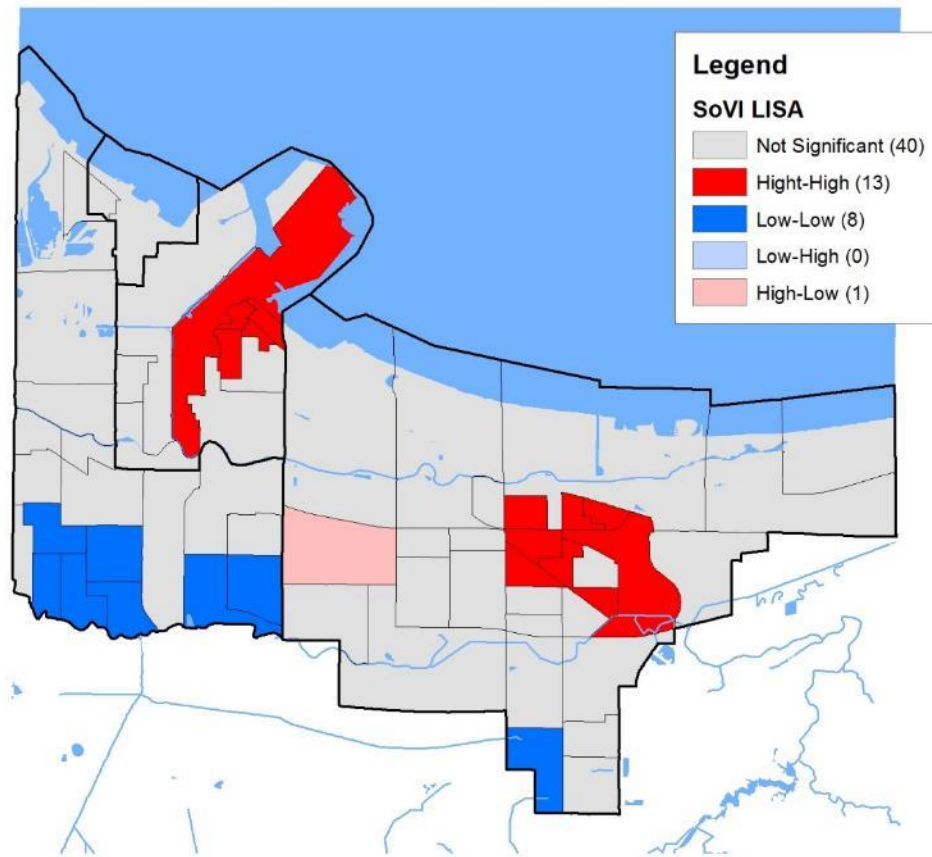
Figure 15 LISA analysis results showing statistically significant clusters of 2006-2010 SoVI.

As the Univariate LISA statistics showed, social vulnerability is significantly spatially auto-correlated even when the unit of analysis is as large as the census tracts in relation with the extent of the study area. Two major significant hot spots of high social vulnerability are identified in the area of study. One of them corresponds to the municipality of East Chicago. The other one is located in the core area of the city of Gary. Both known by social and economic struggles during the last half of the last century, and that have remained affected by post industrialization dynamics. Although it was expected a higher level of autocorrelation as well a higher level of significance, the results are robust enough to verify a positive spatial autocorrelation reflected in spots of high vulnerability.

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5.C.   SPATIAL RELATIONSHIPS BETWEEN PHYSICAL AND SOCIAL FABRICS

The Figure 18 presents the results of the bivariate LISA. This statistic shows the spatial correlation between social vulnerability values at the tract and the density of facilities with permits to discharge to waterways. These results are a way to show whether vulnerable populations are located in the proximity of these facilities and how strong these spatial relationships are. Twenty nine census tracts constitute eight statistically significant clusters. Three clusters of low social vulnerability surrounded by low density of facilities discharging to waterways are located in south and central Gary, and south Hammond. Two clusters of high vulnerability surrounded by low density of facilities are located in the central area of Gary, whereas two low-high clusters are located to both sides of East Chicago. East Chicago entirely constitutes the only high-high cluster, showing a spatial correlation between high social vulnerability and the densest area regarding polluting facilities. The high-high cluster coincides with the highest level of significance for the LISA statistical test. The low-high cluster in Gary follows in significance. Therefore, these two identified clusters are of the major relevance.
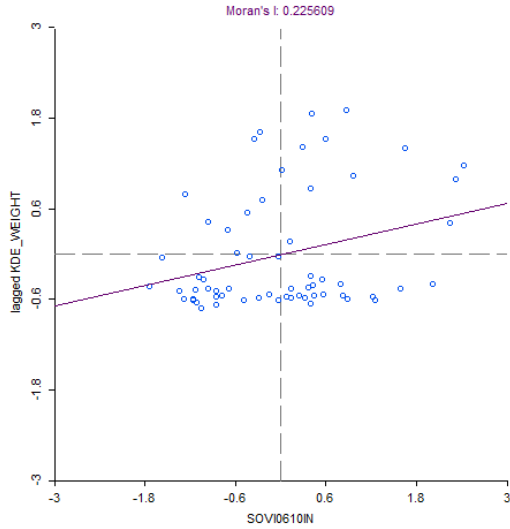
Figure 16 Moran's scatterplot showing the correlation between 2006-2010 SoVI and the spatial lag of density of polluting facilities.
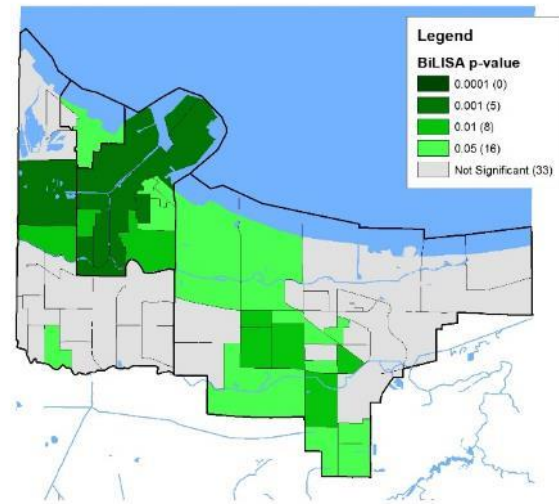
Figure 17 Significance map of the bivariate LISA analysis of 2006-2010 SoVI by density of polluting facilities.
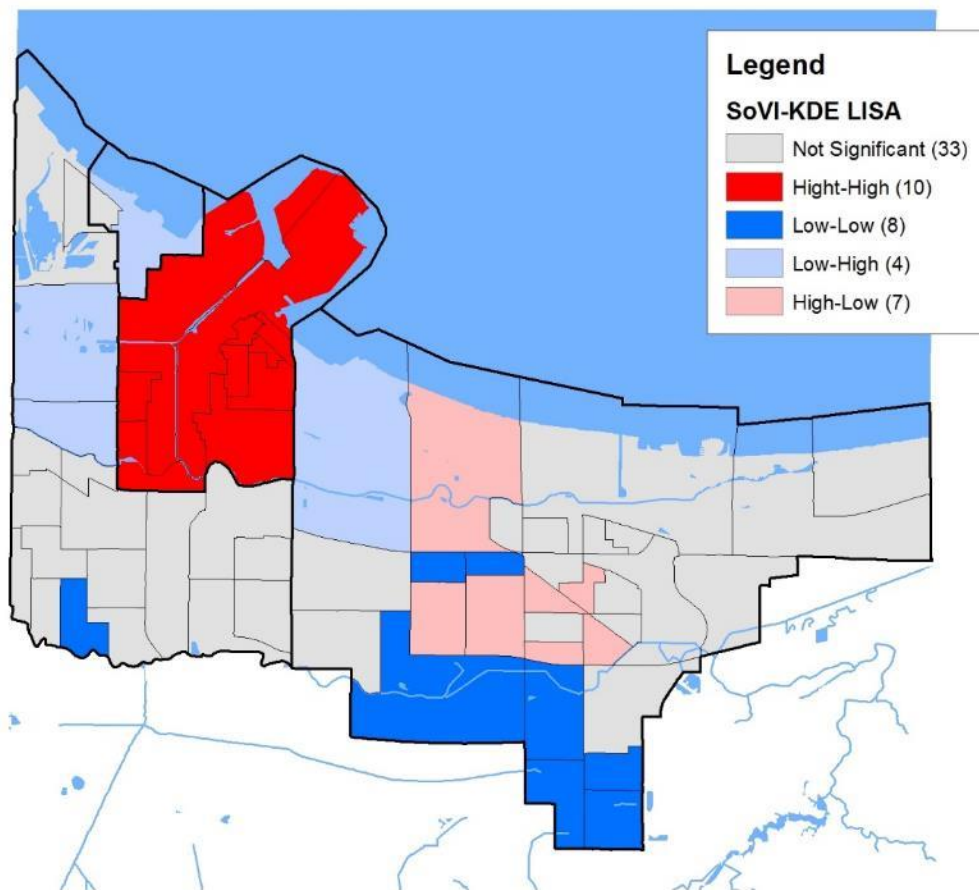
Figure 18 LISA analysis of 2006-2010 SoVI by density of polluting facilities.
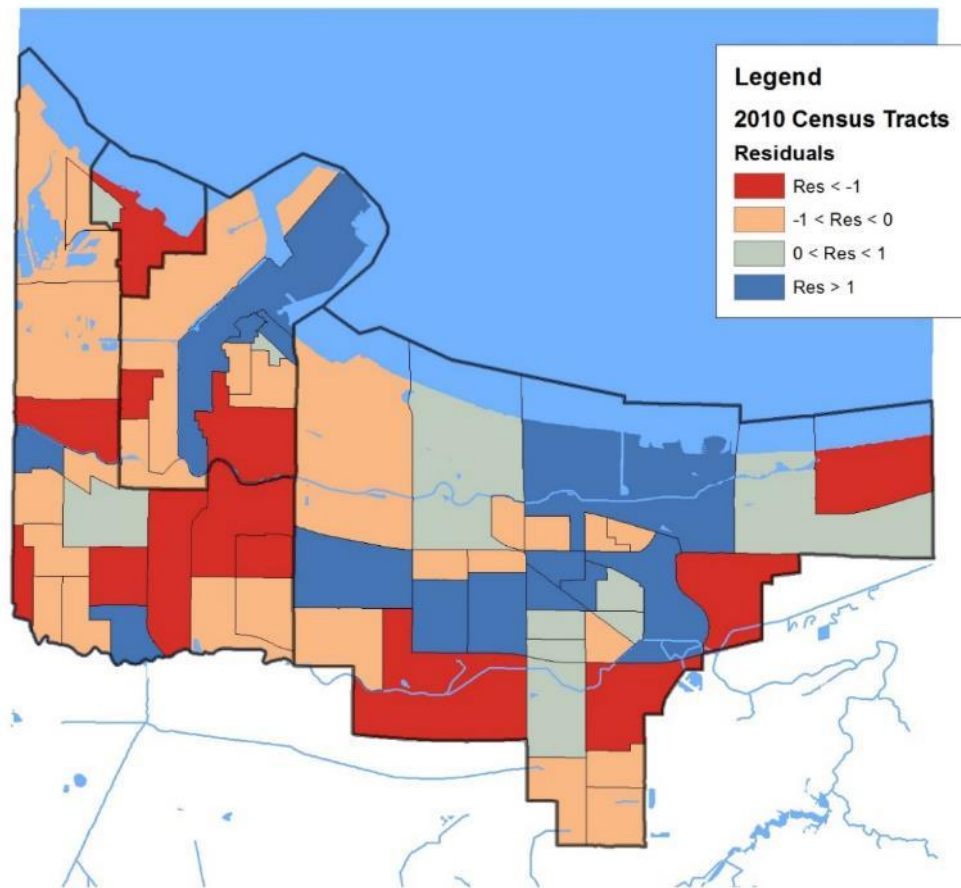
Figure 19 Residues of the spatial error regression model with 2006-2010 SoVI as the dependent variable and density of facilities as the independent variable.

The spatial error model run with 2006-2010 SoVI as the dependent variable presented an R-squared of 0.378, meaning that there is some level of fitness between the estimated values and the observed ones. Table 3 shows the results of the model. The coefficients suggest a positive correlation between the density of facilities and the SoVI values at the tracts, as well as between the errors (lambda) and the SoVI values. Both correlations are statistically significant. Figure 19 shows the residues originated by the regression model. A LISA analysis was additionally conducted to test the spatial autocorrelation of the residues generated by the spatial error regression model. Moran's I

was of -0.006. Although this shows a slight negative correlation, it is enough close to zero to assume a random distribution.

Table 3 Regression coefficients and test statistics for spatial error regression model of 2006-2010 SoVI for census tracts.

Variable	Coefficient	Std. Error	z-value	Probability
Constant	2.31	0.466	4.947	< 0.001
KDE_Weight	1.74	0.651	2.675	0.007
Lambda	0.55	0.127	4.334	< 0.001

In conclusion, bivariate LISA results suggest a spatial relationship between social vulnerability and the distribution of facilities which have permits to discharge to waterways. The spatial correlation between SoVI and density of polluting facilities is highly significant in almost half of the tracts in the study area. However, different areas show different types of clusters. High social vulnerability is significantly correlated with high density of polluting facilities in East Chicago. East Chicago constitutes a hot spot where the neighborhoods are of a complex demographic composition with a limited capability to face hostile circumstances. Among those circumstances, communities located in places with past and remaining pollution generated prior to the enforcement of limits to discharges are likely to suffer burdens because of the inherited perception of environmental impact. Whereas East Chicago shows high-high patterns, the core area of Gary shows a negative correlation between social vulnerability and density of polluting facilities. Gary downtown and residential area is separated from the industrial land that is located on the lakeshore, resulting in a low density of facilities. However, socio-demographic factors are of a nature that contributes to a social vulnerable population concentrated in this area. Therefore, environmental inequalities of the type of proximity to degraded water resources and to polluting facilities are not representative of the reality in place. If environmental inequalities exist in the city of Gary, they might be driven by different factors than those playing a role in East Chicago. In general

south tracts show low-low spatial correlations. These southern areas have been dedicated to residential uses, far from the most industrialized zone in the lakeshore. The neighborhoods here were developed in more recent decades with some level of suburbs style and where only mobile people from more detracted areas could move in.

The regression model allows us to explore in more depth the relationships between the distribution of facilities discharging to waterways and the distribution of vulnerable population in the area of study. There is positive correlation between the density of facilities and the SoVI values at the tracts, as well as between the errors (lambda) and the SoVI values. The fact that the errors are significant and positively correlated to SoVI suggests that there are other factors driving the distribution of vulnerability apart from the location of polluting facilities. According to LISA statistics for the residues from the regression model, Moran's I value suggests randomness in the spatial distribution of the residues. Therefore, the model is adequate accounting for all variables driving social vulnerability spatial distribution either through the location of polluting facilities or the variables hidden in lambda. Additionally, residuals which are not significantly correlated suggest the existence of highly different underlying drivers in different zones of the study area.

5.D.   CHAPTER SUMMARY AND CONCLUSION

The spatial analysis has shown that facilities with permits to discharge to waterways are mostly concentrated in East Chicago. On the other hand, the highest social vulnerability values (2006-2010) are located among census tracts of East Chicago and the center of Gary. Accordingly, there are two significant clusters of high social vulnerability, one in East Chicago and another in central Gary. When exploring the relationship between social vulnerability and the facilities under study, the analysis reveals that there is spatial

correlation between values of social vulnerability and the density of ICIS facilities. Under the light of this analysis, East Chicago represents a clear case of environmental justice concerns since it comprises the most significant cluster of high vulnerability and high density of facilities in the region. Low SOVI and low KDE clusters shows how communities in the southern area, closer to suburban communities, are the verification of a differential burden of environmental impacts related to the industrial past and current activity in Northwest Indiana. Gary, on the other hand, shows a different case, where the density of industrial facilities is low while social vulnerability is high. However, this does not necessarily mean that there are no environmental burdens challenging this community. I suggest that the existence of fewer large industrial operations, in particular the proximity to US Steel facility affects an environmental conflict for Gary communities as well. The spatial analysis is not sufficient for understanding the complexity of these cases. In order to verify and inform better the interpretation of environmental issues in the region, Chapter 6 presents the results of a qualitative analysis on the perceptions of the environment and the communities of Northwest Indiana.

CHAPTER 6   PERCEPTIONS OF COMMUNITY AND ENVIRONMENT

Chapter 6 presents the findings from the qualitative piece focusing on the perceptions of the key informants on community and environment. Community and environment correspond to the social fabric and the biophysical context of the place model of vulnerability developed by Cutter (1996) and applied in the previous chapter for the quantitative assessment of differential burdens in the study area. This chapter starts revealing those underlying non-factors of vulnerability that the spatial analysis cannot address, while it helps to reaffirm those dynamics depicted in the quantitative results. The following findings help to answer better to what extent there are environmental justice conflicts experienced by the communities of the Indiana Grand Calumet region, and starts point towards the idea that governance is the key stone for addressing those issues.

6.A.   PERCEPTIONS OF THE BUILT ENVIRONMENT

The boundaries, the scales and the extension of what we consider our community, our region, our scope of work varies in regards to our experiences living in that community. All interviewees were asked to define geographically their community or the area to which they have a stake on, either in terms of their work or their residence. The answers were diverse varying mostly on scale. Six to sixteen interviewees referred to their immediate city or section within the city; for instance East Chicago city was the answer for two of the interviews who live and work in the city, and Miller section of Gary was the response of someone who resides in that area. However, the rest of them refer to a region that vary from the four cities of Gary, East Chicago, Whiting and Hammond, to the three lakeshore Counties of Indiana, and at least two of them referred to the metropolitan area of city of Chicago.

However, it is generally recognized that the natural and the built environment do not present boundaries for environmental, social and economic dynamics. The area was described as an urbanized continuous where community dynamics take place whiting and beyond municipal boundaries.

> *"We know that there are no boundaries in terms of cities, because you go from one city to the other city and you just crossed one street." – John Fekete, chairman at CARE Committee*

> *"It is continuous and one of the challenges we have, not only from environmental but economic development as well. (…) In Lake County there are 53 governmental entities. As you drive down the street, you don't know when you pull off to one elected jurisdiction or to the other." – Kay Nelson, Environmental Affairs Director at the Northwest Indiana Forum*

This aspect is significantly important when local governments and even private organizations evaluate whether to invest and/or intervene in the particular location. Both benefits and burdens are likely to be perceived by communities all across the area. For instance, Charles Hughes argues that the selection of a site for the construction of the new airport in the City of Gary represents benefits probably larger for surrounding communities than for Gary itself. Economic and transportation projects of that scale requires competent human resources, contractors and services not available in Gary but in other nearby cities such as Merrillville or Crown Point.

> *"What takes place out there benefits the entire region" – Charles Hughes, Executive Director at the Gary Chamber of Commerce*

In addition to social and economic impacts of changes and projects occurring in the region, some interviewees emphasized that "*the environment knows no boundaries*". Impacts on water resources and air pollution trespass municipal boundaries and required the intervention of more than one jurisdiction. As noted by some of the interviewees this was

the reason that motivated to have an area of concern that covers four municipalities in the context of United States-Canada Great Lakes Water Quality Agreement.

> *"The Little Calumet River and the Grand Calumet River that are in La Porte County, Porter County, Lake County and Chicago affect the water quality of Lake Michigan ultimately. A natural resource like that can have implications on lots of communities." – Kris Krouse, Executive Director of Shirley Heinze Land Trust*

6.B.   WHO MAKES UP THESE COMMUNITIES?

Northwest Indiana, in particular the communities of Gary, East Chicago, Whiting and Hammond, is characterized by the diversity of its population. More than half of the interviewees agreed on the fact that the region is highly diverse and particularly made up by minorities. For instance, most interviewees identified Gary as a major African-American community, whereas East Chicago is identified as a predominantly Hispanic community. Although "*African-Americans are not confined to Gary, Gary's got a 90 percent African-American population*," said Dennis Rittenmeyer, Executive Director of One Region, who has been leading the publication of the Northwest Indiana Quality of Life Indicators Reports since 2000. Hammond is identified as the most diverse because of remaining descendants of Eastern European immigrant community from the early 1900s, with more recent and strong affluence of both African-American and Hispanic populations.

All of the area is described by informants as "*an evolving blue collar community*." The former working class has shifted over time from jobs at the steel industry to the increasing services sector. Additionally, they acknowledge that the region comprises a high percentage of residents below the poverty line, greatly associated with the loss of jobs. Most interviews attribute the loss of jobs to economic recession and the modernization of the industry.

Some of the demographic changes that have been identified by informants are related to different age groups. Some interviewees have informed that there is a significant elderly group in the area. However, under the eyes of key informants, there are different dynamics within each city's community. For instance, Hispanic families are on average younger and bigger in number of family members. Additionally, they are *"more likely to move in the absence of jobs, whereas older African-American population does not."* This is not to say that there are not Hispanic elderly groups. There are actually a number of Hispanic immigrants who came during the '50s and '60s and '70s without their parents or sons and daughters.

Another significant group in the community is the disabled population. It was repeatedly present among interviews, however informants did not provided details about the existence of this particular group. Several informants agreed in existence of this particularly vulnerable group as a distinctive characteristic of the overall community. It is one of the considerations that social vulnerability indexes are lacking, that also has important implications for environmental justice issues.

While diversity is seen as distinctive and a major characteristic of the region, these communities have experienced discrimination issues and segregation still visible in how different social groups are distributed geographically. While there have been an overall increase in mutual acceptance and the number of settings that encourage ethnic and racial diversity, there are sectors of the community that have not completely overcome racial conflicts. In early decades, industry attracted a large number of descendants of Eastern Europeans, later it brought African-Americans, and finally Hispanic populations arrived too seeking job opportunities and affordable housing. With later migration of affluent sectors of the community, the region became quite unique for such a high rate of minorities

populations. However, this brings up again an environmental justice concern because this minorities where those who remain in the proximity of industrial activities, exposed to an environment with significant pollution.

Informants from the non-profit sector mentioned that the region is highly diverse at the larger scale. Diversity is depicted in cultural history, racial and ethnicity blend, a mix of urban, industrial built environment and a highly biodiverse ecosystem. By contrast to other areas in the state, Northwest Indiana is not only more diverse but also is characterized by a particular cultural and historical heritage and dynamics that led to this particular composite multiplicity which should be considered as one of the most important strengths of the region. Although looking at demographic information at scales like Lake County (as an example of a geography that includes the study area) reveals a pretty diverse population, at smaller scales of place or even within the municipal boundaries, neighborhood communities are highly segregated. Representatives from of the NGO society agreed in particular on racial/ethnic segregation. According to Dennis Rittenmeyer, Lake County counts with and overall 30% minorities' population, whereas some neighborhoods are around 85 to 95% one single racial/ethnic group. The results of such segregation is the isolation and lack of recognition of changes happening around.

> *"In Lake County there is the urban north, the middle and the rural south. And those three are pretty divided for a lot of reasons." – Katherine J. Luther, Director of Environmental Programs at NIRPC*

Another significant breakdown at the county level is given by a division of the north and the south. Interviewees working at organizations with regional scopes, either from the government or NGO sector, pointed out notably differences regarding urban, suburban and rural areas. The north corresponds to Gary, East Chicago, Whiting and Hammond

communities; it transitions around communities like Munster, Highland, and Merrillville, through a better off suburban area, towards rural communities in the south of the county such as Crown Point, Lowell, Schererville, and St. John. It is noted that suburban and rural communities are predominantly White/Caucasian populations, remarking the minority composition and diversity of the urban north.

The impacts of economic struggles still remain in the community not only reflected in the poverty rate but also in the history of crime and corruption. Additionally, residents encounter social deterioration depicted in the physical appearance of certain neighborhoods because of abandoned buildings and a major perception of crime. Charles Hughes, Executive Director of Gary Chamber of Commerce, among other interviewees from the NGO sector, expressed that Gary is probably the most affected community in the area. The city has had larger burdens while trying to transition upward. Predominantly African-American also has the most significant proportion of elderly population, low income and unemployed groups. "*Gary is the community that has suffered the most, clearly, and is still suffering.*"

6.C.   VULNERABLE POPULATIONS AND SITES

Interviewees were asked if they could identify vulnerable populations in the terms of having the most burdens, lacking access to resources or political representation, and/or facing the most difficulties in order to overcome stressors in their life. There was a general agreement within the research subjects on the perception that low-income groups are the most vulnerable. Many coincided in that it is not a matter of race or ethnicity but of social class and resources. The challenges for minority communities are similar, either predominantly African-American or Hispanic. Additionally, low income and class groups are likely to have less representation in the governance structure unless community

organization happens and pushes their issues into the public agenda. These groups may feel discouraged to face politics or daily concerns left non time to publicly participate in the system.

> *"If resources are limited they continue to get worse." – Richard Morrisroe, City Planner for the City of East Chicago*
>
> *"The people who have experiences that they want to talk about aren't the ones that necessarily are going to impact public policy for their own good, for their own betterment, improvement." – Dennis Rittenmeyer, Executive Director of One Region*

As officials of the city of East Chicago pointed, class and income levels are to have an impact in youth too. It is challenging for kids from the lower percentiles of family/household income groups to keep motivation and continue within the education system because of the lack of opportunities for them and their families. On top of that, the lack of opportunities drives young people who have more resources to move out in pursuit of both education and jobs. From a city wide perspective communities like Gary are losing many of capable students and professionals, assures the executive director of Gary Chamber of Commerce. In any case, the region needs to improve the education system and offer more programs targeting youth, something many informants from the government and the non-profit sector concluded.

In relation to these phenomena, there is a perception of generational poverty. Many elder members of these communities own property where they have been living for a long time while they are currently unable to work. Although this situation raises the difficulties of maintaining their homes, they are reluctant or unable to move out, it leads them to inherit these properties to members of their own family who also struggle to get a job and/or maintain the property. On the one hand, generations of poor families do not have the

resources or tools to get out of this situation. On the other hand, properties deteriorate and impact social and economic aspects of the neighborhoods.

In particular, communities located along the Grand Calumet River were identified as vulnerable communities that suffered the most from environmental impacts and the dynamics of the industrial activity. Doreen Carey, Especial Projects Coordinator at the Lake Michigan Coastal Program of the Department of Natural Resources, has been actively involved in the clean-up of the Grand Calumet River for a long time both from the governmental side and the community-based organization. She expressed "*it's primarily African-Americans and Hispanics who have the most direct impact of the pollution that's produced by the mills and the refinery.*" Residential spots developed in the intricate mixture of industrial land, transportation infrastructure and open space, and were occupied by a working class predominantly minority. This mixture creates a strong spatial relationship by proximity of the original source of pollution to these particular populations with environmental justice implications.

> "*Those are poor communities (...), working class people or maybe not employed, heavily minority, who end up being disproportionately disadvantaged compared to others.*" – Dennis Rittenmeyer, Executive Director of One Region

Another significant factor of vulnerability to pollution, mentioned during the interviews, is the fishing activities in rivers of the area. Fishing communities are either motivated by recreation values or by consumption. Those who would consume fish are highly expose to toxic compounds that accumulate in fish tissues. Lack of knowledge about the health of the fish is of the most importance, combined with the fact that it requires several generations of fish after remediation is complete. Although the dredging of the contaminated sediments in the Grand Calumet River continues, most definitive results will not be seen until

long after full remediation is accomplished. In the meantime, there is at least some vulnerable population likely to be exposed to hazards and affected.

Under the light of the insights provided by most interviewees, social vulnerability in the Grand Calumet area can be better assessed. Vulnerable populations residing in the Grand Calumet area are related to factors of class, income, unemployment, public participation, education, youth and elderly, disabilities, abandoned or blight properties, and usage of the waterways (fishing).

6.D.   WHAT UNIFIES THESE COMMUNITIES (MUNICIPALITIES)?

"With our proximity to Chicago, our access to transportation, the lake shore and the dunes being right there [the region] has a lot of potential. [Then,] being able to develop and grow and promote ourselves it's just a matter of really being able to capitalize on those assets and capture them." – Kris Krouse, Executive Director of Shirley Heinze Land Trust

Gary, East Chicago, Whiting and Hammond have a number of common characteristics that emphasize the idea of a region or sub-region in Northwest Indiana and justify the scope of this analysis. Research subjects naturally came with features, characteristics and dynamics that are shared by all four municipalities. For instance, in terms of the geography and physical environment, they all count with part of the shoreline of Lake Michigan. According to many interviewees, the lake is considered for these communities one of the most important assets in the area. The nearness to Lake Michigan has played a significant role in how the region developed, in particular attracting the industry because of the availability of water for industrial processes and the possibilities for freight transport by boat.

Additionally, the land on which Gary, East Chicago, Whiting and Hammond stand correspond to a unique ecosystem of swales and dunes that was severely modified by the industrialization and urbanization of the land since the beginning of 1900s. Lee Botts, board member emerita of the Alliance for the Great Lakes and board president emeritus of the Dunes Learning Center, former board member of Save the Dunes Council, has been involved in preservation of the Indiana lakeshore since the 1950's, recalls that U.S. Steel settled down in Gary area in early 1900's and literally tiered down huge dunes in order to build the steel mill.

Representatives from organizations whose action is focused on ecology conservation such as The Nature Conservancy, Save the Dune, Shirley Heinz Land Trust and the Coastal Program of the Indiana Department of Natural Resources, emphasized the importance of restoring natural areas in the region because of the biodiversity of this particular ecosystem. They recognized that the swale and dune habitat in the surroundings of the Grand Calumet River is rare and unique in the world where several endangered species live. According to Lee Botts, the characteristics of the sand dunes in the southern end of Lake Michigan and its biodiversity were object of research from which Henry Chandler Cowles developed the concept of ecological succession "*with the consequence that there was international interest in the Indiana Dunes.*"

The region is obviously described as historically dominated by the steel industry since its origins are tied to U.S. Steel. Botts explained that after the 1871 fire in Chicago, the City Fathers decided to push the heavy industry out of the core of the city. Industry found undeveloped land in the Calumet area, around the state line, where swamps and swales were seen of no value at the time, even cheaper in the Indiana side of the state line. That brought

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U.S. Steel along with other companies, and lead to the foundation of Gary in 1906. Thereby, this strong industrial character is heavily related to Chicago metropolitan area. An evidence of it is that all four municipalities share their connection to Chicago not only through business and industrial networks but also infrastructure networks, in particular transportation systems. Not unexpectedly, the transportation system is mostly dedicated to freight logistics. However, there are community linkages to the city of Chicago through the express ways and the South Shore Railroad.

Although different parts of Northwest Indiana present different demographics, the entire region suffered from economic detraction. The impacts on most significant demographic groups are similar if not the same when it comes to job opportunities and income. For instance, African-American and Hispanic populations have historically been occupying low-wage jobs and disproportionally impacted by job dynamics. As I mentioned before, poverty and unemployment rates are significant in all four municipalities. All governmental officials interviewed sustained that fact and perceive it as a common issue that has to be addressed for mutual benefits of municipalities and the overall region.

> *"Hispanics were given certain kind of undesirable jobs, whereas Blacks were given other undesirable jobs." "I have been told coke ovens were heavily Black; railroad transportation was heavily Hispanic." – Richard Morrisroe, City Planner at the City of East Chicago*

While these characteristics call for a unified identity, there is an apparent contradiction in the way communities interact with each other. Although counting with rich regional heritage product of a story of more than 100 years, all which creates strong bounds across municipal boundaries, these communities are oftentimes insular or isolated as best described according to officials and representatives from regional organizations. Kris

Krouse, Executive Director of Shirley Heinze Land Trust, expressed it as *"people are a little soloed within their own communities."* Racial segregation and constraints related to political boundaries have contributed to that phenomena, whereas socioeconomic burdens, struggles and priorities might play an important role in how communities talk to each other. Municipalities and local districts have limited resources, local organizations also lack of enough support, so these entities are driven into individual priorities, individual efforts to overcome difficulties and achieve some of their goals, limiting the time and efforts that they put into connecting with peers. Sharing common characteristics, assets and difficulties, encourages and requires collaborative efforts and regional visions.

6.E.   MAJOR CHANGES OVER TIME

Northwest Indiana is described as a region that has suffered great economic recession with the consequent loss of jobs along with the population decline. These are the most recalled historical changes by most interviewees with repercussions still in the present. More than half of the interviewees considered that the major historical change in the region was the loss of jobs. This lead to a migration of population seeking job opportunities out of the region, population decline with the consequential deterioration of neighborhoods, abandoned homes and less attention focused on public service and management.

The detraction in the economic activity had as a consequence the decrease in the tax base (revenue) too, impacting the cities' financial capability. Some interviewees said that communities like Gary have seen affected their public budgets, impacting schools finances and other services provided by the government. These kind of issues pushed municipalities, organizations and people in general to find ways to do the most from their resources, *"do more with less."* Particularly noted by informants from the civic society that municipalities

lacking resources were pushed to compete for economic development, and they are still competing at a certain extent.

In last decades these communities have seen the shift in population from the industrial urban lands of Gary, East Chicago, Whiting and Hammond towards emerging suburban communities like Munster, Hyland, and Griffith. Today, this trend continues with Saint John and Schererville, communities further south. Many interviewees that represent the industry and the government sector witnessed that changes in the steel industry and the massive loss of "steel jobs" led people to look for other opportunities. Those mobile enough migrated *"further south, away from the pollution and into more expensive homes and to different neighborhoods."* According to governmental officials, White/Caucasian populations are the ones who in bigger number have been migrating to other communities. Some interviews have noticed that in coincidence with these migration patterns South Lake County has experienced growth and development both from a population and business standpoint. This attracts people from areas such as the Grand Calumet region contributing to the population decline.

Under difficult circumstances, industry experienced changes regarding their capability to economically support these communities conversely to what it used to be case in the first half of the 1900s. Some interviewees recall shrinking employment in the steel companies in the order of 10 to 40 thousand jobs lost in periods of a decade. However, informants that talked from an industrial standpoint and with deep knowledge of regional indicators argued that there were several other changes in the local Industry. Technological advancements drove factory automation and the introduction of more efficient systems, including cleaner processes (improving pollution control). Technological improvement

meant tradeoffs for the community and the environment: while pollutants releases to water, air and soil reduced significantly thanks to cleaner processes, a smaller number of workers was needed to operate the systems because of the automation of the plants.

Additionally, there have been changes in the attitude towards the industry and from the industry towards environmental protection and remediation. Companies operating in the region faced the enforcement of the Water Clean Act ant the Air Clean Act among others, pushing them to implement costly changes in their processes and procedures, carrying on remediation, increasing costs related to toxic compounds and waste management. *"When the environmental regulation started impacting the company, it became apparent to companies that they had to address this with dedicated people."* Larger companies had some capability to hire people and create departments dedicated to the compliance with the new regulations. Those are, like BP and the steel companies, now take credit for cleaning-up their processes and having reduced the water pollution in Lake Michigan. However, smaller companies would simply designate employees from their engineering plant that would take care of environmental regulations, not being able to afford larger changes or to take leadership in environmental issues.

On the other hand, while companies were pushed to implement quality control and pollution control, they internally incorporated environmental management practices and procedures in their plants. Each company and each division within the company "*wanted to be perceived as part of those changes*," as well. Many companies have been recognizing the need for sustainability for their own interests, because of cost-effectiveness implications and corporate benefits regarding better performance. On top of having improved their environmental performance and complied with remediation charged to them, most of these

companies implement also internal programs for their employees in order to reinforce good habits, (e.g., household hazardous waste management). From a more corporative responsibility standpoint, some companies are known for supporting environmental education and outreach programs, like Mighty Acorns Program for 4th to 6th grade school students, as well as natural areas conservation projects run by organizations like The Nature Conservancy and Shirley Heinze Land Trust. NIPSCO, U.S. Steel, Arcelor Mittal and BP were the companies identified by interviewees as those who are leaders in carrying out these types of actions and being partners for many environmental initiatives in the region.

> *"In the late '70s, early '80s, they were somewhat polarized. It was either you were on this side or you were on that side." – John Fekete, chairman at CARE Committee*

However, in the beginning the industry sat on the other side of the table while agencies and other organizations were demanding the "payback" for environmental damage and efforts in clean-ups. Although during the 1930s, 40s, and 50s, there were no regulations nor enough knowledge about the impacts of industrial processes on the human health and the ecosystem, there was a common perception that pollution was industry's fault. *"They had to be sue"* for what they caused to the Grand Calumet River, among other natural resources, and they were. Environmental advocacy organizations, such as Save the Dunes, strongly confronted the industry in those early years of the environmental movement. However, after decades of environmental regulations enforcement and joint projects, the dynamics between the industry and advocacy groups evolved into less confrontational and more productive forms. Over time, experiences of public and regulatory hearings shaped the relationship with the environmental groups and the government allowing them to build a platform for communication and for seeking common ground. As an interviewee from an environmental

agency expressed "*they went from fighting industry tooth and nail*" to work closely with the private sector as they never been before. In the last decade, it has been seen more of trust and collaboration among non-profits and industry when it comes to restoration of impacted areas.

Most interviewees that represent industrial perspectives, as well informants from the regional and State government levels, strongly agree that the large majority of industries in Northwest Indiana are in compliance with most regulations. In their opinion, the industry has made significant contributions and efforts for the improvement of the environment. Although there are still perceptions of a "polluting evil industry" because of the history lying behind, companies now operate within really stringent permits. It has been difficult for some people to understand some technicalities and realized that industry does not get dirtier over time instead the limit gets more stringent. This has been a gradual process of improving standards from the Federal and State levels that took place in most environmental governance settings. Air and water permits, among others, impose controls to industrial operations for what the industry should feel proud of when *"their compliance records are very, very good."* There is still a lot to improve; regulations will continue changing, but there are no doubts about the progress done. However, there are still some concerns, such as water quality issues regarding remaining contaminated sediments, potential violations of discharge permits, combined sewer overflows of the local Sanitary Districts and E. coli contamination because of bird and geese population in George Park. However, according to many informants, most remaining environmental issues have been either addressed or in its way to being addressed.

"You don't see the U.S. Steel mills looking as scary as they once did. You still have the emissions. You still have the flames. But it's not as bad." – Brenda Scott-Henry, Director of Environmental Affairs and Green Urbanism at the City of Gary

Almost all interviewees have lived in the area for at least ten years, and they have witnessed many of the environmental changes in the area. Because they constitute selected key informants, the majority of them have been involved in one way or another, or at least have some level of knowledge about remediation efforts. Having said that, most of them referred during the interviews to an environment that is *"getting a lot better."* As I said before, since companies started complying with permit levels, pollution has been reduced significantly from what it used to be decades ago. Although, clean-up has not finished and may take still many years, the Grand Calumet River is one example of natural features that have changed drastically for the best. The water column complies with the Great Lakes water standards, native species are reproducing, *"the Grand Calumet River is alive again."* Air controls, brownfields and superfunds remediation, natural areas restoration, are all other examples mentioned by interviewees of the actions that have been taking place in Northwest Indiana. According to various interviewees, the current conditions are in many cases the results of actions that started a decade ago, and it was not until now that is showing its first but tremendous positive outcomes.

"The Grand Calumet River was pretty much considered an industrial sewer." – John Fekete, chairman at CARE Committee

Restoration of natural areas has been an area of extreme growth recently. Lee Botts, board member emerita of the Alliance for the Great Lakes and board president emeritus of the Dunes Learning Center, former board member of Save the Dunes Council, did an inventory of the number of projects for the restoration of natural areas in the region, with

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the purpose to communicate to the public the work that has been carried out in the area, and create awareness in the communities. She could identify around 170 sites. In her own words, *"the scale of restoration of natural areas is amazing in this area,"* for which she emphasized that the private sector is increasingly supporting these efforts. Shirley Heinze Land Trust, The Nature Conservancy, Save the Dunes, and the Indiana Department of Natural Resources with their Lake Michigan Coastal Program have been the most active in restoring and preserving natural areas.

6.F.   THE HERITAGE OF NORTHWEST INDIANA AND THE GRAND CALUMET RIVER

The history of Northwest Indiana is heavily colored by industrialization and consequent pollution combined with economic struggles, social conflicts and crime. The heritage of these communities has a lot to do with how people experienced and perceived these changes over generations. Pollution heritage, in particular, is strongly present in the ways in which people relates to the environment, and at what extent the open space and outdoor activities are part of their lives. Interviewees were asked to identify open spaces in Northwest Indiana and activities that either them or members of these communities do outdoors. Through different perceptions, ideas and anecdotes they described the way in which people experience the environment.

The most recurrent space mentioned by the interviewees was Lake Michigan and the lakeshore. In their own words, it is one of the most important assets, a source of water resource, means for transportation, but mostly a natural feature that could be enjoyed by the communities. Indiana beaches and dunes are of significant importance for the informants. The shoreline has already been seen as of value for the people of the region and even beyond the area of this study.

The rivers of the region are seen as of value for enjoyment too. Same way that Lake Michigan, its value is affected by water quality but mainly by the lack of accessibility. Although there are still limitations, accessibility to rivers has been improving as a result of remediation projects and the restoration of natural areas in their surroundings. The Grand Calumet River is described as an urban industrial river; for many years it was the "industrial sewer." Going through industrial uses and transportation infrastructure, access to the river is limited. However, it is simultaneously considered a fishing spot even when fish quality is not warrantied to be safe for consumption. The Little Calumet River is been mentioned in relation to paddling, canoeing, and fishing but also as accessible through a network of trails built and recovered in the last decades. Not a minor detail, the Grand Calumet has received much more contamination than the Little Calumet due to its closer proximity to the industry.

Additionally, the Lake Wolf and Lake George are both examples of green open space with a significant water feature that has been remediated and improved for the benefit of surrounding communities. Around of the Lake George there are trails and athletic fields. The Lost Marsh Golf Course in Hammond is also identified as an open space where people of the community practice outdoor activities. On the north east side, Gary is counted with the Marquette Park, which is one of the remediated sites in relation to the Grand Calumet River clean up in early stages of the regional project, along with the Miller Woods. Beyond the limits of Lake County, informants identified the Indiana Dunes State Park primarily located in Porter County. On the south side of the area of this study interviewees identified Gleason Park and Golf Course in Gary, the Little Calumet Trails, and further south the Oak Savannah Trails and the Oak Ridge Prairie County Park. On the immediacy of the Grand Calumet River interviewees recognized Columbia Park, the recently remediated and restored Roxana

Marsh, and Gibson Woods, while on the west north, there is Jerose Park in East Chicago and Whiting Beach front Park located in the shore of the Lake Michigan.

According to most interviewees, for the most part these areas are used for jogging, biking, walking, playing sports in open courts or fields. Fishing in the rivers and lakes has been mentioned as the reason to which the rivers and lakes are accessed by people in the area, although as I mentioned before, paddling, canoeing, kayaking and boating are in some extent other practiced activities. Enjoying the beach and dunes are of the most common association with spending time outdoors. Some interviewees mentioned that there are some number of people who practice hiking, bird watching, and nature appreciation. These last activities have been important in the curricula of education and outreach programs for youth.

However, there is some agreement among interviewees that only a small portion of these communities really do make use of open spaces, amenities and nature preserves. Some of them attribute this to generational changes in activities and interests. Some interviewees would say that youth is more urban than what it used to be; youth rather spend more time recreating with electronic devices and internet access than outdoors. In this regard, many interviewees expressed concerns about the need for more parks and recreational outlets for people of all ages. However, there is a question of accessibility that plays an important role in attracting youth, elderly or median age people to these assets. The built environment may present barriers even where parks are located within the urban land, within a false proximity to residents because of those barriers.

> *"You have kind of a common perception of when you have dirty air you have jobs." – Richard Morrisroe, City Planner for the City of East Chicago*

"It has been many years and many generations that go through this and it is already on their mind." – John Fekete, chairman at CARE Committee

The way communities value these assets and make use of the open space has been influenced also by perceptions of the environment in the area related to the predominance of industrial activities and the historical pollution. Many residents grew up in this area having experienced heavy pollution. Many have associations between pollution and the existence of jobs and prosperity. They raised their children with those perceptions, and habits related to the use of the open space that reflect thoughts and beliefs about the environment and not necessarily factual knowledge about the quality of the environment. Five out of sixteen interviewees told me stories about clouds of smog at the level of the street, rain and snow colored by the emissions of the smokestacks and deposition of solids of different colors on cars or anything left outside that describe air pollution problems decades ago. These memories remained in the communities. John Fekete, who as many other interviewees lived largely in the area, said *"that is the way people grew up."*

The pollution in Lake Michigan was consequently severe as well. Regarding water pollution, Richard Morrisroe recalled that when his sun was a kid a popular thought was that *"if you dropped your T-shirt in the Grand Calumet River, you would watch it disintegrate before your eyes."* Some interviewees recalled stories of standing in the shore of Lake Michigan and not seeing the bottom because of the cloudiness, or the permanent presence of oil in the water. The pollution was mainly caused by discharges of industrial waste water from processes but also from oil spills, contingencies that were not managed properly, and sanitary districts sewage discharges without treatment. Additionally, the public have concerns, not only about the quality of the rivers and the lake, but also about the drinking water supply. Many people in the area would never drink public supplied water because they

thought the city was not treating it adequately. Without doubt water pollution was perceived by the communities in Northwest Indiana as a risk to their health.

In this context, it seems that some groups in the community are not that aware of the opportunities that are locally and regionally available for enjoying the environment and practicing outdoor activities. Some interviewees attribute the low rate of community utilization of parks, open spaces and natural assets to different levels of comfort. People's comfort could be related to the lack of habit, the lack of knowledge, perceptions of safety or perceptions of environmental degradation. According to Kelly Anoe, Director of Grants and Partnerships at the Legacy Foundation, the community of Northwest Indiana have in general a lifestyle that does not include being out, active and healthy, a fact for what she attributes the State to be low ranked in quality of life with high rates of obesity, asthma, and other health issues.

Kay Nelson, Environmental Affairs Director for the Northwest Indiana Forum expressed that governmental agencies and other organizations working towards the environmental improvement of the region have battled for 40 years to change public's perspective about the environment and the industry. Communities that developed around industries over 100 years have been heavily affected by pollution generated previous to any rule came into place. Compliance with environmental regulations do not remove historical contamination, a fact that *"communities like the one of the Grand Calumet River should be fully aware of, but they are not because they are more concerned with going to work, raising their kids, keeping the house up, poverty or illnesses."*

CHAPTER 7   ENVIRONMENTAL GOVERNANCE IN TRANSITION

This chapter presents the findings from a qualitative assessment focused on characterizing the environmental governance schema operating in Northwest Indiana. The perceptions of key informants that represent sectors and stakeholders of this schema provide the foundation to understand the evolving interactions between actors, the challenges encountered by them and factors that strengthen or obstruct good governance. This chapter explores some of the linkages between these aspects of environmental governance and the outcomes in terms of quality of place and environmental equity.

7.A.   PAST: COALITIONS

It was not until the 1970s that environmental regulations started playing a significant role with the creation of the US Environmental Protection Agency in 1970. In relation to water pollution control, the Clean Water Act was passed in 1972 which was modified later by the Water Quality Act in 1987 (Water Quality Standards History, n.d.). According to Doreen Carey and Lee Botts, who witnessed the early stages of the long process for remediating and restoring Northwest Indiana waterways, it was the Clean Water Act violations what drew attention to the Grand Calumet River which was considered a *"dead river."* As a consequence of the environmental movement of the 1970s and the new regulations, an environmental coalition started to emerge in Northwest Indiana towards the end of the 1980s. Different actors and sectors sat down at the table and agreed that they need to find a way to address environmental degradation and pollution. Key Nelson, another strong environmental advocate, pointed out that the Alliance for the Great Lakes, formerly called the Lake Michigan Federation, is recognized as one of the former environmental

coalitions in the region which also started in the 1970s. It brought together organizations such as the Save the Dunes Council, local chapters of Sierra Club or Audubon, National Wildlife Federation, and The Nature Conservancy, among others. The Federation was to serve as an organizer to work with local organizations all around the Lake Michigan, that later expanded throughout the Great Lakes.

Under that umbrella, it was organized what it was called the Grand Calumet Task Force. Its purpose was to involve people who lived in the communities along the Grand Calumet River in the remediation efforts. As described by Mary Mulligan, Brownfields Specialist for the City of Gary, who has worked for the City more than twenty years in environmental issues, the task force was in character an advocacy coalition for supporting and improving the Grand Calumet River as well as a sort of social regulator that monitor government's accountability in these matters. Created in 1987, the Grand Calumet Task Force was particularly distinctive in its origins since its members were in majority African-American at a time that was very unusual to have Blacks participating in environmental organizations. The Task Force became a big force in pushing for the clean-up of the river. They provided a voice to the public, in particular from residents along the river, a portion of steel workers, people that were part of the industrial process as others that were not, all who had interest in a clean river. Doreen Carey, who is a former Director of the Grand Calumet Task Force, believes that without public pressure the Grand Calumet area would have not been designated an area of concern. Representatives of the industry had their place in the task force, too. The Grand Calumet Task Force was considered the most effective schema in which community stakeholders, advocacy organizations and corporations could work together and advance the goals of remediating water pollution of the river. However, after

some time, the task force needed to rise some funds in order to continue their efforts in organizing the community and providing input for the clean-up projects. Financial needs led them to seek support from corporations that were already involved with the task force or from those with responsibility on the clean-ups in order to fund their activities. In the opinion of some interviewed environmental specialists, it was clear that the industry had to take a big role in cleaning the Grand Calumet up in order to have broader results. The government neither the advocacy organizations have the resources to do it by themselves.

Lee Botts recalls that by 1990s there was a deliberate effort to promote cooperative action in Northwest Indiana. Some interviews remember that by then local chapters of national advocacy organizations became more active in the region, local organizations were emerging around specific issues, or more geographically oriented, and all those environmental advocacy organizations became part of a regional environmental coalition movement in Northwest Indiana bringing together community members and advocacy groups to agree on environmental goals in order to drive changes in the region. In 1990s, the Grand Calumet Task Force was seen as an emblematic environmental coalition with a diverse representation of the local communities. Doreen Carey tells that the task force, led by Save the Dunes, organized the initial meetings that would let people know what was happening around the Grand Calumet River. It played a significant role in showing to the public that the Grand Calumet River, as well as other waterways, is an important asset, *"not just water in your back yard,"* as Kay Nelson from the Northwest Indiana Forum mentioned. Meanwhile, the US EPA was in the process of seeking funding for remediating the waterways, in particular making effective the funds collected from the Clean Water Action violations. At least those interviewees who had the experience of having been part of the Grand Calumet

Task Force believe that those from the government who got involved in funding and conducting the projects committed to do the best in their ability.

7.B.   DECLINE OF THE COALITION

Many interviewees have the impression that in early years there was more activity in relation to the Grand Calumet River. Over time many people lost interest because the planning process and the implementation of the projects took too long which fueled perceptions of inactivity or inefficiency. The emblematic coalition of the Grand Calumet Task force dissolved around 2006-2007. Some interviewees that were closely involved with the task force and citizens advisories attribute this to the loss of active leaders. Some members of the task force retired, passed away or move away. Moreover, there were no members taking the leadership in keeping the organization community-based character, thereby the efforts gradually faded out.

> *"When government actually took this up, sued the companies and the clean-up began, once things were happening people in the task force felt they achieved what they wanted." – Doreen Carey, Especial Projects Coordinator at the Lake Michigan Coastal Program of the Department of Natural Resources*

Some interviewees, in particular those who are former participants of the Grand Calumet Task Force, believe that the dissolution was motivated by the fact that the primary objectives of the coalition were reached. For them, the major objective was to get things rolling for the remediation of the river. They were supposed to contribute in the process of developing the solution for the clean-ups, produce reports and other materials for supporting the process, and they met those objectives. Once negotiations about the implementation of the clean-ups began and procedures were underway, there was a common impression that the problem was solved. People felt satisfied and lost interest in

engaging in further stages of the project. Additionally, meetings of the task force became over time technical reports of progress on the remediation projects, an aspect that many community members would not have interest in nor competence. On the other hand, it became a matter of governmental agencies, such as EPA securing funds from penalties, consent decrees, and national funds, and IDEM in the implementation of their Remedial Action Plan. However, there may have been also people who disagree with the proposed solutions. Doreen Carey recalls some disagreements, for instance, about the containment solution for the sediments removed from the river that lead some participants to leave the task force.

Among interviewees, there were people who agreed that another difficulty the Grand Calumet Task Force faced in its later years was that the people working in it—the volunteers—started asking for a salary or monetary retributions. On top of that, these long term projects are to happen through slow processes, so the public, stakeholders and volunteers involved lost motivation because there were neither immediate results nor apparent changes. An interviewee from partnership initiative with interest in the waterways clean-ups expressed it as *"it's a slow pace for getting a lot of this work done."* The coalition started working in the 1970s and the clean-ups only started in the late 1990s. As I mentioned before, some people identify that the Task Force also had difficulties in seeking funds at the point that it became dependent on corporate support, contributing to the dissolution of the organization.

Although the atmosphere of large and strong environmental coalitions faded out with the dissolution of the Grand Calumet Task Force, that former collaborative efforts contributed to build a foundation for collaboration and cooperation work in the present.

These coalitions set the precedents for collaboration among community members, advocacy groups, corporations, and agencies from different spheres of the governmental structure. The Grand Calumet Task Force was seen as one of the most influential environmental leaders through the 1980-90s. At least a third of the interviewees explicitly expressed that the dissolution of the task force was a huge loss in the region as a strong environmental advocate, a community-based leader and a coalition that for a few decades could bring together a diverse group of stakeholders.

> *"We continue to pretty much sit down together when necessary and try to work things out." – Doreen Carey, Especial Projects Coordinator at the Lake Michigan Coastal Program of the Department of Natural Resources*

7.C.   CURRENT MAJOR ACTORS AND ROLES

Indiana Department of Environmental Management (IDEM) and U.S. Environmental Protection Agency (U.S. EPA) have been the most acknowledged actors in the remediation of the Grand Calumet River and the Indiana Harbor and Ship Canal by the group of interviewees in this study. Two thirds of the research subjects sample identified these two agencies as the agencies which are responsible for implementing actions and projects. IDEM implements and monitor the Remediation Action Plan while it organizes public participation processes. EPA, on the other hand, supports those efforts, administers funds and monitors progress. It was IDEM with support of EPA organized the current Citizens Advisory for the Remediation of the Environment (CARE) Committee for the Grand Calumet River in 1990. The first CARE committee had been established in the late 1980s but dissolved shortly after (Knaap, Matier and Olshansky 2010). The current CARE committee is the mechanism through which different stakeholders can participate of the remediation efforts that IDEM and EPA are carrying out, however the participation of the meetings is made up by the same group of

stakeholders over the years, a small group of environmental advocates, and less people from the communities and community based organizations.

As I mentioned before, State and Federal agencies took over the action on the Grand Calumet River. However, there are other agencies and non-governmental organizations that have been playing an important role in how the waterways and, in more general terms, the environment of Northwest Indiana are being governed. Interviewees mentioned local, regional and state agencies significantly active in environmental themes. The Army Corps of Engineers has been involved in assessing, designing and implementing remediation solutions, mostly in the Indiana Harbor and Ship Canal. This national agency has worked closed to local governments in order to provide suitable solutions. The Hammond Sanitary District is one of their partners in this project. State and regional agencies have worked closely with IDEM and EPA in the broader scope projects in the Grand Calumet River, such as the Northwest Indiana Regional Planning Commission (NIRPC) and the Indiana Department of Natural Resources (DNR).

NIRPC has been actively involved in creating environmental awareness in the region, including communicating their work and commitment with environmental issues. They develop and implement planning projects such as the 2040 Comprehensive Regional Plan which includes a chapter of environment and green infrastructure focused on developing a system of greenways and blue ways throughout the three Indiana shoreline counties. They have been largely recognized for the implementation of the Marquette Plan which constitutes a significant effort in the lakeshore for reclaiming the Lake Michigan as a regional asset through reinvestment, remediation and revitalization strategies. DNR has been mostly active in supporting conservation initiatives through their department of Lake Michigan

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Coastal Program. They are known for working closely with Save the Dunes, but they also have carried out several actions related environmental awareness in the region.

The city governments have been involved in different phases and through different mechanisms. A third of the interviewees pointed out that the mayors of the four cities are of significant importance in order to gain public acceptance by showing commitment with the environmental remediation, communicating and providing input from the local perspective. However, they are seen as with the most restricted/narrow capabilities because of limited financial, technical and human resources. In this regard, interviewees in the local sphere mentioned that EPA has been providing technical assistance, in particular to Gary and East Chicago, in order to help them in the implementation of local actions for the overall improvement of the environment. On the other hand, local governmental officials argues that local governments are the entities that do work at the community level and can more closely interact with local stakeholders. From that perspective, local government should be able to promote, encourage, enforce and regulate at the local scale, functions that are difficult to perform when resources are scarce.

The Regional Development Authority (RDA) was also mentioned multiple times by the interviewees. While they have worked in planning efforts and investing for regional development, some of their projects, for instance new parks and aesthetic improvements in communities, it is questioned by some people whether they are effectively improving quality of place, far from where it was originally intended. The RDA main focus is on transit oriented development, transportation and economic development, though they have been an important active actor in the development and implementation of the Marquette Plan led by NIRPC.

There was an overall agreement among interviewees about the involvement of organizations at all levels, from community/neighborhood organizations, through all the levels of local, regional, state and Federal actors for the success of environmental remediation, as much as it is for conservation, pollution control, and topics of economic development, education, and safety. Although some functions such as regulation and control are under the sphere of governmental agencies, accountability for those functions could be exercise through public opinion and environment advocacy in the civic society. On this matter civic/non-profit organizations have been particularly important in the way environmental governance has been developed in Northwest Indiana.

Save the Dunes is identified by most interviewees as the most important and historical environmental advocacy leader in the region. The Save the Dunes Council was founded by Dorothy Buell when she recognized that the industrialization was putting too much pressure on the Indiana Dunes. The Council's purpose was to seek political support for the conservation of the remaining dunes and other natural resources in the region, including the Grand Calumet River ecosystem. Save the Dunes major activity is carrying out environmental education and outreach programs in order to create awareness about nature preserves and environmental protection in the communities of the shoreline counties in Indiana. They partner with other non-profit organizations for most of these programs in order to join efforts and reach a larger scope. However, they have been present in a wide diverse settings attending and assisting regional initiatives, citizen's advisories, among others. They are remembered as the advocacy group that stand against the industry in the early stages of the environmental movement. However, over the last decades, Save the Dunes

has been able to establish a productive dialogue with industrial corporations and become partners for several initiatives.

The Nature Conservancy is another well-recognized organization for its role in supporting, leading and assisting restoration projects in the Grand Calumet Area. Although a nation-wide organization, The Nature Conservancy has established strongly in Northwest Indiana. They came to the picture as the experts to help with the restoration of the dunes and swales ecosystem in areas adjacent to the river. An example of their work is the Roxana Marsh restoration, where after the dredging of the sediments, they worked in restoring native plants and promoting the return of birds, insects and other animals to the restored space.

Shirley Heinze Land Trust is the third non-profit organization identified as the most active environmental advocacy leaders in the area because of their success in restoring and preserving natural areas. They count with 16 preserves throughout the northern part of Lake, Porter and La Porte Counties. They started out *as an organization focused on preserving and restoring natural areas in the Southern Lake Michigan Watershed, North of Indiana.* Their original mission was to manage natural preserves with conservation purposes, but it then expanded to education about the value of those areas. According to Kris Krouse, Executive Director, the vision now is connectivity and integration of the region through linking preserves with and within corridors such as the Grand Calumet or the Little Calumet rivers, acquiring and managing more land for preservation, making them more accessible to the public, while accounting for climate resilience and building stewardship for the entire system.

Among interviewees there was lot of agreement on who the major environmental advocates are in the non-profit sector but there were also other organizations identified as important actors, particularly in both matters of conservation, and environmental education and outreach. The Gaylord and Dorothy Donnelley Foundation was mentioned as an organization that helps others to develop their capacity for effective conservation projects. County Conservation Trust and Woodland Savannah Land Conservancy are some of the organizations that apart from Save the Dune, The Nature Conservancy and Shirley Heinze Land Trust, focus on ecology, conservation and management of nature preserves in the region. Taltree Arboretum has come up in a few interviews as one of the organizations focused on environmental education. Similar to Save the Dunes, they offer educational programs, events and exhibits to educate guests about the importance of environment restoration and conservation. As I will mention later, there are significant partnerships between these organizations and initiatives such as Mighty Acorns Program and GLISTEN Program (the Great Lakes Innovative Stewardship through Education Network) which focus on different levels of education in order to incorporate environmental education and create awareness through different activities.

Apart from conservation leaders, there are key actors identified by the interviewees significantly important for the development of the communities and the region. The most significant one is in Lake County is Legacy Foundation which main purpose is to support local initiatives, local community based organizations, and help these communities to access higher education through scholarships. Kelly Anoe, from Legacy Foundation, explains that the organization provides funding, assistance and a support network for local non-profit groups and organizations whose activity is oriented to the improvement of the quality of life

of the communities where these organizations operate. Apart from providing funds for the implementation of projects that enhance quality of life through arts and culture, education, environment, health and human services, entrepreneurship and economic mobility, and civic infrastructure among other topics, and the support of scholarships, Legacy Foundation has implemented an innovative program named Neighborhood Spotlight. This program offers an incentive for communities to bring all stakeholders together, from the NGOs, to businesses and government offices, to collaborate in identifying the major issues in the community and develop strategies and solutions for addressing those issues. The program includes a technical assistance and training for the neighborhood actors who are applying to the funding, that provide them with tools, skills and knowledge to help them to establish collaboration among the different stakeholders and engage the whole community in the project.

In this schema the Industry has always an important role to play. After it was possible for the industry to collaborate with agencies at all levels and with the advocacy groups for implementing projects that would improve the conditions for the community and the environment, they established relationships of cooperation and support. The larger companies in the area such as US Steel, Arcelor Mittal, NIPSCO and BP, have shown significant participation over the years either through implementing and funding projects (some demanded by the consent decrees for the violation of regulations, or their participation as stakeholders), but also through their support to education programs, outreach and conservation initiatives. Some are partners with Save the Dunes, The Nature Conservancy, Shirley Heinze Land Trust, Legacy Foundation and other local organizations. Industries also have participated of many larger partnerships and sponsored events and

initiatives of all kinds, for instance industry is present in the Strong Cities and Strong Communities initiative, for which Gary, IN was selected by the Federal government during 2014. Additionally, some of these companies participate of citizen's advisories such as the CARE Committee. However, most small and medium businesses do not have the resources nor the incentives to be part of these schemas. Therefore, they are relegated in the environmental governance structure of the region.

On the other hand, the Northwest Indiana Forum is presented as the voice for businesses community with the purpose of foster economic development through encouraging investment and jobs creation in the region. The Forum has an Environmental Affairs Committee which represents the interests of the Forum members' on environmental issues affecting Northwest Indiana. According to Kay Nelson, Environmental Affairs Director, the Forum acts as a nexus between government and other organizations and the business community. The forum participation in conversations about environmental issues including regulations, control, policies and programs is seen as a valid and neutral discourse conversely to if the respective representatives of companies would directly be part of the dialogue. The Environmental Affairs Committee works as the connector or mediator for a more productive and effective dialogue in representation of the larger number of interested parties. The Forum comprises a big variety of sectors, from oil and gas, to construction, finance, banking, services, and media, among others. The Forum also partners with local, state and regional agencies as well as non-governmental organizations, as chambers of commerce.

7.D.   PRESENT: THE ESTABLISHMENT OF PARTNERSHIPS

The major theme that describes how environmental governance is operating in the area is the establishment of partnerships. The way major actors and minor actors are interacting with each other in Northwest Indiana is the result of years of an evolving relationship between them. Different types of organizations evolved in the roles they play for the protection and improvement of the environment and the quality of life in the region. In this constantly changing dynamic, organizations recognized that collaboration and cooperation between them allows them to achieve goals that would not have been able if they operated alone. All interviewees mentioned at least partnerships of some kind and with some purpose among some of the identified major actors.

> *"I think there's good collaboration with federal agencies, state and a few of the non-profit organizations. And so when you bring those different layers of entities – federal, state, municipal, non-profit, in some cases universities (...) – you can get a lot more done because each of those layers have access to different resources." – Kris Krouse, Executive Director of Shirley Heinze Land Trust*

First, at least a third of the interviewees declared partnerships between the organizations they represent and the US EPA. It is widely recognized that EPA seek to build partnerships with State, regional and local organizations for the projects they fund, supervise and/or lead either locally or regionally. For instance, US EPA, IDEM and the Army Corps of Engineers were identified as the work team on remediation projects, in particular those related to the clean-ups of the Grand Calumet River and the Indiana Harbor Ship Canal. In these cases, the input of each agency is crucial from different perspectives that ranges from technical to policy-making, regulatory and enforcement standpoints. From the federal, state and regional levels, US EPA, IDEM, RDA, and Indiana DNR are agencies that have encouraged the participation of a diverse set of organizations from different sectors, either

the local governmental agencies or representatives from businesses and industries, understanding that those participants have to be involved to carry out regional programs.

On the other hand, as I mentioned earlier in this chapter, US EPA developed a strong relationship with organizations like Legacy Foundation driven by the need of connecting with other local organizations, the need of being welcome by local stakeholders. The insertion of a federal agency in the region has been interpreted as an intrusion or a way to take over things that belong to local jurisdictions, rising issues of trust and unwillingness to collaborate. Kelly Anoe explained that EPA partnered with Legacy Foundation since 2012, when EPA started having more presence in the area. EPA started dedicating human resources locally, established local offices and designated officials to work directly with local governments and organizations. It was challenging for them to communicate and interact effectively with these local actors because they were seen as outsiders. Through the relationship with Legacy Foundation, EPA was able to established solid relationships with local stakeholders.

Along this same line, an interviewee declared that Urban Waters Partnership is originally the Urban Waters Federal Partnership, but the word Federal has been dropped in order to avoid discouraging local stakeholders. However, the nature of this structure is different. It was created with the main purpose of partnering. The designated Urban Water Ambassador major responsibilities are to communicate with stakeholders and bring them together to build a cooperative environment among them. In other words, an intrinsic purpose is to keep the communication between organizations and people that is fundamental for the major goal of protecting water quality and revitalizing communities along waterways. The partnership is an effort of the federal agencies to best communicate

with *"on the ground, local, all the time living, in the back yard folks."* In the process of building understanding and stewardship for local urban waters (EPA, n.d.) strong relationships, communication and cooperation are fundamental.

There are many other examples of structures meant to support a more fluid communication, promote a collaborative environment at the regional scale, and incentivize significant stakeholder to participate of different processes that range from assessment and monitoring to decision-making and policy-making. For example, the Calumet Stewardship Initiative is supported by the Illinois Coastal Program and constitutes a bi-state effort. Its vision is to promote collaborative work among members and *"cultivate lifelong stewards and advocates for the protection of nature and quality of life in the region."* (Calumet Stewardship Initiative, n.d.). The Calumet Heritage Partnership is another bi-state partnership committed to celebrate and preserve the heritage of the Calumet region, including natural, historical, and cultural heritage aspects seeking to revitalize the communities and enhance regional connectivity (Calumet Heritage Partnership, n.d.). According to some interviewees this collaboration has been strong and encouraging of bringing partners together.

Partnering is the key stone of the work of many organizations working for the environment and local communities in Northwest Indiana. According to Kris Krouse, Shirley Heinze Land Trust *"is all about collaborations and partnerships."* They define their work as partnering with other organizations for the purpose of conserving, managing and educating about natural areas. Their partners include all types of agencies, non-profit organizations and corporate partners. Managing natural preserves requires bounds with actors that would contribute with funding, but also with designing and developing a project, in the implementation stage, or for bringing the people that will benefit from it. The whole cycle

requires collaboration and cooperation of different actors. Partnerships are seen as a way to overcome jurisdictional boundaries to make possible changes that benefit the local communities as well as the region. Their work is not, cannot be restricted to one community or municipality, it needs to and helps to bring those communities together.

Legacy Foundation's work does highly involve the creation of partnerships. In the way Kelly Anoe expressed it, Legacy Foundation is intended to connect resources with people that need them by reaching the community, convening community groups, involving different organizations, engaging all of them in this conversation as well as in facilitating the use of resources towards a better quality of life. Working with partners, advocating and propelling that change is what characterize what Legacy Foundation has been developing in Lake County. For instance, they partner with Knights Foundation establishing and administering grants specifically dedicated to fund projects in Gary that aim civic innovation, attracting and retaining talent, and economic development among others. Beyond funding community initiatives and projects, Legacy Foundation has developed a capacity to bring partners to talk to each other, becoming a leader in community advancement. Similarly to how they contributed with US EPA and getting them close to local organizations, they have helped many other organizations in connecting with others.

Along with the partnerships, there are multiple spaces for dialogue between sectors and organizations. Representatives of the One Region, and of the Northwest Indiana Forum are means for communication and agreement. Many partnerships are created through the establishment of boards where many different entities are represented. The former Quality of Life Council, currently under the structure of One Region, is seen as a successful case of setting up an organization that was able to bring priority issues to the attention of decision

makers encouraging the implementation of joint strategies to tackle the problem from a regional and multi-sectorial perspective. One Region is organized through a board whose members belong to different governmental levels, different educational entities, and representatives from the non-profit, business and media sectors, among others. On the other hand, the Northwest Indiana Forum is mostly made up of representatives of different business and industrial sectors with some representation of the governmental and regional agencies. These organizations provide space for dialogue between different sectors because their governance structure brings together those actors seeking to agree on different topics. This dialogue allows a diverse group of organizations and people to agree on priorities, major challenges, directions and strategies for addressing them. This kind of dynamic affects greatly the way governance is being exercise by all these actors in regards to environment, community and economic development, and regionalism.

Environmental education and outreach have been a motor for the formation of partnerships. Research subjects from the government and the civic society mentioned some larger partnerships of which many local organizations are part. For instance, nature preservation advocates in Indiana, such as The Nature Conservancy, Shirley Heinze Land Trust and the Dunes Learning Center, are involved in the Mighty Acorns Program whose purpose is to bring youth in contact with nature. The program targets fourth to sixth grade students who participate in summer camps, field trips, and activities that provide an education curriculum on ecology and preservation of nature. The final goal is to encourage youth to get involved in ecology and conservation as well as to create awareness about the value of natural areas. It is supported with donations and funds from other organization. It is considered a partnership between educational actors, conservation advocacy

organizations, parks districts and other institutions, which scope is the Chicago Wilderness region reaching the three States of Wisconsin, Illinois and Indiana.

Another mentioned example of partnerships driven by education purposes is the GLISTEN Program, the Great Lakes Innovative Stewardship through Education Network. This program is a collaboration between government, non-profit and profit organizations with high education entities. The GLISTEN program implements a model in which they seek to educate students from different levels about ecology and land conservation. In this process they provide internship opportunities to perform land management on preserves. This model is applied for the whole Great Lakes region. Kris Krouse declared that Shirley Heinze Land Trust has collaborated with the program as well as benefited from it having interns during the summer working in their preserves. According to him, there is a common perception that the GLISTEN program has had the most success in Northwest Indiana region. He attributes this to the existence of vibrant partnerships motivated by nature conservation interests in this area.

From the different examples of partnerships that I mentioned before, it is clear that the industry participates in this governance structure. Precedents in making the industry responsible and accountable for some of the pollution generated decades ago, the encouragement of team work among personnel from the companies and the regulating agencies, and the establishment of a dialogue between the industry and the civic organizations, set the key stone for a collaborative environment between the corporate sector and other stakeholders. Either motivated by specific interests or by corporate responsibility, most emblematic companies partner with several organizations and agencies, and are part of spaces for dialogue and negotiation of policy and strategies. The private

sector has a place and role in the structure that leads changes for the enhancement of environmental quality, quality of life and development of the region.

A level of partnership that exists but might not be recognized as such is that one between local governments. Interviewed governmental officials said that the four municipalities have good relationships and have been increasingly working together in different fronts. The City Planner of East Chicago, Richard Morrisroe, affirmed that the city has worked closely with Hammond in several development projects including the remediation and restoration plans for the Indiana Harbor Ship Canal. In his words, *"we [East Chicago and Hammond] are neighboring cities and at times it make sense for us to work together."* From a state/regional perspective, some other officials mentioned that the three municipalities, referring to Gary, East Chicago and Hammond, have developed a cooperative relationship never seen before between them. This has been part of Mayors' discourses and actions several times.

> *"At the leadership level and the staff level I think the three cities are working together better than ever."– Katherine J. Luther, Director of Environmental Programs for NIRPC*

Additionally, local jurisdictions are actively included in many of the higher governmental level programs and initiatives. This is neither seen as a partnership per se but has evolved in developing collaborative relationships between federal, state and regional levels with local governments. As I mentioned before, initiatives such as Strong Cities, Strong Communities or the Urban Waters Partnership are meant to include the municipal agencies. Governmental officials from local governments said that are used to work with state and regional peers as much as they do with local partners. They considered that the lines of communication are well established for any issue they need to address.

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7.E.   THE PERCEIVED VALUE OF PARTNERING

Many interviewees recognized the importance of developing partnerships or coalitions to overcome difficulties in Northwest Indiana. Many projects, programs or initiatives carried out by the organizations represented by research participants of this study depend partially or totally of some kind of collaboration or cooperation between different organizations. There are organizations such as the Chamber of Commerce or the Northwest Indiana Forum that are meant to bring and sustain collaboration among actors of the same or different sectors as a way to support economic and social development. There are also organizations whose work is primarily connecting organizations and resources in order to foster community development and strengthen the region, like Legacy Foundation and One Region. As Kelly Anoe from Legacy Foundation has expressed, organizations alone cannot take credit for some projects because most work is done as a cooperative effort. Especially regional and state agencies work establishing all sort of collaborative structures as strategies to address issues that affect a wide set of stakeholders. Local governments seek collaboration with peers but also higher levels of government. Almost all of the interviewees recalled at least one successful partnership or collaborative effort, and could identify others outside of their own organizations. Nowadays it seems that nobody would oppose to collaborate given the past experiences and the already developed governance dynamic.

Some of the value of this way of governance is that each actor plays a different role. Each actor brings a different perspective to a project, with knowledge, expertise and credentials of all types that makes that input valuable and useful for getting results that satisfy the most all stakeholders. Within these circumstances, the leadership of an action is taken by different organizations given those credentials and their particular interests and

purposes. This is the way the environmental community has been functioning evolving from the earlier advocacy coalitions, though this is increasingly frequent with many other fields and issues.

Collaborative schemas are also a way to overcome jurisdictional boundaries. In particular when tax revenue and budgets are frequently allocated to a particular unit, counties and municipalities need to look for creative ways to address issues beyond those boundaries and alleviate some of the burdens, needed resources and efforts required to have things done. In this line, one of the strongest incentives for the establishment of partnerships is procuring grants and other funds. For governments and organizations whose budget is constantly being cut, partnering with other entities is a way to access to grants and acquire funds for investment. Grants are opportunities that many times are not reachable for standalone organizations. Moreover, they are opportunities to implement actions for the benefit of the communities beyond specific budget allocations, whether these actions are educational or environmental or economic focused. Actually, many interviewees remarked that Northwest Indiana is generally working to make the most of those opportunities, one of the reasons for some of the positive changes seen in the last decades. Communication, collaboration and coordination among a group of organizations avoids duplicate efforts, saves time and maximize resources.

> *"When you start thinking about grants and what you can do when you have partnerships – it is pretty amazing." Kris Krouse, Executive Director at Shirley Heinze Land Trust*

In the opinion of most interviewees, partnerships are capable of bringing positive impacts for the whole community. Partnerships and coalitions encourage community involvement. Organizations like the Calumet Stewardship Initiative, One Region, Shirley

Heinze Land Trust, Legacy Foundation, and Save the Dune, whose work is not limited to a particular community or municipality help to bring communities together. A collaborative environment invites to participate for both individuals from the community as well as organized groups or well established entities. The establishment of partnerships or coalitions sometimes helps to provide a context in which individuals as well as organizations are able to interact and act more effectively.

The Area of Concern and the clean-ups that have been carried out in the Grand Calumet area is an example of collaboration among a diverse and large group of entities. The dredging project is not been taking by one local entity. The federal and state governments are leading a joint effort with the participation of regional and local agencies, industry and non-profit organizations. The remediation of a river that has suffered a century of contamination is promising. Happening in Northwest Indiana *"backyard"*, the discharges are being controlled, the sediments are being removed, and the wetlands, dunes and swales are being restored with significant implications. As recognized by some interviewees, the project has potential to spur economic and recreational development, community enjoyment and quality of life. The benefits that the remediation will bring to the ecosystem and the community can stimulate the economy as well as provide opportunities for job creation, education attainment, attraction and retention of talent, crime prevention and enhancement of public health. Place can be looked at a key driver of broader changes for the entire region. *"The environment is one big piece of that puzzle."* However, such an ambitious vision would not be possible if the projects were developed and carried out by one entity, without the input and support of those who have stakes in the communities and the region affected. It is

because of the participation and collaboration of those who made the work teams that clean-ups can account for a broader set of benefits and at larger scopes.

> *"We are doing things and we are working together." - Katherine J. Luther, Director of Environmental Programs at NIRPC*

Many interviewees considered that as collaboration and communication is happening, partnerships are the essence for many of the changes taking place. It is accurate to say that governance for the environment but not limited to it is being dominated by the establishment and maintenance of partnerships between the different sectors and levels of organizations. Although some actors are still missing and, in particular, there is lack of grassroots or community based organizations, the work and the relationships are being sustained thanks to a large number of programs, projects and initiatives. Interviewees are mostly confident that this is the direction that environmental action and community development needs.

7.F.   THE CHALLENGES IN THE CURRENT ENVIRONMENTAL GOVERNANCE

Although the collaboration is occurring and driving the work of many organizations towards a better environment and quality of life, there are challenges and difficulties that effects how effective the environmental governance is. There is an overall perception of current lack of public participation in topics related to the environmental actions. The environmental community, people and entities with some decision-making capacity are seen as strong and active. However, the participation of community members who live in the AOC, conversely to the times of the Grand Calumet Task Force, has decreased. According to John Fekete, the CARE Committee used to have a good representation of all stakeholders and community members, lasting for a long period. However, the current meetings of the

committee are made up by a small group of people, the usual key actors that are closely involved with the clean-ups activities.

> *"There was a time when we would have just our regular board meeting in East Chicago and people would come and pack the place and listen to what was going on and complain about a variety of things. [Nowadays] we are doing things in East Chicago and we are doing everything we can to publicize the good things we are doing and have public meetings but nobody shows up." – John Fekete, chairman at CARE Committee*

All interviewed informants affirmed that public participation is fundamental to develop projects that affect the communities. As the representative from NIRPC pointed out, it is crucial to get public input and acceptance for having fair and equitable processes. However, both the governmental officials and representatives of civic organizations have cocerns about the difficulties that they face to fully engage the communities in their work. For example, some interviewees that have been involved in the CARE Committee meetings and work mentioned that there is no consistency in the location of the meetings neither the time of the day in which they are held. The participation of the commuity advisory committees of the companies like US Steel, there is even less participation. Some people attributes this to the technical character of the meetings, where the conversation falls into too much detail about the levels of contaminants or the processes for controling and remediating, information that is beyond the comprehension or interest of many community members. While the governmental agencies become more active in tackling environmental issues, the community engagement has decreased in some fronts. Interviewees talking about IDEM and EPA public meetings about the Area of Concern projects said that they do not have a representative and consisten group of attendants from the communities of the four municipalities. People recognize that these meetings are made only by the usual

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environmental advocates and officials. It is possible that the outreach strategy is not appropriate for the communities that make the Grand Calumet region.

Many interviewees expressed concerns about the diversity in the participation in organizations that advocate and work towards the improvement of the environment and the quality of life in Northwest Indiana. For instance, Dennis Rettinmeyer expressed that some events and activities organinized by One Region lack of diversity in race and ethnic backgroun, different age groups, different fields and sectors, among other aspects. Many interviewees refered to the environmental community as a "white, English-speaking" dominated field. This is not limited to environmental advocacy, but it applies to most civic and advocacy organizations in the Region, all represented through the research subjects of this study. The lack of diversity is depicted in the particaption of boards, commissions, committees and even in the public meetings held for environmental purposes. It is interpretated as that environmental organizations that partner and participate of the projects do not necessarily nor officially represent the general public in terms of diversity. In the words of one of the interviewees, *"that is a gap that needs to be bridged."*

For these reasons, among others, many interviewees consider that for the success of partnerships and coalitions required to reach the right stakeholders. Kay Nelson from the Northwest Indiana Forum admitted how critical is for the forum to reach a diverse group of people and organizations from different backgrounds and positions that represent the individual communities of the region. There is a need to establish a more fluid dialogue with stakeholders at the municipal level. There is a perception of a large number of small, local and/or community groups in Northwest Indiana that is not involved in the governance structure. However, these on the ground groups are not visible enough and lack the capacity

to work at a city-wide scale, making it difficult for regional agencies and organizations to reach them. From several perspectives, various interviewees consider that community leaders are not part of the picture, and there is a need for more community-based organizations. Many agree that there is a well dedicate and passionate group of advocates that work seeking to impact and change the reality of the community, though local non-profit groups tend to operate individually in isolation from other groups working towards similar goals. Incentives like the Neighborhood Spotlights are promising in breaking these barriers promoting integrated communities that simultaneously embrace a sense of unity and diversity. Kelly Anoe, from Legacy Foundation, said that they had people who were part of the same neighborhood, nonprofits, who had never met or worked together, for which they need to learn how to collaborate with each other even beyond the funding given by the Neighborhood Spotlight program.

The lack of community engagement and public participation rise questions of environmental justice. Despite the progress gained in the last decades in fostering a an environment of collaboration and active participation for the advancement of the environment and quality of life, the fact that community leaders are not part of the governance schema as desired by governmental officials and non-profit organizations talks about a gap in representativeness and inclusion. According to some interviewees from the non-profit sector there is still a *"lack of local recognition and appreciation for the environmental history."* It is possible that many local residents are unaware of the importance of natural resources in the area. However, it is likely that people face tensions between different struggles in their lives and more pressing issues become priorities. As expressed by many of the participants in this research, there are so many pressing issues in these

communities that participation in environmental dialogues moves to the bottom of the hierarchy. Many interviewees coincided that communities of the Grand Calumet are likely to be more concerned with working performance, job opportunities, taking care of their families, quality of education, and keeping their house up. Communities that have been impacted by the economic changes in the region, working communities that were left with a heritage of detraction and degradation of the environment and the community, are more pressed to make a living taking them away from the opportunity to participate in processes that may improve the built environment and the community at large and long term.

Some among the interviewees would say that the time it took to implement actions in order to revert the conditions of the these communities after decades of pollution and degradation of the environment is related to class and income levels of the people that stayed in these communities. For some informants, the fact that people of power do not live in the proximity of the industry and the polluted waterways is a factor delay and weakening remediation and conservation efforts. For a long time, it was considered that the "industrial north" did not worth to invest in improving the built environment because of the remaining pollution and social diminished community. These communities are not any proud of having been the *"workshop of America"* neither accepts that *"smoke means jobs."* The implementation of clean-ups and the future maintenance and monitoring of the quality of the waterways and preserves is one major concern among environmental advocates and people who has worked to recover the quality of the ecosystems. For many governmental officials at the state and regional level Gary, East Chicago, Whiting and Hammond are altogether an environmental justice focus.

Competing priorities are not an issue only for residents but it is a reality of local goverments and organizations. Northwest Indiana is undoubtly challenged by the scarcity of resources. Although it is been already recognized by many active stakeholders the importance of partnering and collaboration for seccuring funds and making the most with them, communities and local organizations, even municipalities are competing for resources. Budgets are continuoulsly shrinking and are many times constrain to specific jurisditions. Local goverments are restricted many times to tax base financial plans where limited funds can barely allocated to municipal services and functions. Even industries suffer from shrinking budgets for which they strategicly cut environmental, outreach, and community programs, limiting their action in the environmental governance structure. This is significantly important for medium to small companies and businesses that do not have financial nor human resources to dedicate to these matters.

> "At the end of the day people have to operate within a budget, and [in particular for governmental jurisdictions] that budget has boundaries." – Kris Krouse, Executive Director of Shirley Heinze Land Trust

Because of these scarce resources, many organizations and agencies just do what it is in their capacity. Financial resources become an obstacle to break boundaries and barriers in order to partner and collaborate with a group of actors instead of standing-alone. Local entities are seen as successful in creating awarenes about environmental and social issues, communicate and keep a commitment with that issue in their discourse, but they are enable to lead actions, lacking not only financial resources but also technical, scientific, and engineering capabilities. As it is expected, this circumstances lead many organizations and groups to seek grants as a way to finance their activities and staff. Therefore, there is a sort of grant dependency among local organizations which brings additional challenges for the

continuity of local efforts in the region. Many staff positions and specific actions are funded through grants which life span is of one to three years. If no additional grant is seccure in that period, the program falls apart and people working on it is forced to seek other job opportunities. In this scenarios, most programs, initiatives or projects require a start-up period that may extend long enough to consume most of a grant period or available funds. This limits the impact of actions that are to be sustain through this type of funding. All types of organizations are looking for funding, from regional to local agencies, including the non-profit and private sectors; in other words, everyone in Northwest Indiana is *"chasing dollards and projects."*

> *"You get a group started. You get organized around it and, then, your grant goes away. It is very, very difficult to sustain effort." – Kathering J. Luther, Director of Environmental Programs at NIRPC*

An interviewed governmental official attributes some of difficulties to overcome economic and social issues in Northwest Indiana is given by the inexistence of a strong philanthropic community. Many places in the United States have been greatly benefited from donors and fundraisings for the investment projects that benefits the communities and helps neighborhoods and cities to overcome difficulties. It is perceived that in Gary, East Chicago, Whiting and Hammond the groups of donors and sponsors are not present. While other wealthier areas such as Chicago City can rely on philanthropy, cities like Gary and East Chicago have heavily relied on government support. However, an important leader for the communities in Lake County is Legacy Foundation which main purpose is to support local initiatives *"building a culture of philanthropy across generations that will positively transform"* the county (Legacy Foundation Mission, retrieved on March 2015).

In relationship to the above mentioned aspects, leadership has been repeatedly mentioned during interviews as a factor of success for the sustainability of social and environmental efforts including partnerships and collaboration among stakeholders. Many strong individual leaders in the former environmental coalitions are no longer active and their succersors were not able to maitain the engagement of all the involved parties. When new people come in to participate it is likely that history is lost and the interest diminishes. This happens because most organizations are driven by individuals, key leaders that push things forward, people that may move away for a variarety of reasons. The organizations in Northwest Indiana have not matured enough to transmit history, knowledge, leadership skills and long term visions from generation to generation of their participants. This takes time and requires a lot of effort from current individual leaders in order to build common visions, train leaders, pass the flame that sustains the actions of a group of people.

Additionally, the lack of leadership is seen in certain spheres of the environmental governance structure, although there are many active organizations. Some interviewees perceive that after the disolution of the Grand Calumet Task Force, there have not been a environmental advocate leader. Save the Dunes was seen as an organization that took part of that role, however it could not entirely take the place. Organizations like Shirley Heinze Land Trust, The Nature Conservancy, the Calumet Stewardship Initiative, are well recognized leaders but their specific interests and goals take them away from a central major role for the overall environmental and community advocacy. On the other hand, the local goverments are not seen as leaders in environmental actions, neither higher levels of the goverment. Some beleive that there is no figure with enough presence, enough representation, enough resources, capable to influence people for a greater common good.

Having said that, it is important to notice that for some interviewees trust and credibility are fundamental in this equation. The region has seen many governmental officials involved in corruption cases fostering distrust on officials and representatives. There has been always concerns about who benefits from particular projects. Even if they are inttended to remediate a polluted natural resource with implications for the whole community, the approved solutions and the contracts that derive from those are seen as means for benefiting particular sectors. During the 1990s and eary 2000s there were many cases of redevelopment and place improvement programs for which the funds were never seen to be spent in the selected projects. Scandals and corruption demoralizes the communities and creates distrust. This discurrages public participation and community engagement, as well as the establishment and strengthning of partnerships and coalitions. Overcoming these issues is challenging and it takes time and effort. Communication, dialogue and collaboration is happening under the lens of all participants in this research but the challenges are many and significant.

CHAPTER 8   DISCUSSION

The discussion presented in this chapter builds on the findings of the previous chapters and the literature pieces in order to provide a compelling interpretation about the linkages between vulnerability and environmental justice, showing that there is an overlap between environmental hazards and vulnerable communities, and then indicating that the evolving environmental governance schema has been long influencing the changes on natural resources and ecosystem quality as well as on the way communities relate to the environment.

8.A.   PLACE VULNERABILITY AND ENVIRONMENTAL JUSTICE IN THE GRAND CALUMET

The communities located in the Indiana Grand Calumet region experience social and geographic conditions that constitute environmental inequalities. The extent to what these inequalities exists is given by dimensions that only could be revealed by a combination of quantitative and qualitative methods. First, the results from the spatial analysis suggest a series of spatial relationships between the distribution of polluting facilities that have permits to discharge into waterways, and socially vulnerable residents in Hammond, Whiting, East Chicago and Gary. The applied methodology shows an overlap of the industries concentrated in the area of the Indiana Harbor Ship Canal and hot spot of socially vulnerable populations in East Chicago implying that this area suffers of environmental justice conflicts in regards to the location of industrial uses and facilities since the results are statistically significant.

This affirmation bases its assumption that vulnerability is a function of the proximity to the source of the hazard or the impact. Cutter (1996) assumes that this was the case for

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most natural hazards. Nevertheless, it is also the case if we consider findings from Maantay (2002), Morello-Frosch et al., (2011) and Sadd et al., (2011) that show how populations in the proximity of polluting sources are exposed to toxic hazards that produce psychological and mental health stressors. However, proximity measures are not necessarily an indication of exposure since other non-spatial factors are likely to operate in producing place vulnerability and environmental burdens (Maantay, 2002; Sadd et al., 2011). Nevertheless, the qualitative findings from the key informant interviews re-affirm that degraded interactions between people and the environment as a result of historical pollution, among other socio-political factors, may impose burdens or stressors to those who remain living in the proximity to hazardous and industrial land uses. Using KDE and SOVI have been shown to be appropriate to assess disproportionate burdens, risk or impacts that are primarily a function of proximity. It is important to mention that KDE calculated from the distribution of industrial facilities does not intend to represent biophysical vulnerability; instead, it is a way to assess one aspect of the geographic context closely related to human perceptions and the influence of elements of the built environment on people's vulnerabilities.

The spatial analysis also shows that a smaller number of facilities are located in the headquarters of the Grand Calumet River, close the Marquette Park lagoons. Although there is not a clear overlap nor a high-high spatial correlation between the concentration of these industrial facilities and the cluster of high social vulnerability in Gary, the qualitative analysis offers perspectives on a different dimension of the spatial linkages between Gary's social vulnerability and the influences of the industrial activity and pollution. I risk saying that there is a certain level of interconnectedness between vulnerable populations in Gary and the dominance of US Steal Works in the near shoreline. It is likely that the complex social and

political fabric is driving different dynamics in Gary than in places like East Chicago. As Maantay (2002) pointed out, there are other non-spatial conditions that influence vulnerability and environmental justice outcomes. Gary was the central location for the civic and political activity since the early years of Northwest Indiana development. It became vibrant to later suffer from economy detraction that led to unemployment and poverty. Based on the observations from both quantitative and qualitative pieces, I argue that the spatial relationships that produce social and environmental inequalities for this area are less related to the proximity to a dense area of industrial facilities, but more tied to the intangible linkages between the operations of US Steel located in the coast line and the community of Gary. Although this is just one facility, the dimensions of this industry in relation to the economic and social relationships with the population in its surroundings and the local governance structure are much more influential in generating justice outcomes and affecting place vulnerability. As Cutter, Buroff and Shirley (2003) recognize place vulnerability and place inequalities are a result of a complex set of factors.

Northwest Indiana presents singular vulnerable places whose dimensions are not entirely capture with a reductionist approach and requires considering other ways of analyzing the case. According to key informants' responses, the most vulnerable groups are considered those of low income levels, elderly population, and disable population. Table 4 presents a synthesis of the major factors contributing to social vulnerability. Although race and ethnicity are well accepted factors of vulnerability in the literature and significantly related to justice concerns, these are not strongly considered by the local stakeholders. The region comprises such large mix of minority groups that the relative influence on vulnerability is unclear. The major contributor to social vulnerability is, without doubts,

income and class which are seen by key informants as closely related to the lack of opportunities, jobs and education. The lack of opportunities exacerbates existing vulnerabilities in the communities of Northwest Indiana, diminishing the value of efforts for the improvement of the environment across the area.

Although key informants argue that race and ethnicity are not factors of social vulnerability as it is income and class, a majority of minority populations are still the ones located within the mosaic of industrial land and waste hazardous sites. Associated with certain types of jobs and industries, these social groups were either willing to stay because of affordable housing/land or the proximity to job sources (industry and transportation in large measure) or not able to move because of limitations such as financial struggles or family dependencies. This again demonstrates that socio-economic processes are factors that tie into geographic relationships that involve the environment and the community.

Additional vulnerable groups that are related to these spatial-social dynamics are the disabled population and the elderly. The disabled populations' element is not captured by the SOVI estimated by NOAA as used in this study, and could only be identified through key informants input—although the literature does offer similar rationales for groups that require special services and assistance. The level of disabled populations in Northwest Indiana could be related to the existing heavy industry in the area, indicating temporal and geographic linkages. Many jobs at steel mills, oil refineries, chemical plants, and packing houses, particularly in past decades, exposed people to a high risk of getting insured while performing their tasks. Again, the economic activity is interrelated to a particular vulnerable group, which is a sign of spatial as non-spatial factors of vulnerability.

Table 4 Synthesis about sources of vulnerability.

Factor	Residents' experiences	Impacts on Vulnerability
Income and class	A result of external and internal economic, social and political challenges in the region. Lack of opportunities, jobs and education. High priority of attending basic needs for subsistence.	Limited mobility, conflicting priorities, and additional burdens to face challenging circumstances. Loss of talent and work force.
Race and ethnicity	Associations between particular racial or ethnic groups with certain types of jobs, forcing to remain in the proximity of those jobs (heavy industry and transportation).	Large minority communities that mask the relative influence on vulnerability. Dependency on certain types of industries to provide jobs.
Elderly	Limited access to opportunities, dependency on support and assistance. Linkage with generational poverty.	Least mobile because of the lack of access to resources, ties to neighborhoods, and difficulties to maintain properties. Needs of assistance.
Disabilities	As a result of the exposure to risky tasks as part of the job in heavy industry. Limited access to job opportunities and dependency on social assistance.	Need of support and assistance. Limited access to resources to face any challenging condition.
Environmental Quality	Memories and beliefs about pollution that remain in the collective identity and reinforce perceptions of a degraded environment as well as habits that neglect outdoor activities and diminish the value of natural assets.	Diminished value of natural assets with implications for community and economic development. Lost opportunities to improve the quality of life regarding biophilia and healthier habits associated with outdoor activities.
Fishing	Direct exposure to health impacts because of toxic levels of pollutants in fish.	Lack of awareness about health impacts. If already socially vulnerable, it is likely that people do not have access to appropriate information and health care.

Moreover, despite the fact that the region is considered diverse and rich in a variety of social groups and backgrounds, populations are highly segregated at higher resolutions such as neighborhood scale. These dynamics are not entirely captured by SOVI since the data is not available at the unit that allowed a more granulated analysis. Regardless, segregation leads to the competition of resources in a way and reinforces the cycle of fragmentation among communities. This is partially revealed by SOVI as the transition between the urban and industrial core in the proximity of the lake, and the rural south. Social vulnerability maps as well as density of industrial facilities show part of the transition, including an intermediate zone corresponding to a suburbanize area. Considering key informant perceptions, these patterns are the result of population migration, consequent demographic shifts, and changes in urban density, led by economic and technological changes in the industry as well as social and political transformations that, again, exacerbates vulnerability of place in communities more closely exposed to the industrial land uses.

Generational poverty is another factor of vulnerability that is hardly captured in its full dimension by social vulnerability indexes. This aspect combined with neighborhood deterioration and abandoned homes impacts place quality and vulnerability of place increases. Reinforcing a "broken window" effect, it imposes social stressors on communities while impacting also the city and the region as a whole. Apart from a reduction in tax revenue from abandoned properties, these conditions encourage a series of deterioration processes affecting the quality of place. Lower density of residents also makes the provision of basic services more expensive effecting burdens in the municipal services capacity and institutional vulnerability. The disabled population, the elderly, blight and abandoned homes are certainly results of processes with reflections in environmental degradation and

pollution with high implications for managing vulnerability and environmental justice conflicts.

On a different note, fishing is a particular issue that seems to fall a bit away from previous discussions. However, fishing represents a source of food or of leisure in these communities. People that consume fish from the Grand Calumet region waterways are highly exposed to health impacts, representing an additional source of vulnerability. On the one hand, it is because of the fish consumption itself, on the other it may be also because of the limited capability to purchase or produce other food than fish. This talks about one factor of vulnerability that is natural resources dependency. Although most scholars have talked about it at the scale of countries and regional geographies, it does affect local communities and individuals within them generating a higher level of vulnerability for them.

The Indiana Grand Calumet region shows significant disproportionate environmental burdens across communities in the region even after pollution has been addressed, remediation of the waterways and brownfields is happening, and standards and controls are effective in minimizing emissions and discharges to a harmless level to human health. Vulnerable groups remain concentrated in areas that have experienced greatly the influence of industrial land uses hazardous waste sites. Predominantly, minorities and disadvantaged groups are willing to accept or are unaware of the impacts that these conditions may cause in their lives. The spatial analysis has demonstrated to be able to illustrate these conditions making it possible to identify areas of major concern and those needing policy interventions in order to reduce environmental justice conflicts. Evaluating the relationships between vulnerable populations and environmental pollution exposure contributes to the understanding of spatial interdependency of environmental inequality components.

These observations have implications for environmental governance. The limited possibilities to participate of the governance that specific social groups have should be addressed by key actors in the governance structure by providing means that allow challenged communities to participate and provide input for decision-making. This, combined with the loss of diversity in the governance arrangement seen over the last decades, prompts warranting representation and inclusion in both filling active roles in the structure and in public participation. From a planning perspective, planners and decision makers, as well as other active players that advocate for the better of the region, should implement more democratic processes by improving communication, community outreach, and logistics for public meetings, among others. Finding strategies to encourage public participation and more inclusive governance arrangements needs to be part of the environmental and social justice agenda. Planners and decision-makers should have a more advocacy approach in order to be able to influence the realities of these communities, design and implement interventions that better address the burdens and concerns of the communities where remediation is taking place.

Despite the factors that exacerbate the existing vulnerabilities of the communities in Northwest Indiana imposing disproportionate burdens to populations across the region, the character of the area and the characteristics of the environment constitute factors that could potentially alleviate some of those inequalities. First, water resources in the Grand Calumet region links this area with the larger system of the Grand Calumet River basin and ultimately with the Great Lakes system. The dense industrial and urban environment comprising the transportations systems and infrastructure links the area with the city of Chicago and, ultimately with the rest of the country and other destinations around the globe. The actors

in the governance of the Grand Calumet region should take advantage of the level of interconnectedness of the system in order to better manage vulnerabilities of place. On the other hand, water resources are of great value in a region like Northwest Indiana. The lake and the rivers are fundamentally assets that form part of the identity of the area. For instance, water availability was with no doubts driver of most of the activity that historically has occurred in the shoreline of Lake Michigan. Therefore, there is a spatial relationship depicted in the proximity to the river and the most industrialized land in the region and the interconnectedness of these elements.

Then, even with a strong and persistent pollution product of industrial operations and urban development in times of no regulations or controls over contamination, the region presents a great value for local and international scientific community of ecologists and biologists. The fact that this region is characterized by a highly diverse system of beaches, wetlands, waterways, swales and dunes, rich in biodiversity attracts and motivates also the nature conservation advocates. It could be argued that nature conservation within an integral system that comprises industrial, residential and transportation uses could be a driver in reducing vulnerability and improving quality of place as well as quality of life for the communities of the area. The value of the natural resources of the region as part of the cultural identity, as means for economic development and as object of scientific interest should be taken as the key stone in current and future remediation efforts and of the overall environmental governance in Northwest Indiana as a way to mitigate some of the vulnerabilities that create environmental and social inequalities.

8.B.   ENVIRONMENTAL GOVERNANCE IN TRANSITION

Environmental governance in the Indiana Grand Calumet River region is in constant transition. It has evolved through three distinct stages since the area was designated an Area of Concern (see Figure 20). The first stage can be identified from the late 1970's to the early 1990's. Under the influence of agreements between U.S. and Canada resulting in the Great Lakes Legacy Act, environmental coalitions arose and developed filling the absence of an environmental governance structure. The coalition provided opportunities for the public and a variety of organizations to participate in problem-solving, creating a space where some of these actors could develop leadership in environmental advocacy, environmental protection and nature conservancy. Central to this movement, the Grand Calumet Task Force was organized by community members who in part were seeking environmental justice for the communities along the Grand Calumet River, which confirms what Lashley (2010), Kaswan (2013), and Colsa et al., (2014) said about the emergence environmental justice movements. During the 1980's, the Grand Calumet Task Force was well consolidated and seen as a legitimate leader in guiding environmental efforts in representation of a large and diverse group of organizations and community members. A second stage can be recognized in the late 1990's and early 2000's when the large coalition started to lose momentum. During this period, some products from the coalition efforts were materialized—such as official reports with the results of the evaluation of pollution levels or the first documents prepared with the recommendations for a remediation solution; however, the stimulus was weaker since it was not yet enough progress to show environmental outcomes. Since the coalition provided an environment in which to build a cross sector dialogue and develop relationships among organizations, the former coalitions devolved into a complex network

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of partnerships and collaboration. Lastly, a third stage can be seen in the last decade with an evident dominance of partnerships and collaborative efforts among active actors in the environmental governance structure; this is what we see today. However, this arrangement is in constant transition since actors change over time as well as the relationships between them.

Stage 1: Coalition Emergence	Stage 2: Coalition Dissolution	Stage 3: Partnerships Establishment
Focus on regulation enforcement • Persecution of violators • Lawsuits and penalties • Permits for discharges **Community driven efforts** • High public participation • Strong advocate leaders • Voluntarism **Legitimacy** • Shared vision • Representation and inclusion	**Focus on Remedial Action Plans** • Evaluation of pollution • Design of solutions • Clean-up kick-offs **Federal and State presence** • Consent decrees funding • Professionalism • NGO's support **Cross-sector dialogue** • Civic and industrial agreements	**Focus on clean-up progress and restoration** • Fewer sections done • On-going clean-ups • Nature conservation **Federal and State lead** • Partnerships with local organizations **Cross-sector collaboration** • Environmental education programs • Incentive for multi-partner programs

Figure 20 Three stages in the Indiana Grand Calumet region environmental governance transition.

Stage 1 was prompted by the Great Lakes Legacy Act and consequential regulations. The emergence of the coalition was characterized for the focus on regulation enforcement and community driven efforts. Many efforts were centered in pursuing those violating the regulations, finding companies and businesses responsible for the caused damage to the environment and making them pay for it. Advocacy, grassroots, non-profit, civic groups, were the first in taking a strong position against the polluters, which gave them a shared interest providing ground for developing their role as community organizers. The coalition was certainly most effective in engaging community members during those years in order to warrant public input in the remediation plan. Additionally, it was necessary to better

understand the situation, determine how much damage was produced in years of no environmental regulations, and identify what was necessary to reverse those conditions, restore the ecosystem, and improve the quality of the natural resources. The coalition did a lot for having a real diagnosis of the pollution in the Grand Calumet River basin and the surrounding communities. The coalition efforts were fueled by a strong group of leaders from the community. This stage was characterized by significant community engagement, public participation, and voluntarism. The coalition was certainly most effective in engaging community. With such leadership, many community members were willing to dedicate time and effort for the environment bringing a really diverse group of people.

Stage 2 evolved through changes in the composition of the governance structure as well as changes in the relationship among players upon a series of factors. First, remediation of the rivers (the major focus of the coalition) is a long term and slow process that requires to manage expectations in order to keep people engaged and motivated. Second, communication and public participation should deliver adequate information for the right audience, avoiding technical and/or managerial content of no-relevance for the public and providing proper mechanisms for incorporating public input and/or managing conflicts of opinions. Third, leadership has to be passed to successors capable to keep the efforts of the coalition on-going. Finally, the economic challenges affecting the region represent also financial constraints for the task force to keep their level of activity. Certainly, the factors that led to devolution of the coalition prevented advocacy groups to keep the general public involved. Although, this study is limited in evaluating to what extent each factor contributed to the dissolution of the largest coalition in the region, it does show what a radical change in the governance structure was.

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Stage 3 is characterized by an evolving arrangement of relationships. Environmental coalitions in the Grand Calumet River region set the precedents for collaborative relationships between organizations of all types. Towards the end of the coalition, industry, advocacy groups and governmental agencies established a more collaborative dialogue rather than a confrontational one, which remained an open channel for communication. In other words, relationships with the industry as well as with governmental agencies at different levels matured and became more productive. Even during periods of economic recessions and changes in the industry, there was a fruitful environment to advance the development of these relationships in order to face those challenges in a better way. Additionally, the most mature organizations have taken the lead in environmental education and community outreach, still in line with community engagement role but with a different form. Partnerships and collaborations emerged as a core theme in environmental governance in Northwest Indiana upon the recognized benefits of collaboration (Leach and Pelkey, 2001; Lemos and Agrawal, 2006; Newell, Pattberg and Schroeder, 2012; Simona and Ioana, 2013) and the emergence of incentives for partnering.

The benefits of partnerships are recognized in the literature (Leach and Pelkey, 2001; Lemos and Agrawal, 2006; Newell, Pattberg and Schroeder, 2012; Simona and Ioana, 2013) as well as by key informants of this study and range from building shared visions, to developing agreements on policy and strategies, gathering input from peers and stakeholders, sharing resources, securing funding, and building capacity. Partnerships could contribute to a more democratic problem solving and decision making. Within partnerships individuals are trained to work together, to communicate better, and to contribute to problem solving. Partnerships are seen to help to build governing capacity, but also adaptive

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capacity since relationships between partners are dynamic and evolve in response to the changing conditions. These benefits prompt the establishment of several incentives for connecting and linking resources in the search of more comprehensive and adequate solutions in Northwest Indiana. Some of them are driven by the need of training and/or funding, such as from programs like the Neighborhood Spotlight or Strong Cities Strong Communities Initiative, while others reflect commitment of organizations to environmental education and outreach programs or to nature conservation efforts.

Along with the evolution of the relationships among organizations, the governance transition also involved a gradual shift from a community driven effort to a more professional set of organizations. In particular, the non-governmental organizations have increasingly become less community organizers and more expertly oriented. According to Rios (2000) and Colsa et al., (2014), this trend is driven by a gain of legitimacy of the NGO's and civic organizations as part of the growing and maturing process. However, this has resulted in an environmental advocacy community highly dominated by "white, English-speaking, professional" as expressed by key informants during interviews. Additionally, Colsa et al., (2014) expressed that the way communities face environmental justice issues shape their activist strategies, rhetoric and resources is different from the mainstream environmentalists. It is notable that in the Grand Calumet case, officials and NGO representatives that advocate for the environment are more of the type of the mainstream environmentalist. These groups of advocates seem to be currently situated in a position far from the community members concerns which could contribute to sustaining environment and justice conflicts.

Nevertheless current actors include the State and Federal levels, as well as regional and local agencies. Although with different roles it is clear that the actions of governmental have been instrumental in producing environmental and social outcomes in regards to the Grand Calumet Area of Concern remediation as well as to the overall improvement of the environment. Some agencies have taken more technical and engineering roles, while others have been assigned to regulatory and control functions or have taken a strong leadership in reaching out the community and creating awareness about the environment. Within this set of actors, cities have been the most limited in resources for sustaining their responsibilities of regulation and control, but still have shown commitment through active discourses and activities regarding public communication and acceptance. Many of the current challenges for environmental governance in the Grand Calumet region are a result of the lack of resources at the municipal level. Local governments are seen their budgets cut year by year, are lacking of human resources, equipment, and funding for being able to fully comply with their responsibilities, less to say to carry out additional efforts regarding larger projects. Their capabilities to make of the remediation projects more comprehensive interventions that include community development are limited, not to say null most of the time.

Cook (2014) argue that different patterns of governance can be produced depending on the existence of a leader institution facilitating coordination, the level of clarity in roles and responsibilities of each actor, and the level of agreement in the definition of the issue, its scope and the strategy for addressing it. The outcome patterns vary from "piecemeal management," null or inactive management, to the most innovative management approaches. Successful outcomes are better achieved when an organization takes the lead facilitating coordination, as it happens currently with the remediation projects where IDEM

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and U.S. EPA are driving the efforts. Restoration efforts in nature preserves and remediated areas are some successes, where each partner in the project has a clear role, either bringing founds, planning and executing the restoration, monitoring, and brining attention to the nature preserves once the results were achieved. Coordination is successful for those issues in which there was agreement about the problem and the goal, such as when the Grand Calumet Task Force was working towards the objective of proposing a solution to reduce the cumulative pollution of the river. However, there is an overall deficit of attention to the communities living in the areas where clean-ups and restoration are happening. There has been little engagement with the realities of these communities and how environmental projects could influence them as an integral part of projects.

In the transition, a sort of decentralization process happened because of the development of networks as a result of different roles among actors (Hooghe, and Marks, 2003; Lemos and Agrawal, 2006; Cook, 2014). Within a multi-player and multi-level governance structure, partnerships, again, allow us to overcome jurisdictional boundaries and resources constraints beyond any allocation of resources. They are seen as a way to overcome those boundaries, as jurisdictional, political, social, or budgetary, among others. They encourage community involvement and consequential community development. I risk to say that partnering is a way of boundary spanning, especially in cases of environmental governance where natural resources and ecosystems link jurisdictions and even discontinuous regions (Meadowcroft, 2002; Sthepherson, 2013). Additionally, considering the interconnectivity of the human-nature systems, plus the network of collaboration and partnership, actors could benefit from considering a framework or approach in which to develop connective capacity (Edelenbos, Bressers, and Scholten, 2013) among actors, levels,

scales and sectors and extend the linkages in order to enable resources and collaboratively address issues that concerns several stakeholders.

Environmental governance in Northwest Indiana has certainly evolved going through different stages from coalitions towards a schema of partnering and collaboration. This observation is supported Paavola (2007) who argues that there is always continuous change in the institutions that constitutes governance structures. Those changes have been driven by the emerging challenges that the coalitions encountered leading to the dilution of such a large environmental movement. In my opinion, this transition represent an adaptive response, although not as thorough as what adaptive governance refers to (Dietz, Ostrom, and Stern, 2003; Folke, 2006; Lulofs and Bressers, 2010) but close enough to the concepts of adaptation and evolution of governance under changing conditions. The shift can be seen as a response of the organizations facing those challenges, experiencing the changing socio-economic background and internalizing changes in environmental issues status. Enhancing adaptive governance (Dietz, Ostrom, and Stern, 2003; Folke, 2006; Lulofs and Bressers, 2010) could improve the quality of environmental governance of the Indiana Grand Calumet region by achieving effectiveness in problem solving and decision making processes matching scopes, resources, roles and responsibilities to the changing conditions, actors and issues.

Understanding the drivers of the evolution of environmental governance arrangements is fundamental for planning and decision making. Environmental planning, in particular when committed to environmental justice, requires to discern circumstances and relationships that require particular consideration, and to be responsive to those. Actors who perform planning roles should acknowledge the roles and responsibilities of other

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actors, the interests of different stakeholders and use that knowledge to better shape the decision making process. Identifying the associations among organizations, the assets and resources that are available or being shared, the scope of each player's actions and interests, and the value of each one in participating of the environmental governance schema are minimum requirements for the a better interaction with the structure and its players for the planning of better outcomes. In that process communication, transparency, and management of expectations and contributions are of the most important for strengthening the relationships and establishing comprehensive and collaborative efforts.

8.C.   OUTCOMES OF ENVIRONMENTAL GOVERNANCE

Since the designation of the area of concern, Northwest Indiana has experienced a significant improvement of the quality of the water, air and soil, and of the ecosystem as a whole as a result of the enforcement of pollution control regulations and the implementation of remediation projects of huge magnitude. Key informants have described the changes in the region emphasizing how much the pollution has been reduced and how much restoration and nature preservation has been carried out during the last decades. However, these changes have happened gradually, as a result of processes that started several decades ago. Figure 21 summarizes the major outcomes and challenges of the three stages of the evolution of the Indiana Grand Calumet region.

Stage 1 outcomes were limited to the establishment of the coalition as the first formalized and recognized governance arrangement focused on environmental matters. The early phase of the coalition did not see many changes related to the reduction of pollution because of its efforts. However, the coalition itself was a significant socio-environmental outcome since it organized players around the idea of collectively influence the reality of

Northwest Indiana environment. During stage 2 was when the first fruits of the coalition efforts showed up. However, it was already devolving and shrinking giving room to new arrangements. By then water quality in waterways and waterbodies had improved significantly thanks to the enforcement of discharge standards and permits. The remaining pollution locked in the sediments was not yet to be removed but the remediation projects were under way since the Remedial Action Plan was produced. With the efforts of the State and Federal agencies, the establishment of the CARE Committee and the participation of several environmental expert NGO's, restoration of natural areas and associated programs in environmental education were incorporated to the agenda. Those constitute the major outcomes of the current stage of the environmental governance evolution, though many issues remained unresolved.

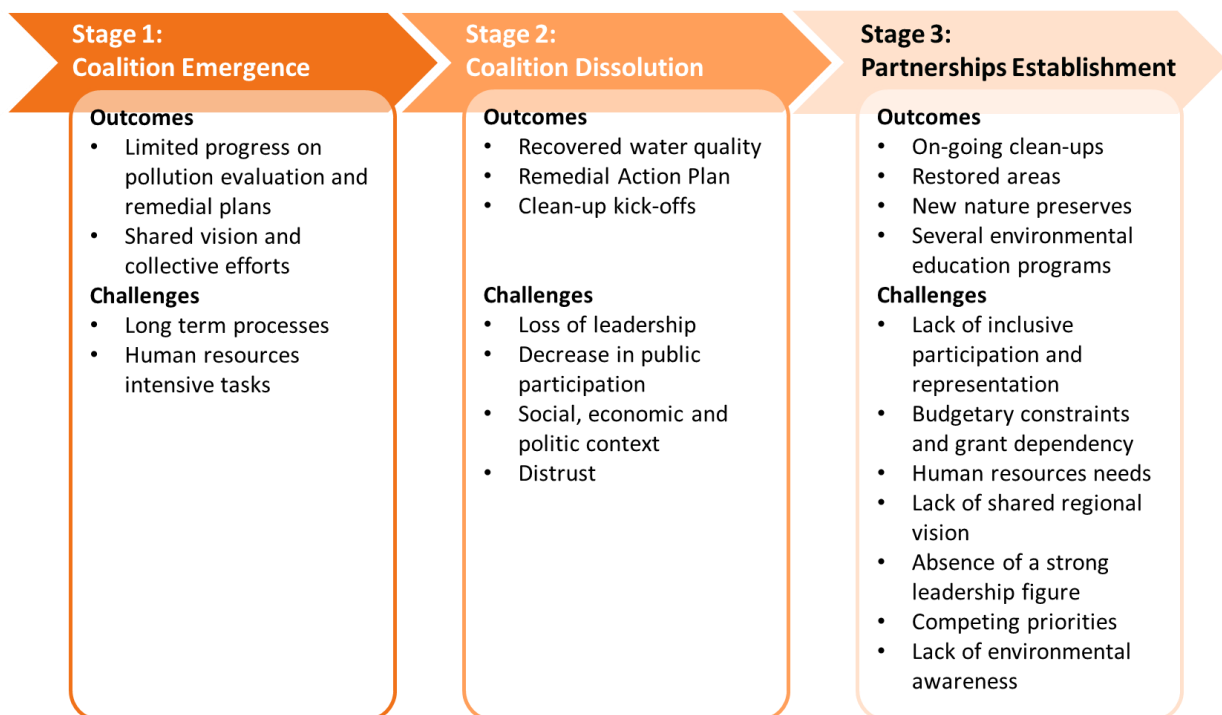| Stage 1: Coalition Emergence	Stage 2: Coalition Dissolution	Stage 3: Partnerships Establishment
Outcomes • Limited progress on pollution evaluation and remedial plans • Shared vision and collective efforts **Challenges** • Long term processes • Human resources intensive tasks	**Outcomes** • Recovered water quality • Remedial Action Plan • Clean-up kick-offs **Challenges** • Loss of leadership • Decrease in public participation • Social, economic and politic context • Distrust	**Outcomes** • On-going clean-ups • Restored areas • New nature preserves • Several environmental education programs **Challenges** • Lack of inclusive participation and representation • Budgetary constraints and grant dependency • Human resources needs • Lack of shared regional vision • Absence of a strong leadership figure • Competing priorities • Lack of environmental awareness

Figure 21 Outcomes and challenges during the three stages in the Indiana Grand Calumet region environmental governance transition.

First, public participation and inclusive representation are still limited from the decline suffered during stage 2, aspects that environmental justice literature states that inclusion and representation are key elements for equitable outcomes. In Northwest Indiana, there are concerns about not having a full involvement of the communities where remediation and restoration projects are happening. Some key informants suggested that the outreach strategies are not adequate for engaging all social groups in these communities. On the one hand, the fact that small, local, community organized groups as well as small businesses are likely to be unnoticed and/or difficult to be reached creates large gaps in representation and inclusion. On the other, the most exposed areas to the presence of industrial and hazardous land uses and to the burdens of historic pollution coincide with places where people with limited power and representation live. As some interviewees expressed, industrial and polluted land in the proximity of residential areas is not a pressing issue for those in power, thereby the changes are slow for these communities. Therefore, residents experience the aggravation of vulnerabilities under already challenging social, political and economic circumstances. Moreover, corruption and scandals have hurt the trust on governmental figures requiring transparency, accountability and communication to strengthen the relationship between the government and the community. All of these aspects are part of the multidimensional nature of vulnerability in its relation to power, representation and locational differences noted by Lashley (2010).

Then, communities do not fully benefit from environmental improvements if they do not perceive the value in the remediation and restoration. In this regard, there are questions of accessibility to open spaces, nature preserves and water bodies, either for recreation, enjoyment, appreciation or the practice of outdoor activities. Accessibility could be

measured in terms of the existence of access point to parks and nature preserves, trails, docking areas in rivers, all types of amenities, but also in terms of the number of people aware of the existence of these sites, the quality of this spaces, perceptions and interests regarding open spaces and nature. A way to exemplify that is looking at the major differences between the Little Calumet River and the Grand Calumet which tells different stories in the development of the land around them and the opportunities for people to access the resource. The Grand Calumet goes through a highly dense industrial land, with less access points to the river or green spaces along it, whereas the Little Calumet runs through a less dense and more suburbanized area, with a good number of trails, parks and preserves along it, and also several points of access to the river for practicing activities such as canoeing, kayaking, and fishing. Even the coastline, which is clearly a mosaic of private industrial properties, has fewer opportunities in terms of accessibility for outdoor activities, leisure and enjoyment of the beach, and nature appreciation. There are certainly geographic distances and physical barriers, such as private ownership of the land, railroads and highways blocking view and access, but there are design considerations that should be taken into account in order to provide spaces adequate and accessible, for all ages and for all kinds of activities in order to attract people.

Accessibility also relates to heritage and stigmas that remain in the communities of Northwest Indiana regarding perceptions, memories and beliefs about pollution. Polluted rivers, beaches, smog and toxic wasteland are part of the stories collected in this study which describe the identity of the area. These resilient perceptions, memories and beliefs influence choices in the lives of community members (Hilhorst and Bankoff, 2004; Birkerstaff, 2004). Heritage of pollution has reinforced habits and ways of life that reject a direct relationship

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with nature. Therefore, environmental education programs are of great important in order to create awareness and change the minds of future generations in order to modify the way these communities relate to the environment, since people learn about risk and impacts through local costumes, governance and science (Birkerstaff, 2004). Additionally, socially vulnerable communities are strongly challenged in their daily life, imposing additional barriers to a better relationship between the community and the environment. Daily priorities and struggles interfere with any level of interest for enjoying open and green space or adopt healthy habits related to outdoor activities. Experiences of poverty, lack of opportunities and discrimination certainly limit freedom of choice (Hilhorst and Bankoff, 2004). People under socio-economic stressors tend to neglect time and effort dedicated to the enjoyment of the environment as well as to activities that improve health and quality of life. Managing these dimensions of vulnerability and environmental conflicts are certainly under the governance orbit (Lebel, et al., 2006; Paavola, 2007), thereby, it requires an approach that address them.

While Maantay (2002) argues that an approach to reduce environmental inequalities is to reduce the level of harmfulness of a site or facility, I argue that disproportionate burdens are factored by the social context and that making facilities less harmful is not enough to alleviate the burden. Resulting patterns of inequalities and vulnerability are the product of economic, social, political, and environmental processes (Morello-Frosch, 2011; Paavola, 2007; Gibbs and Jonas, 2010). There are social dimensions driving vulnerability and socio-environmental conflicts that have been long recognized in the literature (Cutter, Buroff and Shirley, 2003; Morello-Frosch et al., 2011), to which the inequalities of the Grand Calumet region are not an exception. Many of these factors are not even spatial, and require of a

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different approach for analysis (Maantay, 2002; Sadd et al., 2011). As I mentioned in a previous sections, current approaches of environmental governance in the Indiana Grand Calumet region privilege interventions to restore the quality of the river while ignoring the relationships between the environment and the community. Neglected social aspects of the projects implemented in Northwest Indiana are a failure of the governance approach, in particular of the planning process behind those decisions. Issues that diminish the democratic processes and information available about the implications of environmental actions and policies are to be tackled during planning phases in order to produce well-informed decisions and warrant quality and just outcomes.

Limited environmental outcomes from the current interventions are symptoms of institutional vulnerability described by Birkmann and Wisner (2006). Young (2003) identifies that institutional vulnerabilities exist when mismatches between institutions, and between them and stakeholders perceptions and interests manifest in the governance dynamics. Managing vulnerability of place and inequalities requires mitigating governance vulnerability, since vulnerable governance schemas are not capable of produce fair outcomes neither reduce vulnerability of place or increase the resilience of communities. As Young (2003) has stated: fit, interplay, and scope are of significant importance to understand the adequacy and effectiveness of environmental governance. Persistence of misfits does not produce positive outcomes even in the presence of highly engaged and well-organized interested parties, in particular community-based or driven organizations, and/or close relationships between industry representatives, officials and legislators. Sometimes misfits generate political sensitivities about the rights and responsibilities of different jurisdictions. Institutional interplays may produce subordination or breakdown of local actors, for

instance when they favor consumptive uses placing significant pressure on the social-ecological system at the local scale and increasing its vulnerability.

The governance of the environment of the Indiana Grand Calumet region does manifest some level of misfit between governance and the environmental attributes of the place and the nature of the issue. Although governance has achieved a good level of collaboration regarding issues that actors in the region are willing to tackle, there are still environmental justice concerns and high vulnerability yet not addressed that reflects a lack of focus on areas that require attention. Lashley (2010) argues that recognizing the unique characteristics of environmental justice issues is necessary for collaborative problem solving processes. Some of these vulnerable areas may not be perceived, or participants may not recognize incentives to address them (as, for instance, when un-empowered communities do not have representation), thereby salient issues are not appropriately addressed. Therefore, stakeholders lose their capacity to participate in solving environmental conflicts, especially when collaboration is being prompted by Federal or higher governmental tiers as it happens with the remediation in this area of concern. Additionally, misfits are expressed in deficits in the recognition and conceptualization of the human-nature system (McLaughin and Krantzberg, 2011; Kaswan 2013). Ignoring or misunderstanding the system leads to ineffective efforts, inappropriate strategies and policies, and inadequate governance dynamics. Planners have long recognized the attributes of considering the human-nature systems in the conceptualization of interventions that affects urban environment. It is necessary to take into account communities' experiences and conditions in order to implement more comprehensive efforts that actually tackle environmental justice conflicts for the better of the places and the communities.

Interplay issues are less significant in the Indiana Grand Calumet region governance since collaboration and partnering are the framework for most interactions between actors. The region has been able to open a productive dialogue across sectors and across levels of governance. For instance, relationships between the industry and the government and the advocacy groups has successfully evolved from confrontational to collaborative. Existing interplay issues are mostly salient in relation to the lack of public participation and involvement of smaller, local community groups and organizations, since it talks about the absence of interplay with community members. Locational differences, identity, logistics, and outreach strategies are crucial for encouraging an appropriate level of public participation (Lashley, 2010). The absence of direct interplay with the community is a sign of limited power and representation (Buroff and Shirley, 2013). Beierle and Cayford (2002) argue that decisions on public policies and actions should be seen as public decisions that need some technical input rather than technical decisions with some public input by recognizing the social values of public participation. Public participations is more effective in achieving social goals if institutions are more responsive encouraging motivated participants, increasing the quality of the deliberations and generating a sense of control of all the participants over the process. Public participation then is likely to produce robust decisions based on public values and builds trust while helps to educate and inform the public on the issues to be tackled.

Lastly, issues of scope or scale are of great importance in regions like Indiana Grand Calumet region. When looking at the governance of a region, we assume territorial organization of the governance, while the issues within the region are interrelated prompting governance driven by particular policy issues. In other words, governance

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organized into jurisdictions and territorial levels mutually exclusive and governance driven

by task or policy coexist in order to govern over environmental and social (Hooghe and

Marks, 2003). Nevertheless, if the connective capacity of the social and natural subsystems

is considered, it is clear that governance scope and scale are to be defined strategically to

encompass all relevant aspects of the environmental problem, including actors, flows of

energy and resources, impacts and benefits, etc., interconnecting different jurisdictions and

even discontinuous regions (Meadowcroft, 2002; Sthepherson, 2013). On the other side,

many key informants refer to the communities as having dynamics that do not respect

boundaries either. In particular for informants out of the municipal sphere, the area of

intervention has to exceed municipal boundaries, advocating for governance structures that

address the region as a whole. This has to be emphasized not only for environmental matters

but also from an economic and community development standpoint. The investment in

infrastructure for one municipality, the location of a new company, the restoration of an area

within one city, all bring benefits for the entire region by bringing new activities and

incorporating assets that are valuable beyond boundaries of any type.

We need to understand and consider that boundaries of the remediation actions over

the waterways in the Grand Calumet region are to be expanded to account for social, cultural,

historical, ecological and economic scopes (Davis, M., 2014). This emphasizes the need for

collaboration between different jurisdictions of same and different level and for addressing

environmental issues with a regional vision. Approaches like connective capacity

(Edelenbos, Bressers, and Scholten, 2013) and boundary spanning (Lulofs and Bressers,

2010) are good adaptive approaches to environmental governance that could bring benefits

to the current circumstances of Northwest Indiana by providing a comprehensive and

adequate scope and scale management. This also relates to inclusion and diversity considerations since fragmentation, isolation and lack of participation are, although non-spatial, boundaries to be overcome in order to have comprehensive and democratic governance schemas. There is a dichotomy to be faced between a highly diverse region, encompassing a wide range of demographic groups, activities and places, and significant segregation at higher resolutions. These communities need to embrace unity and diversity simultaneously in order to overcome their constraints: unity as empowering the whole region and building a shared identity and vision of the future, and diversity in recognizing and representing the values and interest of each group as part of an inclusive and democratic governance.

Under these circumstances the capacity to reduce vulnerability is limited, in particular because of the lack of resources that constraints the capabilities of local agencies and organizations to transform remediation interventions into comprehensive efforts that incorporates socio-economic dimensions. Making these interventions part of larger efforts that put the community in the center requires competent human resources, time and appropriate funding dedicated to design and plan for justice outcomes. However, efforts in environmental education and outreach offer promising opportunity to change the reality of the Grand Calumet communities. By creating environmental awareness and strengthening the social capital with environmental and justice knowledge, it is possible to shape the relationships between the community and the environment, including residents of all ages, engaging non-profits and private companies of all sizes, and promoting a diverse set of activities that improves quality of life and provides socio-economic benefits for the whole region. On the one hand, best practices of private environmental management and pollution

control in addition to internal and external environmental education initiatives organized or supported by the private sectors has helped to create awareness among employees. On the other, environmental education and conservation initiatives, either supported by the private sector, but carried out by organizations of the civic society have reached a large community, particularly youth in Northwest Indiana, that would shape future generations behavior and choices in regards the environment and the way they interact with it. However, there are politics that need to be considered and addressed if imposing conflict of interests. Private support of environmental education should not prevent regulatory agencies to enforce strict standards of environmental management, nor the government to develop comprehensive curricula within the formal educational structure. Current initiatives are not necessarily sufficient to fill the gap in addressing vulnerability and environmental justice conflicts. For instance, health education and health care should be part of a comprehensive effort to address vulnerabilities related to pollution and quality of life, or urban development could be planned around restored areas that offer public access. Although there is still a lot to be accomplished, the region does feel, and deserved to feel, proud about the progress done so far, either in terms of remediation and pollution control but also in bringing awareness and building an environmental of collaboration.

CHAPTER 9   CONCLUSION

9.A.   SUMMARY OF FINDINGS

Environmental justice literatures talk about differential environmental and health impacts particularly on communities of color, minorities, and low income populations, among others, which could be seen as a differential in social vulnerability and vulnerability of place. The spatial analysis has shown that there are significant inequalities, depicted by the clustering of vulnerable population located in the proximity to highly dense area in facilities with permits to discharge wastewater to waterways, such as in East Chicago. Conversely, the spatial analysis falls short in explaining areas with a more complex dynamic where there could be significant influence from fewer but larger industrial operations as in Gary. Additionally, perceptions about the region and its communities talk about other variables that effect vulnerability that have not been considered in the social vulnerability index used in this study, indicating that public input and expert judgement are crucial when using quantitative approaches to assess the extent of environmental inequalities. On the other hand, inclusiveness and representation of all stakeholders are key aspects in environmental justice conflicts, factors that are hard to address using quantitative analysis.

 Environmental governance schemas have the capability to heavily influence the realities of the communities being challenged by factors of vulnerability and environmental impacts. These schemas have evolved by taking different forms characterized by the presence of regimes, coalitions, partnerships and public participation, and based on different arrangements that vary on scales and levels, interconnectivity among those and the elements of the environment, and the capacity to adapt over time under changing circumstances. This study has shown that environmental governance in the Indiana Grand Calumet region is in

constant transition. The stories presented in this research describe an evolution from a former coalition towards a schema of particular partnerships and collaborative relationships. Coalitions have evolved and devolved based upon the character of the efforts and objectives set up front, the presence of strong environmental advocates that serve as individual leaders, the relevance of technical and administrative tasks and reports for the public, the interplay between different stakeholders including the government, the industry and the advocacy community, and last, but not least, the financial challenges putting at risk the continuity of organizations. Partnerships and collaboration among the actors emerged as a natural response to the dissolution of the coalitions in order to advance goals of environmental restoration, nature conservation, community and economic development and regional strengthening.

However, current approaches privilege interventions to restore the quality of the river while ignoring the relationships between the environment and the community. This efforts, although well intended, are neglecting more comprehensive actions in order to tackle environmental inequalities still remaining even when pollutants are removed from the sediments. These partial outcomes are greatly a consequence of deficits in the recognition and conceptualization of the human-nature system. The existing network of actors built on partnerships and collaboration is certainly the arrangement to tackle environmental justice concerns even when pollution heritage and social stigmas are strongly rooted in the communities. Although the capacity to reduce vulnerability is limited, current efforts in environmental education and outreach offer promising opportunity to change the reality of the Grand Calumet communities. These observations can inform better future actions and interactions between stakeholders and active actors.

9.B. CONTRIBUTIONS AND LIMITATIONS OF THIS STUDY

This study has demonstrated that vulnerability models could be used to examine environmental justice cases and frame the analysis of environmental governance to understand which approaches produce more just outcomes. However, the analysis presented here has limitations regarding several aspects. First, spatial and quantitative analysis requires a more comprehensive set of variables to approximate the cumulative hazard and/or impact to what communities in Northwest Indiana are exposed. This study uses facilities with permits to discharge the waterways and heavily relies on proximity as a measure of impact, exposure or risk; therefore, it is limited in addressing the complex burdens that communities face in relation to pollution, hazardous sites and land uses. The perceptions assessed through the qualitative piece provide much detailed views of factors of vulnerability and inequalities. The interpretation of these perceptions and the stories about the interplay of actors and factors that constitute the governance of the environment in the region provides a narrative that can inform a more profound analysis on the environmental and social outcomes in Northwest Indiana. Nevertheless, a more comprehensive analysis would include perceptions and stories from a broader set of informants that include community members and diversifies the sectors representation in order to provide a more accurate picture of the realities of these communities.

The study contributes to a better understanding of factors influencing justice outcomes of environmental efforts to remediate and restore the quality of natural resources and ecosystems. It highlights the importance of applying a comprehensive approach that addresses the realities of the communities, the environmental conditions and the collective action that governs those interactions. An approach that better recognizes the attributes of

the human-nature system offer a better framework to plan, decide and implement actions that have the potential to significantly change the way this communities experience the environment and interact with it. The current venue of research looking at these matters may inform further studies to identify underlying factors of vulnerability and environmental inequalities. Additionally, further research focusing on environmental governance and the implications of different arrangements for the improvement of the environment and the communities can certainly benefit and inform environmental policy and planning in the region of Northwest Indiana.

This case study has also shown the value of using a mixed method approach for answering pressing questions about environmental justice and vulnerability. The quantitative analysis offers high level insights about the region, revealing distribution patterns and describing the overall picture. Quantitative information helps to frame issues within a region, a scope and focalized the analysis, and maybe actions, in areas that require more attention. The qualitative piece helps to fill the gaps of quantitative approaches. It provides additional information to explain the observed patterns, either confirming assumptions or revealing a different dynamic. Both quantitative and qualitative analyses have contributed to answer to what extent the communities in Northwest Indiana experience environmental justice conflicts. However, it is only through the narrative behind the interviewees' stories that environmental governance linkages can be established to assess its influence in producing environmental and social outcomes regarding the remediation of the river. It is only through people's experiences, ideas, thoughts and beliefs that those linkages can be determined and the social constructions of environment and governance of the environment are revealed to explain the perceived outcomes.

9.C.   PLANNING PERSPECTIVES

From this study there are several points of connection with urban planning that can be summarized into two major areas. First, planning is an intrinsic part of governance. Collective choices and collective actions that modify environmental conditions and quality of life require of planning efforts to guide them. Regardless the effectiveness or adequacy of the planning process, there are always actors in the governance structure who take the role and responsibility of planning and informing the decision-making process. Planning cannot be dissociated from governance, thereby it is necessary that planners understand their role in the larger structure. Understanding the interactions among actors, acknowledging their interests and roles, and identifying the changing circumstances in which those relationships evolve require spectial consideration from planners in order to more efficiently navigate the process. Planning roles have to be filled by individuals and organizations that show a balanced set of skills combining quantiative data analysis with democratic and political capabilities. Planners should acknowledge the weaknesses of the governance structure and the gaps to be filled in order to produce better outcomes.

Second, urban planning in Northwest Indiana is challenged by a series of difficulties that constrain the opportunities to re-shape the built environment and revitalized region. Local and regional agencies should take advantage of the on-going remediation projects and the attention that the designated area of concern has drawn to the region. Funding and all types of resources have been serving Federal and State efforts in restoring the conditions of the Grand Calumet River basin. Therefore, urban planning could make use of the synergies with the activities and processes driving the clean-ups. The operatign governance has not known how to take advantage of these efforts for a more transformative process.

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APPENDIX: IRB PROTOCOL

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research

Office for the Protection of Research Subjects
528 East Green Street
Suite 203
Champaign, IL 61820

September 2, 2014

Andrew Greenlee
Urban & Regional Planning
M210 Temple Buell Hall
611 Taft Drive
M/C 619

RE: *Grand Calumet: Can environmental governance explain environmental inequalities?*
IRB Protocol Number: 15070

Dear Dr. Greenlee:

Your response to stipulations for the project entitled *Grand Calumet: Can environmental governance explain environmental inequalities?* has satisfactorily addressed the concerns of the UIUC Institutional Review Board (IRB) and you are now free to proceed with the human subjects protocol. The UIUC IRB approved, by expedited review, the protocol as described in your IRB-1 application with stipulated changes. The expiration date for this protocol, IRB number 15070, is 08/28/2015. The risk designation applied to your project is *no more than minimal risk*. Certification of approval is available upon request.

Copies of the attached date-stamped consent form(s) must be used in obtaining informed consent. If there is a need to revise or alter the consent form(s), please submit the revised form(s) for IRB review, approval, and date-stamping prior to use.

Under applicable regulations, no changes to procedures involving human subjects may be made without prior IRB review and approval. The regulations also require that you promptly notify the IRB of any problems involving human subjects, including unanticipated side effects, adverse reactions, and any injuries or complications that arise during the project.

If you have any questions about the IRB process, or if you need assistance at any time, please feel free to contact me at the OPRS office, or visit our Web site at http://www.irb.illinois.edu.

Sincerely,

Ronald E Bush (for Anita Balgopal)

Anita Balgopal, PhD
Director, Office for the Protection of Research Subjects

Attachment(s)

c: Carolina Chantrill

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UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Grand Calumet: Can environmental governance explain
environmental inequalities?
Consent for Participation in Research

Why am I being asked?

You are being asked to participate in a research study investigating the relationships between community and environment in the surroundings of the Grand Calumet River cleanup efforts led by the Environmental Protection Agency (EPA). Based upon your professional or personal stake in an area surrounding a waterway cleanup effort, the researchers would like to conduct an interview with you to learn more about your thoughts, knowledge and experiences in order to understand community perceptions of community, environment and governance. With your permission the interview might be audio recorded.

During the interview, you will be asked about your stake in the community, community characteristics, and the organizations, actions and procedures perceived by you as affecting those community-environment relationships. We ask that you read this form and ask any questions you may have before agreeing to be in the research.

The research is being conducted by a student of the Master of Urban Planning at the University of Illinois at Urbana-Champaign, Engr. Carolina Chantrill, under the supervision of a faculty member, Dr. Andrew Greenlee (Department of Urban and Regional Planning). This research will be a vital part of Ms. Chantrill's graduate student thesis, contributing to her academic formation and training and consequent graduation.

Your participation is completely voluntary. You are free to terminate the interview at any time. If you do participate, you will also contribute to a process that benefits the understanding of how communities relate to the environment and how organizations and governance help to improve or deteriorate those relationships. In other words, findings will contribute to scholar and policy making knowledge related to environmental justice. The results of this study are likely to be disseminated to the public in academic documents, such as academic journal articles, book chapters and conference papers.

What is the purpose of this research?

The Environmental Protection Agency (EPA) has identified the Grand Calumet River in Northwest Indiana among other areas near the Great Lakes where past actions have increased the toxicity of local water ways. Our goal is to use social science research to help understand two things:

1. To what extent there is a relationship between degraded environment and people who have difficulties to deal with hard situations and/or have limited access to resources? and

2. How the conditions of the environment and the community relate to environmental governance, which include who is involved and how the environment is protected and managed?

As a result of this work, we hope to contribute to the knowledge about community-environment-governance relationships that would help technical experts, local officials, administrators and policy makers to improve their work by taking into account residents' perceptions, and ultimately benefit people and the environment.

To accomplish our goals, we will study patterns of environment quality and socio-economic and demographic data sources like the US Census and use audio recordings to collect the stories of residents, community organizers, and other experts who have lived near and thought about the water ways for a long time.

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Grand Calumet: Can environmental governance explain
environmental inequalities?
Consent for Participation in Research

What procedures are involved?

If you agree to participate in this research, we would ask that you do the following things:

- Participate in a 45-60 minute interview where a researcher will ask you questions about your experiences living and/or working in an EPA-designated Area of Concern Grand Calumet River and/or its surroundings.
- Be willing to have this interview audio recorded and/or allow the researcher to take notes.

Interviews will be conducted with approximately 14 individuals in EPA-designated area of concern Grand Calumet, including Gary, Hammond, East Chicago and Whiting.

What are the potential risks and discomforts? Are there any benefits to taking part in this research?

No risks or discomforts associated with this research have been identified beyond the risks that exist in daily life. However, we would like to ask you potentially sensitive questions about your work history and interactions with local political figures and other community members. Your responses will be treated in a strictly confidential manner unless you give us permission to link your name to your responses in research documents and presentations. You may refuse to answer any question that you do not wish to discuss, and you are free to stop the process at any time. Interview contents will either be audio recorded or written documented (based upon your comfort), however, all audio transcripts or written records from the interview will remain confidential unless you specify otherwise when signing below.

Although there are no direct benefits from taking part in this research, this research will benefit academic researchers and policy makers and give you an opportunity to express your thoughts about the topic of this research.

Who should I contact if I have questions?

Please contact either Dr. Greenlee or Ms. Chantrill with any questions or concerns about the research. You may also call them if you feel you have been injured or harmed by this research.

Dr. Andrew Greenlee
agreen4@illinois.edu
217-333-9069

Carolina Chantrill
chantri2@illinois.edu
217-693-1855

If you have any questions about your rights as a participant in this study or any concerns or complaints, please contact the University of Illinois Institutional Review Board at 217-333-2670 (collect calls will be accepted if you identify yourself as a research participant) or via email at irb@illinois.edu. The Institutional Review Board is the office at the University of Illinois responsible for protecting the rights of human subjects involved in studies conducted by University of Illinois researchers.

Grand Calumet: Can environmental governance explain
environmental inequalities?
Consent for Participation in Research

Signature of Subject

I have read (or someone has read to me) the above information. I have been given an opportunity to ask questions and my questions have been answered to my satisfaction. I agree to participate in this research. I understand that by signing below, the audio or written documentation of this interview may not be confidential unless I request that it be so. I have been given a copy of this form.

_____Yes   _____No   I am at least 18 years of age or older.

_____Yes   _____No   I agree to participate in this research process.

_____Yes   _____No   The researcher may audio tape my interview.

If you agree to participate in this research and agree to have your interview audio recorded, please select one of the following options regarding the use of your interview recording:

_____   The researcher may use my responses in educational or academic settings- this may include playing audio recordings of my interview *without* my *further* approval or review of the edited audio.

- OR -

_____   The researcher may use my responses in educational or academic settings- this may include playing audio recordings of my interview *only after I have reviewed the* edited audio and provided written approval.

If you agree to participate in this research and agree to have your interview documented, the interview will be confidential unless you give us permission to link your name with your responses in research products to be disseminated. Please select whether you are willing to be identified by name in audio or written products:

_____Yes   _____No   I give permission to link my identity with my responses in educational or academic settings and in written products of this research.

Signature: _____   Date: _____

Name: _____

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Grand Calumet: Can environmental governance explain
environmental inequalities?
Consent for Participation in Research

Signature of Researcher: _____

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At the time of your initial interview, you requested the opportunity to review any edited audio recording featuring a portion of your interview before it is shared publicly for academic purposes. Please review the edited audio tape in its entirety and provide your instructions regarding inclusion of the material below.

I have had the opportunity to review audio records containing a portion of my interview. After review of this audio tape, I... (please, place a check mark next to the choice that applies):

_____ Give my permission to the researcher to use this audio in academic settings- this may include playing audio recordings of my interview.

_____ Do not give my permission to the researcher to use this audio in academic settings

Signature: _____   Date: _____

Name: _____

Signature of Researcher: _____

[After greetings and presentations, proceed as it follows.]

We are going to set the audio recorder while I will explain/remind you the procedure of the interview.

First of all, I want to thank you for setting aside this time to participate in our research.

Here you have the consent form which includes at its beginning basic information about the project, its purpose and other aspects you might want to review. I will give you some time to read it, and if you have any question or concern about its content I am willing to answer them.

[Consent form with introduction/summary about the project is provided. Time enough for the interviewee to read the whole form is provided as well as answer to any question he or she might have.]

[Once the consent form was signed by the participant, a copy of the document will be provided to him.]

Now we are going to proceed with the interview. I want to remind you that you may choose not to answer any question if you prefer so, and you may terminate the interview at any time. There are no wrong or good responses, and I encourage you to share your genuine opinions and thoughts.

I will start recording know.

In order to set the volume levels and verify the equipment is working well I will ask you some warming up questions.

[Background questions for equipment settings and for contribute to the comfort of the interviewee. This material will not be included as part of the research material.]

[Proceed with questionnaire.]

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Grand Calumet: Can environmental governance
explain environmental inequalities?
Interview Script: Questionnaire

Background

- How long have you been *living/working* in this *community/area/ for this organization*?
  [If the interviewee is an official, professional or representative of an entity or organization:]
  Do you also live in the area? Where?
- What would you say is your role as part of your *organization/as member of this/your community*?
  [Follow up question for a community member:] What is your main occupation?
  [Follow up question for an official or professional either from the private or public sector:]
  Apart from your responsibilities and functions in the *agency/organization/company*, do you participate in other activities related to community and local environment? Would you tell me more about that?
- How would you define or draw the boundaries or limits of your community/*the community in which your organization/company work or has influence*?
  [Follow up question for an official or professional of the public or private sector:] Do you differentiate between your community as the place in where you live and/or the place where you work? Could you tell me more about it?
- Have you seen or know of any changes in this community/area in the last 10 years?
  [Follow up questions:] What kind of changes? Who was leading or driving those changes?
  Did these changes contribute to the improvement of the local community and environment? Did they effect a decline?

Community

- How would you describe the people who belong to *this/your* community?
  [Follow up questions:] Are there different groups of people? Which ones? Who belongs to them?
- Is any or more of these groups a minority group in the community?
  [Follow up questions:] Which group? Where are they located in the community?
- Is there any group who faces more difficulties?
  [Follow up questions:] Who are they? What kind of difficulties? Where are they located?
- Are they disadvantaged in any way?
  [Follow up questions:] In what way? Why do you think is this? Do they have less access to resources?
  [Follow up questions for a private sector member or local resident:] Are they not represented by the politicians? By civic or non-governmental organizations?
  [Follow up questions for a governmental official:] Would you say they are underrepresented in the political system? Who are the political representatives or advocates for these groups?
- *[Question for a local resident/community member:]* Would you say you belong to one or more of these groups?
  [Question for an official, representative or professional:] Would you say that people who work with you (in your organization/agency/company) belong to one or more of these groups?

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Grand Calumet: Can environmental governance
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Interview Script: Questionnaire

Environment

- *[Question for a local resident or community member:]* What kind of things do you do outdoors? (Things you like, you enjoy, or you do frequently.)
  [Follow up questions:] Where do you go to do these activities? Are these places located within the limits you mentioned before? (*The boundaries of this/your community.*)
  [Question for a nonresident of the area:] Regarding your observations and perceptions of the area, what kind of outdoor activities do the people in this community?
  [Follow up questions:] Where do they go to do these activities? Are these places located within the limits you mentioned before?
- What other open spaces do you recognize as part of this community?
  [Follow up questions:] Can you mention them? Can you locate them? (Parks, natural protected areas, rivers or streams, the Lake Michigan?)
  [Alternative question for a governmental official:] What open spaces are within the jurisdiction of your office?
  [Alternative question for a member of the private sector:] What open spaces are related or connected to the company where you work? How are they related? Are there natural resources that are vital for the company's activity?
  [Alternative question for a representative or member of a non-governmental organization:] What open spaces are related or affected by the work your organization does?
- How would you describe these open spaces you just mentioned?
  [Follow up question:] How would you say is the quality of these places?
- Do you recognize the Grand Calumet River?
  [Follow up questions:] Is it part of the environment in which you *live/work*? Can you tell where it is located? Could you describe it?
- How would you describe the quality of the water of the rivers and streams?
  [Optional questions depending on previous response:] And the quality of the Grand Calumet River?
- *[Question for a resident or community member:]* Do you perceive or feel any risk to your health or safety in these places?
  [Follow up questions for a resident:] What kind of risk? Why? Are there places you feel are not safe because they are polluted, contaminated or degraded? Which places? Where are they located?
  [Question for a member of the private sector:] Regarding of your knowledge of the industry, do you think the environment/open spaces/river and streams represent a risk to the public health or safety?
  [Follow up question for a private sector member:] What kind of risk? Why? What places in particular y where are they located?
- Are any of the groups you mentioned before (minorities, disadvantaged, underrepresented, etc.) located near by the places polluted, contaminated, degraded or that represent a risk?
  [Follow up questions:] Which groups? Where? Are any of these groups related to these places in a different way? How?
- How would you describe the relationships between these people and the places?
  [Follow up questions:] Are these relationships positive or good? Are they negative or bad?

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Grand Calumet: Can environmental governance
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Interview Script: Questionnaire

Environmental Governance

- *[Question for a local resident, community member, or private sector member:]* What kind of things do you know the local government has done to protect or improve the environment in your community?
  [Follow up questions:] The county? The state? The Federal government? Can you mention any other agency or entity that has done something for the environment? What have they done?
  [Alternative question for a governmental official:] What kind of things has the agency you represent/work for done to protect or improve the environment in this community?
  [Follow up questions for an official:] What are the main procedures, regulations, norms, etc. enforced by this agency? What other agencies work for the environment locally?

- How would you describe the effects of these actions to the environment?
  [Follow up questions:] To *your/this* community? Were they good or positive? Were they bad or negative?
  [Alternative question for an official:] How would you say the performance or effect of the actions the agency you *represent/work for* is on the environment and/or the local community?

- Do you know organized groups that are doing work for the environment?
  [Follow up questions:] Non-governmental organizations, civic organizations, community or neighborhood groups? Who are they? What have they done? When and where? Were the effects good/positive, or bad/negative?
  [Alternative question for a representative or member of non-governmental organization:] What are the actions the organization you *represent/work for* has done in the local community and/or for the environment?
  [Follow up questions for non-governmental sector member:] How would you say the effects of these actions are? (The performance of the organization.) Are there other organizations like yours working locally? Who are they? What have they done? How were the effects of their actions?

- Do you know any company or industry that have done work to improve or protect the environment?
  [Follow up questions:] What kind of actions do they implement? Where and when?
  [Alternative question for a member of the private sector:] Have the company you *represent/work for* done actions or had initiatives in order to improve the environment and/or for the development of the local community?
  [Follow up questions for a private sector member:] How would you say is the performance of the company you represent/work for regarding the environment and the local community? Are there other companies working on these aspects? How would you describe the effects of those actions?

- What are your main concerns about the local environment and this/your community?
  [Follow up questions:] What are the most difficult things to work on, improve or protect in this/your community? What are the main priorities?
  [Alternative question for officials and professionals of the public and private sector:] What are the main concerns for the *agency/organization/company you work for* regarding the environment and the local community?

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Grand Calumet: Can environmental governance
explain environmental inequalities?
Interview Script: Questionnaire

- Could you mention any case in which different organizations, either public or private, have worked together in order to protect or improve the environment or your community? *[Follow up questions:]* Are there partnerships? Have you seen collaboration between the government and the industrial sector? Have you seen private companies working together? And non-governmental organizations?
  [Alternative question for an official, representative or professional of the public or private sector:] Has the *agency/organization/company you represent/work for* done collaborative work with other entities? What kind of actions? How would you describe the results of that collaboration?
- Would you say there are other things or aspects helping to protect or improve the conditions of *this/your* community and/or the quality of the environment? *[Follow up question:]* What kind of things or aspects?
- *[If the interviewee has not mentioned the remediation efforts that have been done in the Grand Calumet EPA- Designated Area of Concern:]* Do you know, or have you heard, something about remediation efforts that have been done in the Grand Calumet EPA-Designated Area of Concern?
  [If yes:] Can you tell me something about it? How would you describe that/those project/s?
  [If no, provide some brief information about it and proceed]
- What would you say the benefits for the community of clean up or remediation projects in the river and streams are?
  [Follow up questions:] What would you say the benefits for the industry are? And for the government? Who else do you think could be benefited from this kind of projects?
  [Alternative follow up questions for officials and/or professionals of the public or private sector:] What would you say the benefits for the agency/organization/company you work for of this kind of projects are?

Closing question

- Is there anything else you think I should ask you about these topics and I did not?
- Would you like to add something else to the things you shared with me?

[Additional note: depending on the evolution of the conversation and the content of the interviewee responses slight modifications to this script are consider in order to avoid repetition and to get adequate information relevant for the purpose of this research. This questionnaire is tentative in character, and interview will be conducted in a way that all topics of this script are covered.]

Thank you so much for participating in this research. Before we conclude, do you have any additional questions about the research or the interview process?

[If yes, answer questions] [If no, proceed]

As part of this research, I am trying to interview other official/professionals, residents and other community stakeholders who might have insight into the subjects we talked about today. Do you know anyone who would submit to an interview and allow us to audio record it, and is over the age of 18?

[If no, terminate interview] [If yes, proceed]

Do you think this person/these people might be interested in participating in the study?

[If no, terminate interview] [If yes, provide the interview subject the project information, then proceed]

Please take this project information, including phone number and email at which to contact me. If you are comfortable doing so, please pass this to the people you think fit the description I gave you, and ask them to contact me. Thank you again for your time.

University of Illinois
at Urbana–Champaign

WAIVER OF DOCUMENTATION OF INFORMED CONSENT (45CFR46.117(C))

ALL APPLICATIONS MUST BE TYPEWRITTEN, SIGNED, AND SUBMITTED AS SINGLE-SIDED HARD COPY. PLEASE, NO STAPLES!

Responsible Project Investigator (RPI):

Last Name: Greenlee	First Name: Andrew	Dept. or Unit: DURP
Phone: (217) 333-9069	Fax: (217) 244-1717	E-mail: agreen4@illinois.edu

Project Title:

Grand Calumet: Can environmental governance explain environmental inequalities?

To request a waiver of documentation (signature) of informed consent, please provide a response to EITHER of the following questions. Please be specific in explaining why either statement is true for this research.

(1) That the only record linking the subject and the research would be the consent document and the principal risk would be potential harm resulting from a breach of confidentiality. Each subject will be asked whether the subject wants documentation linking the subject with the research, and the subject's wishes will govern. *Note: A waiver of documentation of informed consent is **not permissible under this category if the research is subject to FDA regulation.**

(2) The research presents no more than minimal risk of harm to subjects and involves no procedures for which written consent is normally required outside of the research context. **

The present waiver of documentation will be only used in those cases in which a phone interview is performed instead of a face to face interview. The waiver of documentation applies to the informed consent form. Given the impossibility of collecting a written consent form, participants will be asked to consent verbally to participate in a 45-60 minutes telephone interview as part of the research project. We do not anticipate any additional risk for research subjects that participate in phone call interviews. The recruitment process and inclusion/exclusion criteria in these cases remains the same than for the rest of the other participants, thereby risk level does not differ from a personal interview in regarding to these aspects. Following a verbal consent script, all necessary information will be provided and oral consent of the participants will be collected allowing same choices than in regular personal interview process. No changes are considered for the scripts and protocol that will be followed for the interview and end of interview. The audio recorded phone call interviews will be treated in the same way than the rest of the interviews. Interviews of participants who do not agree to have the telephone interview recorded will be documented by written notes. Data retention, data security, data management, dissemination of results and privacy terms for these interviews will follow the same protocol than the rest of interviewees.

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The potential participants that might agree to participate in a telephone interview given the difficulty of scheduling a face-to-face interview are likely to be institutional stakeholders with professional and institutional responsibilities. The questions that will be made to these participants (as well as to all participants in this research) refer to at what extent there is a relationship between degraded environment and vulnerable populations in this case of study, and how this overlapped conditions relate to environmental governance, whether organizational, procedural (regulations, control, or other incentives) and/or informal forms of governance. The questionnaire might include potentially sensitive questions about work history and interactions with local political figures and other community members. Therefore, we emphasize that responses will be treated in a strictly confidential manner unless they give us permission to link your name to those responses. Therefore, questions will not represent more than minimal risks if they agree to answer them outside of the research context. Moreover, a similar process would not require written informed consent if not conducted by academic researchers under IRB standards, so if similar questions were being asked for internal EPA program improvement reasons for example or by a journalist then signed consent would not likely be required.

Given that the protocol for phone call interviews comprises same provisions that interviews conducted in person, risks are of the same kind for both cases. In other words, no risks or discomforts associated with this research have been identified beyond the risks that exist in daily life. In particular, a telephone interview only presents the risks of a regular phone call. We do not expect that telephone interviewees have different concerns from other participants in this project.

** In cases in which the documentation requirement is waived, the IRB may require the investigator to provide subjects with a written statement regarding the research.

agreen4@illinois.edu
2014.08.28 10:56:45 -05'00'

RPI Signature: _____   Date: _____

IRB Member Approval: ____**APPROVED**____   Date: _____

AUG 2 9 2014
INST REVIEW BOARD

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ILLINOIS
UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Grand Calumet: Can environmental governance explain
environmental inequalities?
Verbal Informed Consent for Participation (Script)

[Beginning of the phone call. Introductions.]

[Summary of general information to be provided:

The research purpose is to understand relationships between community and environment in the surrounding area of the Grand Calumet River, where the Environmental Protection Agency (EPA) is leading cleanup efforts of the waterways. Base on your stake in the area, we would like to have a conversation with you about you about the community, its characteristics, the environment and the organizations and actions that you note as affecting those community-environment relationships.

This research is conducted by Ms. Carolina Chantrill, a student of the Master of Urban Planning at the University of Illinois at Urbana-Champaign, under the supervision of Dr. Andrew Greenlee. The information collected is going to be a vital part of her thesis. To participate you have to be 18 years or older. Your participation is entirely voluntary. If you participate you will contribute to a better understanding of how communities relate to environment and how organizations and governance can help to improve or deteriorate those relationships. This might be useful for scholar and policy making knowledge related to environmental justice.

The results will be used only for educational and academic purposes, which might include academic journal publications and presentation in conferences, apart from the master thesis already mentioned.

The process comprises a 45-60 minute interview about your thoughts, knowledge and experiences living and/or working in the area. We would like to audio record your responses and/or will take notes about them.

There are no risks of participating in this project beyond the ones that exist in daily life. However, we may ask you potentially sensitive questions about your work history and interactions with local political figures and other community members. You may refuse to answer any question that you do not wish to discuss, and you are free to stop the process at any time.

I am going to ask for your consent to participate in the research. If you have any question or concern you are free to ask either now or contact the research team in the future.

Dr. Greenlee could be reach at the number (217) 333-9069 or at the email agreen4@illinois.edu, and Ms. Chantrill could be contact at (217) 693-1855 or chantri2@illinois.edu. You might also contact the IRB Board if you have further concerns about your rights as a participant or complaints about this study. Their office is located at the University, their phone number is (217) 333-2670 and their email address is irb@illinois.edu. The IRB Board is responsible for protecting the rights of human subjects involved in studies conducted by University of Illinois researchers. When contacting the office please identify yourself as a research participant.]

[After reminding general information about the topic and purpose of the research project, proceed as follows.]

Regarding the information I previously shared with you about this project, do you have any question or concern about the process?

[Allow for a response; answer questions.]

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UNIVERSITY OF ILLINOIS AT URBANA-CHAMPAIGN

Grand Calumet: Can environmental governance explain
environmental inequalities?
Verbal Informed Consent for Participation (Script)

Before starting with the interview I have to ask you for your consent to participate in this research. I will do so by a short series of questions. May I continue?

[Allow for a response and proceed.]

Are you at least 18 years of age or older?

Do you agree to participate in this research process?

Do you agree to have the interview audio recorded?

[If yes, proceed as follow. If no, continue with next question.]

Do you agree that the research team may use your responses in educational or academic settings, including playing parts of this audio without your further approval or review of the edited audio?

[If yes, skip next question.]

Would you like to review future edited audio that the research team may use in those situations?

Would you like to be identified by name in any product of this project? This means that your identity might be linked to your responses, such as in quotes in reports or presentations.

Thank you for your responses. If you do not have any additional question or concern, I will start recording now and we will start the interview.

Thank you for agreeing to participate in this project. I really appreciate your time for this.

The interview will follow as an informal conversation between you and me. Remember that you may refuse to answer any question that you do not wish to discuss, and you are free to stop the process at any time. If you come up with any question or concern about the interview, just let me know.

[Proceed with questionnaire.]

Note: This script is intended to be used only in the case of a phone call interview.

Why am I being asked?

You are being asked to participate in a research study investigating the relationships between community and environment in the surroundings of the Grand Calumet River cleanup efforts leaded by the Environmental Protection Agency (EPA). Based upon your stake in an area surrounding a waterway cleanup effort, the researchers would like to conduct an audio interview with you to learn more about your thoughts, knowledge and experiences. During the interview, you will be asked about your stake in the community, community characteristics, and the organizations, actions and procedures perceived by you as affecting those community-environment relationships.

To participate you have to be 18 years or older. We ask that you read this form and ask any questions you may have before agreeing to be in the research.

The research is being conducted by a student of the Master of Urban Planning at the University of Illinois at Urbana-Champaign, Engr. Carolina Chantrill, under the supervision of a faculty member, Dr. Andrew Greenlee (Department of Urban and Regional Planning). Your participation is completely voluntary. You are free to terminate the interview at any time. If you do participate, you will contribute to a process that benefits the understanding of how communities relate to the environment and how organizations and governance help to improve or deteriorate those relationships. The results of this study are likely to be disseminated to the public in academic documents, such as academic journal articles, book chapters and conference papers.

Why is this research being done?

The purpose of this research is to have a conversation with people who have a professional or personal stake in local environmental protection and remediation efforts to understand their perception of community, environment and governance. This research will be a vital part of a graduate student thesis, contributing to her academic formation and training and consequent graduation. Findings will also contribute to scholar and policy making knowledge related to environmental justice.

What is the purpose of this research?

The Environmental Protection Agency (EPA) has identified the Grand Calumet River in Northwest Indiana among other areas near the Great Lakes where past actions have increased the toxicity of local water ways. Our goal is to use social science research to help understand two things:

1. To what extent there is a relationship between degraded environment and people who have difficulties to deal with hard situations and/or have limited access to resources? and

2. How the conditions of the environment and the community relate to environmental governance, which include who is involved and how the environment is protected and managed?

As a result of this work, we hope to contribute to the knowledge about community-environment-governance relationships that would help technical experts, local officials, administrators and policy makers to improve their work by taking into account residents' perceptions, and ultimately benefit people and the environment.

To accomplish our goals, we will study patterns of environment quality and socio-economic and demographic data sources like the US Census and use audio recordings to collect the stories of residents, community organizers, and other experts who have lived near and thought about the water ways for a long time.

What procedures are involved?

If you agree to participate in this research, we would ask that you do the following things:

- Participate in a 45-60 minute interview where a researcher will ask you questions about your experiences living and/or working in an EPA-designated Area of Concern Grand Calumet River and/or its surroundings.
- Be willing to have this interview audio recorded and/or written documented.

Interviews will be conducted with approximately 14 individuals in EPA-designated area of concern Grand Calumet, including Gary, Hammond, East Chicago and Whiting.

What are the potential risks and discomforts? Are there any benefits to taking part in this research?

No risks or discomforts associated with this research have been identified beyond the risks that exist in daily life. However, we would like to ask you potentially sensitive questions about your work history and interactions with local political figures and other community members. Your name will appear in print materials if you give us permission to share this information, however, they will otherwise be kept in a strictly confidential manner. You may refuse to answer any question that you do not wish to discuss, and you are free to stop the process at any time. Interview contents will either be audio recorded or written documented (based upon your comfort), however, all audio transcripts or written records from the interview will remain confidential, unless you specify otherwise.

Although there are no direct benefits from taking part in this research, this research will benefit academic researchers and policy makers.

Who should I contact if I have questions?

Please contact either Dr. Greenlee or Ms. Chantrill with any questions or concerns about the research. You may also call them if you feel you have been injured or harmed by this research.

Dr. Andrew Greenlee
agreen4@illinois.edu
217-333-9069

Carolina Chantrill
chantri2@illinois.edu
217-693-1855

If you have any questions about your rights as a participant in this study or any concerns or complaints, please contact the University of Illinois Institutional Review Board at 217-333-2670 (collect calls will be accepted if you identify yourself as a research participant) or via email at irb@illinois.edu. The Institutional Review Board is the office at the University of Illinois responsible for protecting the rights of human subjects involved in studies conducted by University of Illinois researchers.

UNIVERSITY OF ILLINOIS
AT URBANA-CHAMPAIGN

Office of the Vice Chancellor for Research

Office for the Protection of Research Subjects
528 East Green Street
Suite 203
Champaign, IL 61820

September 26, 2014

Andrew Greenlee
Urban & Regional Planning
M210 Temple Buell Hall
611 Taft Drive
M/C 619

RE: *Grand Calumet: Can environmental governance explain environmental inequalities?*
       IRB Protocol Number: 15070

Dear Dr. Greenlee:

Thank you very much for forwarding the modifications to the University of Illinois at Urbana-Champaign Institutional Review Board (IRB) office for your project entitled *Grand Calumet: Can environmental governance explain environmental inequalities?*. I will officially note for the record that these minor modifications to the original project, as noted in your correspondence received September 23, 2014: addition of one new staff member, has been approved. The expiration date for this protocol, IRB number 15070, is 08/28/2015. The risk designation applied to your project is *no more than minimal risk*.

Please note that additional modifications to your project need to be submitted to the IRB for review and approval before the modifications are initiated. To submit modifications to your protocol, please complete the IRB Research Amendment Form (see http://irb.illinois.edu/?q=forms-and-instructions/research-amendments.html). Unless modifications are made to this project, no further submittals are required to the IRB.

We appreciate your conscientious adherence to the requirements of human subjects research. If you have any questions about the IRB process, or if you need assistance at any time, please feel free to contact me at the OPRS office, or visit our website at http://www.irb.illinois.edu.

Sincerely,

Ronald C Banks (for Anita Balgopal)

Anita Balgopal, PhD
Director, Office for the Protection of Research Subjects

c: Carolina Chantrill