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Perceived Approaches to Abating Microplastic Pollution in Chicago-Area Waterways

Edmund Uchechukwu Okoli
Walden University

Walden University

College of Social and Behavioral Sciences

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Edmund Okoli

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Review Committee
Dr. Karen Shafer, Committee Chairperson,
Public Policy and Administration Faculty

Dr. Lori Demeter, Committee Member,
Public Policy and Administration Faculty

Dr. Ian Cole, University Reviewer,
Public Policy and Administration Faculty

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Abstract

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MS, International Institute of Aerospace Survey, Enschede, Netherlands, 1991

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Dissertation Submitted in Fulfillment

of the Requirements for the Degree of

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Abstract

Microplastics have increased water pollution, particularly in urban areas like Chicago. The purpose of this study was to explore how conflicts of interests and belief systems among different stakeholders can impede efforts for developing or revising plastic pollution mitigating laws. The theoretical foundation was Sabatier's advocacy coalition framework, which addresses public policies from the perspective of individual or organizational convictions. The research question addressed how policy makers can build coalitions among diverse stakeholders to formulate policies aimed at reducing microplastic pollution. A qualitative case study design included a document review and 12 semistructured interviews of participants drawn from 3 major different stakeholder groups. The interview data were transcribed, inductively coded and subjected to thematic analysis. The study showed universal stakeholder interest for the need for increased research on how microplastic pollution affects aquatic and human life. The results pointed to a moderate intensity of conflict among different stakeholders which enhances the likelihood for formulating microplastic pollution control policy. The study findings also show that policy-oriented learning can enhance increased stakeholder cooperation and lead to policy change on efforts to control microplastic pollution in waterways. Implications of the study for positive social change include increasing awareness of the sources and effects of plastic pollution, which may facilitate stakeholder cooperation and engineer the societal pressure required for formulating environmental and ecosystem protection policies. The result may be an improved environment and a reduction on the dangers of the plastic pollutants to aquatic and human lives.

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Dedication

This work is dedicated to my parents, Charles and Juliana Okoli. My father Charles, who had stressed the value of education, passed on under the impression that I had completed my doctoral work. This work is also dedicated to my mother Juliana for her untiring support and encouragement even when things seemed extremely difficult.

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I will like to acknowledge the great support from my wife Ifeoma who created the atmosphere that made it possible for me to start and continue with the program. My children Amarachukwu, Nnamdi, Onyekachi, and Chiamaka, and my brother Forster were of tremendous support in adapting to the frequent technological changes that I had to adapt to during the program.

I greatly acknowledge the great support and motivation I received from Dr. Shafer who is a mentor per excellence. Dr. Shafer was not just the chairperson of my dissertation but was also a counselor who always provided an atmosphere that made me believe I could do it. I am also extremely grateful to Dr. Demeter, who was more than a second dissertation committee member. She offered insightful suggestions and words of encouragement when it seemed there was no way forward.

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Chapter 1: Introduction to the Study

A proactive approach that can ameliorate the rising problem of microplastic pollution in Chicago-area waterways is necessary to forestall an irreversible deterioration of the aquatic environment. In this study, I intended to explore how a collaborative partnership among different stakeholders can craft a public policy that can reduce plastic pollutants in Chicago-area waterways. Reducing pollution in Chicago-area waterways will likely help prevent diseases, protect aquatic life, and promote scenic beauty. My intention for this study was to effect social change by providing a roadmap on how collaborative partnerships can address policy disputes among different stakeholders.

In this chapter, I focus on the problem statement, the purpose of the study, and the research question. I introduce the theoretical framework and describe the nature of the study the assumptions, and the limitations. I present key terms and the significance of the study, along with a summary.

Background

The protection of the water supply of any community is critical in maintaining inhabitants' health and the sustainability and growth of such communities. The growth of the Chicago metropolis as an important industrial hub in the United States may partially be attributed to its location near a large source of the freshwater supply from Lake Michigan. The lake and its tributary rivers constitute the Chicago-area waterways. As in other areas of the United States, local, state, and federal agencies have attempted to work together to protect Chicago-area waterways from pollution.

Plastic litter, especially in large urban areas such as Chicago, is a contaminant of concern that has attracted increasing attention of researchers. Using data from Chicago-area rivers, McCormick, Hoellein, Mason, Schluep, and Kelly (2014) found that microplastics concentrations exceed those measured in oceans and attributed the contamination to wastewater treatment plant effluent as a source of microplastics. Sutton et al. (2016) also noted effluent from wastewater treatment plants flowing into the San Francisco Bay area contain much higher microplastic concentrations compared to other sources. McCormick et al. explained that microplastics in rivers constitute a unique habitat for harmful pathogens and a new means for transporting unique types of bacteria to downstream regions.

For more than 150 years, the evolution of pollution control regulations has been a dynamic process aimed at addressing aspects of pollution that were insufficiently addressed by existing regulations. To protect the health of citizens from water-borne diseases, environmental and health advocates have pushed for the U.S. federal involvement in pollution control since the 1850s (Andreen, 2003). Andreen (2003) suggested repeated outbreaks of water-borne diseases in the United States during the 19th and early 20th centuries were, in part, a result of inadequate involvement of the various stakeholders who needed to work together for a healthy water supply to its citizens.

The dynamic nature in the emergence of pollution control efforts include the expansion of municipal wastewater treatment plants in the 1930s when the efficacy of municipal wastewater treatment plants in improving public health was recognized (Andreen, 2003). Other examples include the 1956 legislative amendment that eliminated the power of a polluting state to veto federal courts and the federal Clean Water Act of

1972. According to Egan (2017), the Clean Water Act enabled a dramatic reduction in the amount of domestic and industrial wastes that poured into the lake. The 1987 Water Quality Act aimed at improving the 1972 Clean Water Act (Murchison, 2005). The current study aimed at tackling the issue of microplastic pollution by improving the awareness of the dangers of plastic pollution among contending stakeholders through education with a view to forge collaboration that will reduce harm.

Environmental injustice is one reason for increasing adequate stakeholder involvement in developing environmental regulation policies. According to Kelly-Reif and Wing (2016), environmental injustice arises when practices that benefit some people and their environments result in harm to others, particularly as Wing, Cole, and Grant (2000) noted, the less privileged. Kelly-Reif and Wing argued inequalities in political and economic power are usually the underlying factors behind environmental injustice. According to Kelly-Reif and Wing, rural environmental injustice may result when urban food and energy supplies from rural areas are exchanged for urban wastes, such as the commercial pig production in eastern North Carolina and the Japanese nuclear disaster in Fukushima Daiichi. Blakeney and Marshall (2009) and Johnson, Kramer, and MacDonald Gibson (2015) argued for adequate monitoring of water pollution management to prevent apathy toward the less privileged who might suffer disproportionately as a consequence of water pollution.

Another reason for adequate stakeholder representation is local views, framings, and structure of government that inculcate inequalities on how natural resources and economic development are distributed (Kulcsar, Selfa, & Bain, 2016, p. 298). Researchers

such as McCormick et al. (2014) and Sutton (2016) have shown that microplastic pollution is higher in effluent discharge from wastewater treatment plants when compared with river segments that do not receive treated wastewater treatment from wastewater treatment plants. In the Chicago-area, the discharges from such plants is carried downstream to rural communities through a network of canals. Rural environmental injustice, therefore, is one aspect environmental injustice that relates to microplastic pollution in Chicago urban waters, and rural stakeholders' involvement in developing pollution control regulations may reduce the chances of an injustice.

Surging urban population creates an urgent need for strategic measures for mitigating the negative consequences such as energy use and water quality. Georgescu et al. (2015) noted the importance of involving city planners and other urban stakeholders who recognize that solutions to problems in designing future settlements are a complex merging of physical systems. The authors opined that stakeholders can craft locally sensible approaches that maximizes benefits and reduce unforeseen negative consequences, such as microplastic pollution. Zellner, Theis, Karunanithi, Garmestani, and Cabezas (2008) argued that sustainable growth of urban centers depends on a better understanding of the components that interact in maintaining an urban environmental system. According to Romero-Lankao, Wilhelmi, Hayden, and Gnatz, (2016), stakeholders must ask questions on what kind of urban or rural lives people want, and how can those types of lives be accomplished.

The best management practices may involve collaboration among different interest groups. The federal government through the U.S. Environmental Protection Agency (EPA)

has enacted many pollution control regulations through reactive prescriptive regulations that often do not include relevant stakeholders. Microplastic pollution, a growing concern as populations increase, affects a wide array of disciplines and interest groups and requires the involvement of a wide range of expertise for an effective proactive solution. Although various international regional and national laws and regulations have addressed plastic litter, none seem to be directed at microplastics in particular (Leslie, Vander Meulen, Kleissen, & Vethaak, 2011). The lack of literature on collaborative assemblage of diverse stakeholders for finding a solution to the problem of microplastic pollution in Chicago-area waterways constitutes a gap in knowledge worth investigating. Such a study would require the involvement of a wide range of expertise such as natural and social scientists, regulators, researchers, environmental protection advocates, business interest groups, and the general citizenry, among other stakeholders.

In this study, I provide policy makers with added knowledge necessary in formulating regulations for environmental and ecosystem protection. Zellner et al. (2016) argued that better understanding of the dynamics of environmental stress factors are necessary for addressing policies on the location and intensity of urban activities. Microplastic pollution is one of those stress factors with potential for affecting policy on the location and intensity of urban activities.

Problem Statement

Plastic wastes are growing contaminant of concern to the source of water supply, especially in large population centers such as Chicago. According to McCormick et al. (2014), microplastic pollutants can be found in many everyday products such as industrial

resin pellets, personal care products and cleaners, and microplastic fiber from synthetic textiles. Baldwin, Corsi, and Mason (2016) are of the view that the majority of the population is unaware of the sources of these pollutants, their influence, and what the citizens can do to reduce microplastic pollution. No regulations require wastewater treatment plants, often located in large urban centers, to reduce microplastic pollution in effluent discharge (McCormick et al., 2014). Baldwin et al. stated that microplastic pollutants are known to adversely impact both aquatic and human life. Human health, as well as growth sustenance of urban areas, are affected by various types of water pollution, and plastic pollution adds to the list of pollutants that affect the dynamics of urban growth and sustainability.

Conflict of interests among business, city, civic and environmental advocate leaders constitutes an obstacle in finding a solution to the effects of plastic pollution. James (2015) thought that lack of sustainable water supply has contributed to many cities becoming bloated zones of unsustainability. The best management practices may involve collaboration among different interest groups, as was the case in the formulation of the Clean Water Act (Hoombeek, Hansen, Ringquist, & Carlson, 2013). Resolving diverging interests in plastic materials will require a coalition of various interest groups working together to resolve their concern. Such a coalition is currently lacking in Chicago.

No literature exists on how potential conflict of interests among different stakeholders affects the implementation of policies designed to reduce the effects of plastic pollution. The current study added knowledge by providing a better understanding of the

nature of conflict of interest among various stakeholders, and what regulators must do to enhance policy for curbing microplastic pollution.

Purpose of the Study

My purpose in this qualitative study was to explore how conflicts of interests and belief systems about plastic pollutants among stakeholders can impede efforts at developing or revising microplastic pollution mitigation laws. I intended for this study to improve stakeholder cooperation, promote pollution control regulatory awareness, and improve sustainability impact analysis. I designed this study to provide a better understanding of regulations for reducing the damaging effects of plastic pollution in general and microplastic pollution in particular and ultimately improve the sustainability and growth of urban areas.

Research Question

How can policy makers build coalitions among diverse stakeholders to formulate policies aimed at reducing microplastic pollution in Chicago-area waterways?

Theoretical Foundation

The study was anchored on Sabatier's (1999) advocacy coalition framework (ACF). According to Sabatier and Weible (2014), ACF views public policies from the angle of individual or organizational convictions. The authors theorized that ACF views public policies in the same manner as belief systems in which people's or organizational priorities are set based on causal assumptions about how to realize them. Such a perspective allows for a comprehensive assessment of entire policy process, including policy change. Sabatier and Weible further explained that the ACF is best served as a lens to understand and

explain belief and policy change when there are technical disputes and goal disagreement involving multiple actors. In this study, those stakeholders included individuals, manufacturers, businesses, city and environmental protection advocates, several levels of government, interest groups, research institutions, and the media.

The ACF assumes that individuals are rationally motivated but are bounded by their imperfect cognitive ability to comprehend a complex world (Sabatier & Weible, 2014). The model of the individual motivates policy participants to seek like-minded allies and form advocacy coalitions for the purpose of improving the chances that their interests are protected. In competitive policy subsystems, policy disagreements between advocacy coalitions may result in conflicts that are mediated by policy brokers who seek to find a reasonable compromise among hostile coalitions. Huang et al. (2015) argued that it may require the infusion of citizen demand to generate the political and institutional will to find a proactive public policy. Change through public policy is an essential way forward and requires the collaboration of diverse stakeholders to create shared values (Huang et al., 2015; Markard, Suter, & Ingold, 2015).

The contextual in this study is the robust background on the importance of ACF's communication and learning. The outcome is policy-oriented learning, defined by ACF as a persisting change in thought or intended behavior that emerges as new information becomes available (Sabatier, 1999). Syberg, Hansen, Christensen, and Khan (2018) stressed the importance of learning involving the participation of citizen stakeholders by noting that risk communication on the dangers of environmental pollutants improves citizen risk perception, thereby impacting the belief system on plastic pollution, and the

involvement of citizens in such environmental problem. Similarly, Weible and Sabatier (2004) highlighted ACF's assumption of the role of scientific and technical information in modifying the beliefs of policy participants as an important path to change. I discuss the use of ACF as the foundation for this study in Chapter 2.

Nature of Study

I used a case study approach in understanding how to build a coalition among participants for the purpose of assessing effective plastic pollution control and the effects of plastic pollution on urban development policies in Chicago. Qualitative research is designed to explore trends in thought and opinions and dig deeper into issues. According to Rudestam and Newton (2015), case studies relate to a single unit of study, bounded in time and space. In the view of Ratvich and Carl (2016) no linearity in qualitative research exists because the researcher does not lay claim to a universal truth. This flexibility of nonlinearity supports the choice of a qualitative research approach enabled me to bring together interacting pieces of experts in pollution control, environmental policies, and urban policies, all of which were needed to interact in answering the research question. Through interviews and document analysis, I investigated stakeholder cooperation, pollution control regulatory awareness, environmental injustice, and sustainability impact analysis. The goal was to improve environmental and urban growth sustainability that otherwise may be impacted by microplastic pollution.

Participants were drawn from a purposive sampling of three major different stakeholder groups of governmental, business and environmental advocacy groups that are frequently involved in water pollution matters in the Chicago-area. Each of the stakeholder

groups fell within regulatory, business advocacy, environmental protection, urban and city planning, research, and environmental consultants. I interviewed 12 participants with at least two persons drawn from each of the three major stake holder groups and at least one from each of the eight sub stakeholder groups. Interviews were supplemented by a review of documents such as newspapers, meeting transcripts and public letters. The review of such documents was to gain a historical context on the evolution of pollution control regulations as well as buffer interview questions.

The use of Microsoft Excel for organizing data in a matrix facilitated coding and made for ease in identification of emergent themes from the interview transcripts. A computer-assisted coding process software (NVivo) was also used for data organization and management such as coding and data characterization. The coding process involved condensing or aggregating related data in related categories.

Definitions

Microplastics: Plastic materials that are less than 5 mm in diameter. They are often derived from the breakdown of larger fragments (Baldwin et al., 2016).

Microplastics of primary origin: Plastics that are often found in their original or near-original form when collected, including bottle caps, cigarette butts, microbeads, or resin pellets (Wagner et al., 2014).

Microplastics of secondary origin: Plastics derived from environmental degradation processes resulting from the breakdown of primary debris (Wagner et al., 2014).

Advocacy groups: All people or group of people formed of members who render public support to a given policy approach on issues and who share a set of driving beliefs

and views of the world and in some ways act in consonance while advocating for their common policy objectives (Leach & Sabatier, 2003).

Wastewater treatment plant: A centralized facility designed for the treatment of municipal wastewater (McCormick et al., 2014).

Assumptions

According to Denzin and Lincoln (2013), qualitative researcher use an interconnected family of terms, concepts, and assumptions. Ravitch and Carl (2016) described assumptions as occurrences beyond the control of a researcher. Addressing a study's assumptions is necessary to identify the constraints that may limit a study's validity and generalizability.

One assumption in this qualitative case study was that the stakeholder experts that were interviewed provided honest responses. I maintained the confidentiality of the participants so they could provide honest responses. I reviewed the background of the interviewees to ensure they have expertise in environmental protection and regional planning, and I assumed that they provided unbiased responses that were not influenced by their personal interests. I also assumed that the ideas expressed by these experts represented those of the larger stakeholder group. Furthermore, the study assumed the information presented in the reviewed documents were accurate. The documents that will add context and provide background information for the current study included minutes of meetings, event programs and memoranda. I assumed that the documents that were retrieved were relevant documents necessary to support the interpretation and analysis of interviewees.

Scope and Delimitations

The scope of the study was bounded by the research question, which focused on the Chicago-area stakeholders' views on microplastic pollution, the use of advocacy in finding common ground on policy issues, and the methods of data collection and evaluation. The scope was also limited by themes of stakeholder cooperation, pollution control regulatory awareness, and sustainability impact analysis. My direct working knowledge was of the problem in Chicago and the results of many studies showing that plastic pollution in waterways is prevalent in highly populated urban communities.

The ACF was used as the theoretical framework for establishing the basis of the research question. Other theories that were considered included the rational model and the institutional analysis and development theory (IAD). The IAD was not found suitable because it mainly relates to overcoming institutional constraints arising from structural variables in a multitiered institutional arrangement. IAD was also not found suitable because it assumes that actors are well informed with preferences that are well-ordered. These scenarios were not applicable to the scenario covered in the current study. The rational model has its basis on methodical collection of data based on scientific evidence that support intensity and causes of problems (Weible & Sabatier, 2004). The rational model has the benefit of reminding policy analysts of the importance of different stages in analysis but was not found suitable for this study because of the contention that the rational model is oversimplified and prone to human perceptive imperfections (Weible & Sabatier, 2004).

The appropriateness of ACF for the current study was the fundamental argument of the theory: Stakeholders may be grouped based on similarities of their policy objectives. ACF served as an intervention remedy for explaining belief and policy changes among participating stakeholders who previously were not able to communicate and come to common agreement. The rationale for the choice of ACF as an approach to abating microplastic pollution in Chicago-area waterways was to adequately address the research question, which focused on how policy makers can best build coalitions among diverse stakeholders. The aim was to formulate policies aimed at reducing microplastic pollution in Chicago-area waterways.

Transferability is a good measure of the credibility of a research study. It suggests that the results from a study should be generalizable and can be replicated as well as transferable in other contexts or settings (Lincoln & Guba, 1985). The results as well as the outcome from this study may be used to address microplastic pollution in other urban settings outside Chicago. The study outcome may have a wider significance in addressing other pollutants for which no regulations currently exists.

Limitations

The vast freedom involved in qualitative research means that a researcher should be mindful of potential ethical and credibility challenges that may limit acceptability of the findings. The relational dynamics with participants in this study where the researcher is the instrument is paramount in establishing study credibility. According to Ravitch and Carl (2016), such relational considerations should be framed as ethics issue. Shento (2004) attributed the skepticism of the value of qualitative research to positivists' belief that

naturalistic work is the only way to guarantee validity and reliability. Thus, a need exists for qualitative researchers to incorporate measures for addressing issues of validity and reliability.

Shento's (2004) concern about the limitations in qualitative research can partially be attributed to the subjectivity and human bias because of the place of the researcher as an instrument. According to Silverman (2016), a researcher's personal bias can influence data collection and therefore limits a study. As the primary instrument in this study, I conducted interviews that may be prone to bias and random errors. As Fischer (2009) noted, it is important to be aware of any personal biases. My professional background in the field of environmental protection and the philosophy it brought were addressed to demonstrate transparency. For approximately 20 years, I have worked in water resources protection in Chicago. I mitigated bias by interviewing stakeholders who I did not know personally. I also used journaling in documenting guidelines that may affect the study before the study began. The documentation included such attributes as personal feelings, philosophical beliefs, and my worldview. During interviews, I refrained from asking leading questions or offering personal thoughts that may have steered interviewees.

Without adequate measures to safeguard the trustworthiness of the study, the design limits this research to stakeholders to microplastic pollution in Chicago-area waterways. The purposeful sampling approach that were used in data collection for this study was a potential source of bias that may limit the application of the results to a larger population (Acharya, Prakash, Saxena & Nigam, 2013; Patton, 2002). The transferability of this study was enhanced by a rich, dense, and detailed account of the research process aided

by the computer-assisted software NVivo. An audit trail as well as reflexivity not only enhanced the dependability of the study outcome but the study confirmability as well (Houghton, Casey, Shaw, & Murphy 2013). Whereas semistructured interviews provide the flexibility for interviewees to expand on their information, participants might not be truthful in their response because of omission or purposeful exaggeration of important information. The limitations of this study was reduced by peer briefing by knowledgeable experts in environmental pollution.

Significance of the Study

Several studies have been undertaken on the effects of microplastic pollution on the environment and the potential harm to humans and other species (Baldwin et al., 2016; McCormick et al., 2014). The void in literature on how conflict of interests among different stakeholders affects policy implementation for reducing the effects of microplastic pollution in large cities like Chicago raised the significance of the current study. My aim was to explore how to use communication and learning in forging collaboration between different stakeholders, for the purpose of developing viable policy for addressing microplastic pollution. This study also added knowledge on how a greater segment of the population understands the sources of microplastic pollution and what can be done to reduce its damaging effects.

The study results have the potential of giving policy makers added knowledge on how to formulate consumer regulatory policies geared toward environmental and ecosystem protection. New pollution control regulations could lead to cleaner and safer water supplies in the Chicago-area. Zellner et al. (2016) argued that a better understanding

of the dynamics of environmental stress factors (such as plastic pollution) is necessary to address policies on the location and intensity of urban activities. Ultimately, the sustainability and growth of communities at large, and urban areas in particular, will be affected by efficient environmental policies.

This significance of the study also lies on issues of environmental injustice among rural downstream dwellers. Though the current study aimed at establishing a framework for good status in the health of Chicago-area waterways, such a status is better attained if it does not result in environmental injustice. Kelly-Reif and Wing (2016) described environmental injustice as an extension of civil rights movement and includes exposure to environmental pollutants as a result of the negative impact on other people's environment due to benefits acquired by others. Rural dwellers are often exposed to a disproportionate amount of pollutants because they live in areas that lack the resources to characterize or mitigate their exposures to such pollutants.

The current study has the potential of improving on the knowledge of how microplastic pollution from Chicago urban area impacts rural downstream dwellers. According to Danta (2010), current environmental policy and the enforcing judicial system focuses on acceptable levels of pollution and the best rules to enforce them without adequate consideration for inequities in the distribution of pollutants. Danta argued that, as a result, many low-income communities downstream live in environment of direct exposure to dangerous chemical agents.

The results of this study will effect positive social change by drawing the attention of the general population to the phenomenon of microplastic pollution and help

stakeholders work together to create a sustainable urban environment. According to Romero-Lankao, Wilhelmi, Hayden, and Gnatz (2016), studies on the interaction of the ecosystem and the social dynamics could add to knowledge on how a growing population can thrive or survive in a degrading ecosystem.

Planning any community requires a strong understanding of the resources that will sustain such communities in time. The results from the study will add knowledge on the impact of plastic pollutants on the vulnerability of water supplies as the use of plastic products increases in modern societies. In this study, I will thus enable city managers and planners to better understand evolving stress factors that must be considered in building algorithms required for planning the growth of sustainable communities. Social change will result from a better understanding of the ideological differences between competing stakeholders, and the elements that must be integrated in forging a better understanding required in formulating effective policies for protecting the Chicago-area waterways as well as the larger environment from the hazards of plastic pollutants.

The outcome from this study will also bring positive social change by creating awareness to environmental injustice. According Wing et al. (2000), environmental injustice arises as a result of disparate burden of pollution on the less privileged. Such burden is often on the poor and minorities in rural communities. Environmental injustices to poor rural communities have been described by Wing et al. (2000) in North Carolina where pollution from pig farms have disproportionately affected poor residents and by Kelly-Reif and Wing (2016) who characterize the 2011 Fukushima Daiichi nuclear disaster in Japan as environmental injustice to poor rural dwellers. Danta (2010) also characterized

the U.S. Army's decision to incinerate its stockpile of chemical weapons in rural Texas as an example of environmental injustice to poor rural dwellers. In many instances of rural environmental injustice, urban polluting industries incentivize rural communities into accepting the burdens of pollution with promises that are not worth the health and economic losses to the rural dwellers. In my study, I draw public attention to the potential environmental injustice associated with microplastic pollutants in waterways. Because urban wastewater treatment plants have largely been implicated as the main sources of microplastic pollutants to waterways, through my study, I may create social change through education of rural communities downstream of the effluent discharges from the municipal wastewater treatment plants in Chicago.

Summary

The increase in use of plastic products has further threatened microplastic pollution in urban waterways (McCormick et al., 2014). Ameliorating environmental degradation from plastics pollutants will require increased societal awareness through education on the dangers of the problem and the collaborative efforts of different stakeholders who may have diverging interests. Collaborative processes have been used increasingly to resolve environmental problems. Such collaborative process was necessary to achieve pollutant reduction required in the Clean Water Act and is favored for pollution standards that are not directly covered by federal regulations, such as microplastic pollution. In this study, I applied the ACF as a framework in focusing on how to bring competing stakeholders together in order to find a common ground for mitigating plastic pollution in waterways. I addressed the key concept of stakeholder collaboration in developing effective

management practices for protecting urban waterways and drew attention to the dangers of environmental injustice associated with urban pollution as well as how to address such problems.

The next chapter is a detailed literature review. The ACF is discussed, including the ways that the framework has been applied to shape policy for bringing change.

Chapter 2: Literature Review

In recent years, anthropogenic (human induced) plastic debris pollutants have increased pollution of the aquatic environment. This level of environmental degradation is a result of the increased use of plastic products. Baldwin et al. (2016), McCormick et al. (2014), and Mason et al. (2016) found that the breakdown of plastics to its microplastic form (less than 5 mm in diameter) constitutes the main danger to water pollution. An important step toward mitigating plastic pollution of the aquatic environment is to increase societal awareness of how the pollutants are introduced to waterways. An obstacle in finding a solution to microplastic pollution is the potential conflict of interests among diverse stakeholders with interest in plastic products. My purpose in this qualitative case study was to explore the potency of collaborations among different advocacy groups and to shed light on how conflicts of interests and belief systems on plastic pollutants among different stakeholders can impede efforts at developing or revising regulations aimed at preventing plastic pollution in Chicago-area waterways.

Plastic debris can be of primary or secondary origin. Plastics of primary origin are found in their original or near-original form when collected, including bottle caps, cigarette butts, microbeads, or resin pellets. Wagner et al. (2014) attributed the origin of secondary plastic to various environmental degradation processes resulting from the breakdown of primary debris. Thus, microplastics are generally derived from fragmentation of larger plastics, industrial resin pellets, personal care products, and fiber from synthetic textiles among other sources (Baldwin et al. 2016). These fragments make their way to wastewater treatment plants via wastewater collection systems. Driedger, Dürr, Mitchell, and Van

Cappellen (2015) attributed the sources of plastic debris in the Great Lakes to a range of domestic consumer products that contain microplastics.

Plastic pollution is a particular concern in urban areas, where consumption of plastic products is highest. According to McCormick et al. (2014), the domestic wastewater infrastructure is a major source of microplastics in wastewater treatment plants. Though treatment plants are capable of removing a substantial percentage of microplastics from effluent discharges, the quantity that is discharged still causes damage to aquatic life. Wastewater treatment plants are currently not required to monitor microplastics in influent or effluent streams. Baldwin et al. (2016) noted that microplastics can take a long time (sometimes in the magnitude of centuries) to degrade, and once they reach aquatic environments, these pollutants adversely affect both aquatic and human life. There are well-meaning intentions aimed at solving plastic pollution problems, such as using recycled plastic bottles in the textile industry. However, such efforts could be doing more harm because each time a synthetic garment goes through a washing machine cycle, plastic fibers are shed, and these synthetic threads constitute the biggest source of plastic in the ocean (Alberts, 2014).

The ACF has been used widely to find a common ground and in achieving consensus for different stakeholders involved in the management of issues affecting the environment. Stakeholders involved in this study included business, city, civic, and environmental advocates. Because of the diversity in stakeholder interests, it is unlikely that prescriptive regulations solely crafted by the EPA will be effective. According to Franklin (2006), attempts by the EPA to create a common ground for stakeholders to

address plastic waste from the beverage industry have been unsuccessful because certain stakeholders, such as International Bottled Water Association, constitute an influential force with powerful lobbies in state legislatures and the U.S. Congress. Alberts (2014) noted that efforts at getting textile companies to remove features of textiles with negative impacts on humans have also been unsuccessful.

Using ACF for studying policy subsystems and policy change is widely recognized where there is an adversarial behavior of competing coalitions. ACF offers a guide on exploring the attributes of policy stakeholders that can lead to policy change (Olofsson, Katz, Costie, Heikkila, & Weible, 2018). The magnitude of the effects of microplastic pollution highlights the importance of an intervention that will avoid the level of deterioration in Chicago-area waterways comparable to the times before the 1972 passage of the Clean Water Act. In this study, I used the ACF to evaluate how scientific information and new knowledge can create a common ground for stakeholders to derive an effective regulatory policy for combating microplastic pollution in Chicago-area waterways.

This literature review is structured starting with the description of the strategies for locating relevant literature on water pollution and the theoretical framework, the ACF. I describe the genesis and evolution of the framework and its general application in environmental and other fields of study with examples in domestic violence, education, and health policies. Policy-oriented learning, empirical data, stability, and change, as well as perturbation, are used to illustrate how the framework is applied to answer the research question of how to build coalitions among diverse policy makers. I follow with the

rationale for using this theoretical foundation. Next, I discuss the evolution of water policies in the United States, its history, and the fallout from addressing Chicago-area water pollution. I then discuss current pollution control policies in Chicago and the effects of pollution on urban sustainability. I continue with a brief discussion of the different stakeholders and their role in curbing microplastic pollution. The literature review chapter ends with a summary and a preview of Chapter 3, wherein the methodology that drives the research study is presented in detail.

Literature Search Strategy

The initial literature searches were from Walden University Library databases such as Thoreau Multi-Database Search and Sage Premier. Others include Academic Search Complete, Political Science Complete, and ProQuest Central. I also solicited and received literature on research publications on microplastics from the EPA. Search terms included but were not limited to the following: *microplastic, pollution, sustainability, resilience, environmental justice, environmental policy, interest groups, citizen stakeholder, coalitions, citizen participation, business participation, Chicago-area waterways, history of water pollution in Chicago,* and *water-borne diseases.* Because the ACF originated in the 1980s, I used older formative work on the subject and subsequently used Google Scholar to find more recent publications.

Theoretical Foundation

Finding a solution to the problem of microplastic pollution in Chicago-area waterways involves a variety of participants who may see the problem from diverging perspectives. Such participants are all stakeholders in a clean water environment in

Chicago and can be grouped based on their dominant interests or priorities on how to find a solution to this emerging problem. The ACF, which was developed by Sabatier in the early 1980s, is a commonly used theory for managing common pool resources. Weible and Sabatier (2004) noted that ACF seeks to explain belief and policy change among policy elites managing a wide range of environmental resources which includes water. A major characteristic of the ACF is that policy subsystems are defined by units of analysis. Units of analysis may include a set of policy participants or various stakeholders, a policy issue, and a geographic scope. Applying the ACF to finding a solution to microplastic pollution in Chicago-area waterways, the policy participants will include various stakeholders such as businesses, city administrators, environmentalists and government bureaucrats involved in managing the water quality of the Chicago-area waterways.

The appropriateness of ACF for the current study is linked to the fundamental argument of the theory, which states that stakeholders may be grouped based on similarities of their policy objectives. These advocacy coalitions are formed of members who share a set of driving beliefs and views of the world and in some ways act in consonance while advocating for their common policy objectives (Leach & Sabatier, 2003). Such an approach is required because, as Weible and Sabatier (2004) noted, when a problem arises, policy analysts should determine its magnitude and causes and propose alternatives. In the present study, ACF served as an intervention remedy for explaining belief and policy changes among participants or stakeholders who previously were unable to communicate and come to common agreement.

Origin of ACF

The ACF theory, as noted by Hoppe and Peterse (1993), arose from the need to address goal conflicts and disputes that involve multiple stakeholders from several levels of government. Sabatier's (1999) interest was in understanding how the policy process is shaped by technical information (p. 189). The initial ideas of the framework have been largely revised based on case studies. The original application of the theory focused on the energy and environmental policies in the United States (Sabatier & Weible, 1999; Weible et al., 2011). However, application of the ACF has expanded beyond environmental matters to include such fields as taxation, public health, drugs, culture, education, sport, and domestic violence. The use of the framework has also expanded beyond the United States. Sabatier (1999) noted that this time frame corresponds to the expansion of the framework's empirical base with regard to investigators, political systems, and policy domains. A substantial revision of the framework, according to Weible et al. (2011), followed the increase in the scope of application, which resulted in the pluralist assumptions of the framework's American origin being question by international scholars. The result of this challenge led to revisions that factored other cultures in Europe, Africa Asia, and others.

Theoretical Propositions

The ACF foundation is built on the proposition that policy-making originates from a model of the individual within a policy subsystem of specialists, whose behavior is moderated by a larger political and socioeconomic system (Sabatier & Weible, 1999, p. 189). The framework, as presented by Sabatier and Weible (1999), suggests pulling together advocacy coalitions of individuals and groups with varying interests is the best

way to harmonize competing interests. This hypothesis assumes that each policy subsystem is characterized by specialization which binds advocacy groups and that each of the groups is bound by strong causal beliefs that participants want to translate into policy. These beliefs are hypothesized to persist over a long time, and such persistence creates difficulties in effecting policy changes.

Beliefs and Policy Evolution

Both Sabatier (1999) and Meijerink (2006) noted that ACF recognizes that interest group leaders, agency officials, legislators, and politicians play a central role in policy process. In addition to these participants are professionals, such as journalists and researchers, who have an in-depth specialization in a particular area of policy. Legal officials who mediate policy issues are also part of policy participants. Policy participants can be structured into coalitions based on their belief systems which, according to Meijerink (2006) and Zafonte and Sabatier (2004), are structured in three tiers: deep core beliefs, policy core beliefs, and secondary aspects. Deep and policy core beliefs of an advocacy coalition's policy and policy program are resistant to change without an influence outside of a policy subsystem.

One important assumption of the ACF is that the verification of changes in core beliefs requires a period of a decade or more. Secondary aspect coalitions are less stable because the stakeholders within this coalition are far more likely to make concessions than deep and policy core aspects which require external perturbation to trigger change.

The driving force behind deep core beliefs, as noted by Meijerink (2006), is people's basic ontological and normative beliefs that drive their conviction of how things

should be. Sabatier and Jenkins-Smith (1999) noted that deep core beliefs are concerned with a comparative appraisal of the freedom of the individual as against social equity and the interaction between people and nature. What differentiates deep core beliefs from policy core beliefs is that the latter relate to commitments on how things ought to be, and what have caused perceptions of policy. Policy core beliefs relate to fundamental perceptions of how serious problems are, their driving causes and the feelings of the adequacy of the structure of institutions to solve the problems (Sabatier & Jenkins-Smith, 1999). According to Zafonte and Sabatier (2004), policy core-beliefs can be exemplified by prioritizing the importance of stakeholders' welfare and aligning the fundamental value priorities within the subsystem. The authors further noted that actors often screen out information that does not agree with their core beliefs. Secondary aspects hierarchy do not relate to an entire subsystem but, as suggested by Meijerink (2006), address views about how serious a problem is in a specific location or the review of a program.

ACF distinguishes mature policy from nascent subsystems. Mature policy systems, as defined by Sabatier and Jenkins-Smith (1999), include a semi-independent group of experts who have endeavored to affect public policy over a reasonable period, as well as organizations and research institutions with branches that have specialized on the topic over a long period. As discussed in the paragraph below, authors such as Weible et al. 2011 were initially skeptical of ACF applicability outside of the United States and recommended believe amending ACF in a manner that will make it more suitable for comparable research by replacing mature and nascent policy subsystems with a complex typology of subsystems with varied coalitions and policy networks.

Advocacy Coalition as a Universal Framework in Policy Development

In addition to environmental policies where ACF was originally applied, ACF has been used in many other fields. Later application of the ACF beyond environmental matters expanded towards the late 1990s to include such fields as public health and drugs, education, culture, sport, and domestic violence. This time frame also saw the spread of the use of the framework beyond the United States where it originated.

ACF in Domestic Violence

ACF has been used to analyze domestic violence policy changes. Using a case study that was conducted in two localities in the United Kingdom between 1975 and 1995, Abrar, Lovenduski, and Margetts (2000) drew attention to how ACF's theory on change and learning described by Sabatier and Jenkins-Smith (1999) impacted domestic violence policy over time and eventually ushered a change in domestic violence policy. Abrar et al. outlined the opposing roles of two advocacy groups identified as feminists and traditionalists both of whom had different core beliefs on domestic violence. With increasing education, feminists' policy advocacy and a rise of the relationship between the academic and practitioner community, Abrar et al. noted a reduction in conflict among coalition members. The study showed that as local policy actors interacted with the feminists' coalition, the belief systems of the officials were affected leading such officials to appreciate domestic violence from the perspective of the feminists' advocates. Also, exposing traditionalist coalitions to feminists' coalition perspectives, resulted in changes in the traditionalists' core beliefs over time. The effect is the formulation of policies that have reduced domestic violence.

ACF in Education

Phillpots (2013) argued that the emergence of policymaking is a result of continued interaction between policy brokers and interest groups. Using ACF as a lens for viewing public policy landscape he examined the trend of school sports partnerships (SSP) using policy actors' roles and structures and concluded that the seriousness attached to school sports as a serious subject of pursuit in school curriculum followed the influence of an advocacy coalition led by a youth sports trust (YST). The YST advocacy influenced the British government's major policy change in creating the SSP. Such a policy change is indicative of ACF's policy orientated leaning from the YST coalition. Phillpots explained the policy change outcome as the result of increasing alignment of the core and secondary values of a dominant coalition of policy actors that sought for a redesign of physical education curriculum. In this situation exogenous factors that impacted the policy change include increased awareness of juvenile obesity and the election of a new government at the time which was favorable to the policy agenda as well as public opinion all of which aligned with the impact of policy-oriented learning to bring the policy change (Sabatier & Jenkins-Smith, 1999). Huang et al. (2015) urged public mobilization that includes strengthening of media advocacy, and investing in collaboration between diverse stakeholders each of whom can create value and mobilize the public in an integrated bottom-up and top-down approach in enacting obesity-prevention policies.

ACF in Health Policies

ACF has wide application in the emergence of a coalition of people with similar beliefs on how to formulate policies on important health issues. Thom, Herring, Thicket,

and Duke (2016) used ACF as a mirror for reviewing diverging beliefs of different beliefs of different stakeholders on health policy issues in the United Kingdom. Thom et al. found that advocacy coalition was successful in the strategies employed to recruit and bond a set of diverse stakeholder groups of medical bodies, charities, and alcohol health campaigners around a common goal. The formation of the Alcohol Health Alliance (AHA) coalition demonstrated the role of advocacy coalition in contributing to re-engineering policy and public discourse. AHA viewed alcohol problem from the perspective that alcoholism has implication for the general population and that better policy solution should address the overall impact of alcoholism on a general population.

In the United States, the Orphan Drug Act of 1983 is a prime example of a major policy formulation derived by cooperation between opposing advocacy coalitions. The Orphan Drug Act provided incentives for pharmaceutical companies to manufacture drugs for the cure of rare diseases. According to Andraka-Christou (2015), the manufacture of such drugs would have been limited if only market forces were considered because based on market forces alone, the pharmaceutical companies would have taken big losses. Andraka-Christou stated the trigger for the creation of the act stemmed from pressure mounted by a coalition of orphan drug advocacy group led by the National Organization for Rare Diseases (NORD). According to ACF, deep core beliefs are the most difficult to compromise. However, the Orphan Drug Act presented few disagreements at the core policy level. Andraka-Christou noted that the major difference between the orphan drug advocacy coalition and the pharmaceutical industry advocacy they opposed was on policy core level regarding the strategy for the tax incentive that will enable pharmaceutical

industries research on orphan drugs. In realization of the little challenge presented by deep core belief, Andraka-Christou noted that orphan drug advocacy coalition avoided antagonism with the pharmaceutical industry advocacy by liberalizing its advocacy approach.

The approach of liberalizing the orphan drug advocacy group to include other activist groups, journalists, legislators, the pharmaceutical industry, patients, doctors, academics, and celebrities, provided a role for all important actors needed to work with the pharmaceutical industry in pushing for legislation. This approach avoided an unnecessary fight with a more financially buoyant pharmaceutical industry which was the only actor to efficiently produce orphan drugs. The NORD approach of not excluding the pharmaceutical industry from its coalition boosted the legitimacy of the orphan drug legislation which led to the eventual passage of the act. The Orphan Drug Act demonstrated the importance of inclusion of diverse actors within the advocacy coalition, and also shows that advocacy groups do not need to wait for an unpredictable focusing event but can create their focus events.

ACF Application in Water Policy

Sabatier (1988) and Sabatier and Jenkins-Smith (1999) suggested one requirement for a reliable delivery of policy change is to examine the policy context over a decade or more. A case study on Lake Tahoe Basin by Weible and Sabatier (2004) presented an illustration on the use ACF as a theoretical lens for explaining change over time with regards to deteriorating water quality. Policy-oriented learning is an important policy path change illustrated by Weible and Sabatier, who highlighted ACF's assumption of the role

of scientific and technical information in modifying the beliefs of policy participants. This assumption as demonstrated in the Lake Tahoe study showed that the belief of advocacy coalition members began to change from intense conflict in 1984 to more moderate conflict in 2001 as new scientific information became available on the impact of pollution in deteriorating Lake Tahoe's water quality.

Sabatier (1999) and Weible and Sabatier (2004) described such belief changes of advocacy participants in the Lake Tahoe study to policy-oriented learning, where the emerging information enabled actors to change beliefs and learn. Policy-oriented learning as defined by ACF is a persisting change in thought or intended behavior emerging, as more experience is gained or as new information becomes available (Sabatier, 1999). Policy-oriented learning results in revising of policy objectives.

Policy-oriented learning. The current state of affairs with microplastic pollution in Chicago-area waterways is not much different from that of the Lake Tahoe before available scientific gave rise to policy-oriented leaning that resulted in policy change. The accumulation of plastic debris is becoming of increasing concern to the water supply in large urban centers such as Chicago. According to McCormick et al. (2014), few people are aware of the sources and the impacts of this pollutant. Policy-oriented leaning as advocated by the ACF is likely to result in a policy change that will positively impact the water quality of the Chicago-area waterways.

ACF stresses that actors from different coalitions will most likely view issues from different perspectives and that such views are difficult to alter. Harrinkari, Katila, and Karppinen (2016) noted that, in general, coalitions consist of economic development and

exploitation of natural resources interests and environmental aspects and nature protection interests. Harrinkari et al. suggested that representatives of traditional government-led natural resource management organizations, or, in some cases, representatives of social concerns may emerge as a third coalition. The main reason behind conflicts lies in the divide between economic interests and conservation interests. In Lake Tahoe, conflicting interests from economic interests such as mineral extraction, tourism, winter games, and property development pitted against environmental protection advocates interests of protecting water quality. Coalition participants with interests in the river basin included governmental authority among two states, five counties, and one incorporated city. Whereas business groups and developers criticized the management program established by the basin management authority as greatly restricting development, environmental groups were alarmed that the plans did not go far enough. Weible and Sabatier noted that such a stalemate triggered a process of collaborative planning.

Policy change and empirical data. The importance of empirical data in triggering cooperation as stressed in the ACF can be illustrated by the extent of belief change between collaborative institutions of the different advocacy coalitions in the Lake Tahoe study. Between the inception of the ACF study in 1984 and 2001, Weible and Sabatier showed that typical belief systems characteristic of participants in policy subsystems were moderated. Both the normative and empirical policy core beliefs and secondary beliefs changed between 1984 and 2001. The authors attributed the strong divergence to the convergence of beliefs to reflect the political wrangling of the 1984 era and the collaboration that had evolved by 2001. The Lake Tahoe study focused on tractable natural

science problems as against problems in social science. Identifying the seriousness and cause of a problem resulted in the prescription of a policy alternative that led to the change.

Policy stability and change. In addition to policy-oriented learning as a way of explaining policy change, ACF is also used to understand policy stability and change. Meijerink (2006) used ACF as one of a family of frameworks for understanding policy stability and change of the coastal flooding policy in the Netherlands, where an epistemic community of civil engineers sustained the Dutch coastal flooding policy between 1945 and 2003. Meijerink illustrated that the stability of the coalition of engineers sustained a policy monopoly of public works and water management in the Netherlands due to the respect of the epistemic community of engineers by key decision-making officials. This coalition was responsible for the construction of engineering structures that protects the Netherlands from flooding.

Policy stability due to monopoly aligns with a major assumption of the ACF, which states that actors in an advocacy coalition that share a set of normative and causal beliefs and show a nontrivial degree of coordinated behavior to realize their objectives and policy proposals (Sabatier, 1998). The objective and policy proposals of an advocacy coalition often negate other competing objectives advanced by other coalitions. In the case of the coastal flooding in the Netherlands that caused much damage and the loss of lives, the objectives of the community of engineers centered only on people safety without consideration for environmental and economic interests advocated by other coalitions (Meijerink, 2006). Meijerink (2006) suggested that the absence of a formidable opposition explains such policy monopoly.

Perturbation and policy change. ACF suggests that major policy changes within a subsystem arise if there is significant perturbations outside of a policy subsystem (Sabatier & Jenkins-Smith, 1993). Intensified flooding in the Netherlands is one such perturbation because it triggered an approach by the dominant coalition that galvanized other opposition interest groups (Meijerink, 2006). The result was the increased profile for an environmental coalition of fishermen and other groups and a shift in agenda, focus, public attention, and attraction for the attention of key decision-making officials. Sabatier and Jenkins-Smith (1993) noted that the most important effect of perturbations is that there can be a replacement of the previously dominant coalition by a minority coalition. In the case of Dutch coastal flooding policy, Meijerink (2006) noted that the rise of the environmental coalition resulted in a challenge to the monopoly of the epistemic community of engineers by an epistemic community of biologists and ecologists. However, in Menahem and Gilad's (2016) narrative on Israeli water policy, the authors discussed a controversial stalemated policy that persisted over a long time even when policy adversaries were aware of the hurt caused by lack of agreement. In that case, policy makers will more likely relate to solutions that consider views of the future to societal values instead of those that malign opposing views (Menahem & Gilad, 2016).

As more information becomes available on the impact of microplastic pollution, it becomes inevitable that advocacy coalitions for the protection of the environment from known and unknown impacts will rise and as Sabatier and Jenkins-Smith (1993) noted, emergent advocacies challenge and can even replace previously dominant coalitions. Weible and Sabatier (2005), as well as other authors, pointed to the importance of

collaboration of watershed management groups on water quality policy. Hoombeek et al. (2013) noted that in cases where pollution may not be subject to direct federal regulation, there is an increasing need for collaborative activities for the purpose of reducing pollution. Microplastic pollution is currently not directly covered by federal regulation.

ACF core beliefs and advocacy coordination. Using ACF in comparing policy networks in marine protected areas in California Weible and Sabatier (2005) found that core beliefs are very good predictors for advocacy coordination networks. The identification of such core beliefs will enhance emerging advocacy groups for microplastic pollution. Hoombeek et al. (2013) stressed the importance of collaborative process in achieving pollutant reduction required in the Clean Water Act for those standards not directly covered by federal regulations.

The Rationale for Using ACF

An understanding of how public policy process is made requires the utilization of public policy theory. According to Andraka-Christou (2015), researchers have often stressed as factors that affect theories of the policy process individual interests and values, organizational rules and procedures, the socioeconomic environment of political institutions, and policy subsystems. Individual theories of the policy process may be more suitable given a particular context while other theories may be more appropriately applied in different context.

Rational and advocacy models are frequently used as decision-making models for analyzing policy. Weible and Sabatier (2004) believed the strength of these two models in policy analysis depends on the context. The choice of a rational model is based on

experimental knowledge leading to the choice of scientific backed evidence that supports the origin and magnitude of a problem. A major flaw of the rational model of data analysis is human imperfection resulting from lack of neutrality on the part of policy decision makers and powerful political interests (Simon, 1985). Zafonte and Sabatier (2004) emphasized that in policy process, bureaucrats and scientists are not likely to be neutral but will rather play advocacy roles that promote their various interests. Hence, an advocacy model provides policy alternatives that depend on the context of the policy process, which has universally been used for in analyzing environmental policies. Other theories that are frequently used for understanding of how public policy process is made include multiple streams theory, social constructionism theory, and institutional analysis and development theory (IAD).

According to Andraka-Christou (2015), multiple streams theory focuses on setting agenda and involves the flow of three streams (problems, policies, and politics) in the policy system whereas social constructionism theory focuses on the values and power of political actors. Ostrom (2011) stated IAD is directed at understanding and narrating how participants overcome their collective action dilemmas in managing common property such as water resources. Both the ACF and the IAD are directed at managing common resources and both are considered contextually more suitable for the current study based on their focus on environmental policies. IAD participants are challenged by how to overcome institutional constraints. Because each of these theories has a different focus, Andraka-Christou argued that a policy scholar should apply multiple theories (or lenses) to a particular event to comprehensively view the policy process.

As previously noted, ACF involves actors who relate to the world thorough preconceived beliefs that are difficult to alter. ACF is more suitable for the present study than other frameworks because the different stakeholders on the issue of controlling microplastic pollution are more likely to distrust other coalitions. These different stakeholders are also more likely to come to different conclusions based on the same information (Weible & Sabatier, 2004).

The need for collaboration among policy advocates is made more obvious because microplastic pollution is not directly accountable to federal regulators. Hoombeek et al. (2013) stressed the importance of cooperation in achieving pollution reduction required in the Clean Water Act (CWA). As Sabatier and Weible (2004) and Meijerink (2006) noted, an important assumption of the ACF on the availability of scientific information is that such information can trigger a modification of the beliefs of policy participants. Meijerink noted the availability of such scientific information is the principal reason for breaking the policy monopoly of civil engineers that controlled the Dutch coastal flooding policy. The monopoly break resulted in the incorporation of ideas from other coalitions. Weible and Sabatier's narrative that ACF's assumption of university scientists, policy analysts, and consultants being central players in the policy process was of equal importance in the selection of the ACF for the present study because expert knowledge contributes to the formulation of superior policies.

Evolution of Water Protection Policies

The comprehensive involvement of the federal government that gave rise to the 1972 Clean Water Act was preceded by other actions aimed at pollution control. Although

the first formal effort was the 1899 Refuse Act, Andreen (2003) noted that as early the 1850 and 1860s health advocates had pushed for federal involvement in pollution control to address water-borne diseases that ravaged southern U.S. cities. Federal involvement resulted in the establishment of better sewer systems in cities. Andreen stated that repeated outbreaks of waterborne diseases throughout the United States were caused by state governments' failure to cope with water pollution or safeguarding public water supplies.

By the early 1930s, water quality deterioration was reflected in seriously polluted streams in every region of the United States. Between 1931 and 1938, pollution control interventions resulted in an increase in the number of publicly owned wastewater treatment facilities by a magnitude of 46%. Proponents of federal water pollution control legislation had argued that river systems do not follow state boundaries and therefore require federal intervention (Murchison, 2005). Such early attempts were in some cases opposed by industry who feared that uniformity through federal action will result in unfair competition.

The Second World War slowed legislative efforts at pollution control of waterways, but in 1948 President Truman signed the Water Pollution Control Act into law. Murchison (2005) and Andreen (2003) recognized the 1948 Act as the watershed for modern federal legislation on pollution control. However, the 1948 Act was thought to be weakened by the lack of federal mandate to prosecute polluters, who were immune to federal action as long as they only endangered local residents or refrained from activities that threatened public health. In 1956, Congress eliminated the power of a polluting state to veto any federal court action.

According to Murchison 2005, further attempts at improving existing water pollution laws resulted in the Federal Water Pollution Control Act in 1961. The Water Quality Act of 1965 was enacted to address increased recognition of deteriorating waters. The 1965 amendments created the Federal Water Pollution Control Administration (FWPCA) to administer federal programs, and, by July 1970, the EPA was created. The Water Quality Improvement Act was also passed in 1970 followed by the Clean Water Act of 1972, the objective of which was to restore and maintain the chemical, physical, and biological integrity of the nation's waters. Murchison (2005) noted that the 1972 Act was itself modified in 1977, and in 1987 the Clean Water Act was revised with the Water Quality Act. In the 1987 the Clean Water Act revision, more attention was paid to the control of toxic pollutants, nonpoint source pollution, and stormwater discharges.

Pollution Control: Chicago's Experience

The location of Chicago at the shores of one of the five Great Lakes of North America, together with the high density of population, is one reason the responsibility for pollution control in the area extends beyond the local governments and involves federal and state regulations and financing. The lake, tributary rivers, and artificial canals that drain the Chicago-area constitute the Chicago-area waterways. Egan (2017) attributed the resuscitation of the Great Lakes from the industrial and municipal pollution of the 20th century to the Clean Water Act of 1972. According to Egan, the Clean Water Act enabled a dramatic reduction in the amount of wastes that was poured into the lake. The now-scenic shores of the lake represent many decades of human intervention through environmental protection policies.

Chicago's early approach at controlling water pollution was based on unique engineering infrastructures that favored the policy goals of the economic elite coalition because of their investments in heavy engineering (Changnon, 2010). Smith (2013) suggested one of early pollution prevention approaches involved reversing the flow of the Chicago River, which diverted pollutants from Lake Michigan to the Mississippi River watershed. The initial membership of the coalition that addressed a major 1879 pollution of Lake Michigan included a membership of the city's economic elites. In 1885 an assessment from a committee of engineers and scientists attributed Chicago's pollution problems to the growth of the city. A subsequent recommendation for the construction of a canal to divert wastes from Lake Michigan, and the establishment of the Chicago Sanitary District (currently known as the Metropolitan Water Reclamation District of Greater Chicago) in 1889 followed the 1885 pollution committee assessment. This new canal resulted in the permanent reversal of the flow of Chicago River away from Lake Michigan into the Mississippi River system. Galishoff (1980) suggested the diversion of the Chicago River gave rise to early remarkable improvement of the quality of Lake Michigan before the Clean Water Act legislation.

The administrative responsibility for protecting the Chicago-area waterways is charged to the Metropolitan Water Reclamation District of Greater Chicago (MWRD), which was established by an 1889 government of Illinois Act. The Act was an attempt at finding a solution to water contamination of the Chicago-area water supply (Lake Michigan) and improve the quality of water in watercourses in its service area. The MWRD's sewage and waste control activities are governed by an ordinance that protects

public health and safety by reducing and averting pollution. The governing federal, state, and local regulations control the quantity and quality of sewage, industrial wastes, and other wastes taken into or discharged to the area waterways and the MWRD's wastewater treatment facilities. The implementation of the regulations is strengthened by the Clean Water Act, which established federal, state, and local government, industry, and the public responsibilities at implementing a national pollution control standard. An environmental code of federal regulations (CFR) that establishes a standard for discharges into and pollution of sewerage systems does not regulate microplastic discharges (Hoombeek et al., 2013).

Urban Sustainability and Microplastic Pollution

In this section I discuss the problem of balancing the needs of the society and associated damage to the environment. According to Yigitcanlar and Lee (2014), sustainability originated in the early 1970s following a rise in awareness of the impacts of development practices on the environment. Childers, Pickett, Grove, Ogden, and Whitmer (2014) viewed sustainability to involve future human needs and values. Thus, sustainability involves finding the solutions to problems that meet those future challenges that will sustain the interaction between human activities and the environment. Childers et al. (2014) noted that there is a rising need for sustainability as urbanization increases because of emerging challenges that are associated with increases in population and failing or inadequate infrastructure that will sustain such increases. Childers et al. suggested cities everywhere are facing different kinds of challenges that make it difficult to achieve sustainable urban features. Finding a solution to such problems will hinge greatly on

accurate information. Yigitcanlar and Teriman (2015) argued comprehensive and accurate information is needed to support decision making, policy analysis, and the formulation of sustainable urban development policies and programs.

The changing nature in the configuration of societies over time means that stakeholders who want to build a sustainable society must have the foresight to anticipate how sustainability indicators might affect future developments. Kaushal et al. (2015) noted that urban structure, function, and services evolve with time. Urban evolution implies predictive management that is based on past observations of consistent patterns instead of reactive management that come after the fact. In terms of my study, predictive management will mean that the increasing impact of microplastic pollution should be factored in planning a sustainable municipality. Planned developments should be within the carrying capacity of a development area**.** Huang, Lam, and Yuan (2015) suggested that if developments are concentrated beyond their natural limits, there are bound to be such urban problems as a degraded ecosystem, air, and water pollution. Thus, various stakeholders in Chicago-area water pollution must understand how microplastic pollution will add to the future demands of the population. As Yigtcanlar, Dur, and Dizdaroglu (2015) argued, the prosperity and environmental sustainability of cities are not differentiable. Cities will not prosper unless the environmental and social objectives of such cities are adequately built into their economic goals.

Register (2006) argued that, to achieve sustainable management required in the 21st century, policymakers will have to understand urban sustainability indicators. Urban sustainability indicators enable problem diagnosis and identification of pressures that offer

useful policy intervention information. Shen, Ochoa, Shah, and Zhang (2011) noted that sustainability indicators communicate the status of the practice used in evaluating sustainability attainment of goals. Urban sustainability indicators provide the simple measurable evidence needed to create and maintain environmentally-friendly cities, promote long-term economic productivity and the health and well-being of citizens (Science for Environment Policy, 2015). Urban sustainability is often assessed on the basis of environmental, economic, and social development. Sustainable development occurs only at the intersection of the parameters used in defining environmental, economic and social indicators. Policy makers use indicators in addressing actionable issues and set sustainability goals and objectives that factor equity, and projected demographic changes. The quality of waterways is a principal environmental indicator for evaluating urban sustainability. The 1972 Clean Water Act established a water quality compliance standard for waterways that stakeholders and policy makers should put unto consideration when developing urban sustainability goals. Because science-driven policies is a critical component of sustainable development, and scientific knowledge is a central factor in the ACF, stakeholders should be educated on the impact of microplastic pollution on water quality.

When sustainability indicators point to actionable issues, stakeholders and policy makers are triggered to intervene. Metson et al. (2015) argued active management practices must be developed to address distortions in natural environmental equilibrium. Policy makers and stakeholders seeking long-term solutions or designing interventions for such distortions need to understand the factors that drive the changes. Therefore, the

management of microplastic pollution necessitates stakeholders who understand how plastic pollutants move through the system. This requires a good understanding of the products that generate such pollution, and the longtime impacts such pollution can have on the infrastructures required to sustain an increasingly urban population. Creative ideas must be devised for future cities to be sustainable and resilient (Childers et al., 2014).

Stakeholders are likely come to common agreement and elevate the dangers of microplastic in waterways to prominence if they are adequately informed of such dangers. Metson et al. (2015) stated that narrowing the difference between scientific understanding and policy relevance has been part of the sustainability discourse. Larsen and Gujer (1997) noted that sustainable development is a major contemporary problem that is more apparent on issues of water supply, urban drainage, and wastewater treatment. Larsen and Gujer identified the principles of sustainable urban water management as the provision of a minimum level of service from urban water management, equal sharing of resources, and a consideration of the global consequences of local actions. Microplastic pollution should be seen in the light of the 1976 Resource Recovery Conservation Act (RCRA), which recognizes that improper disposition of wastes is a danger to human health and the environment. The RCRA places the burden for the proper disposition of such wastes on waste generators.

Stakeholder Groups

For purposes of this research, stakeholders are the actors whose behavior must be coordinated to achieve the common interest of finding the common goal of a solution to the increasing danger of microplastic pollution in Chicago-area waterways. The interests of the

stakeholders may not always align. Interest group competition in this study is broadly between manufacturing industries and environmental groups. A broad range of interest groups (stakeholders or participants) includes business groups, government officials, environmental advocates, scientists, environmental consultants, journalists, and taxpayers. Mitchell, Weaver, Agle, Bailey, and Carlson (2016) noted that such actors may act in ways that promote their preferences relative to those of other groups. According to pluralist theory (O'Connell, 1969), stakeholder pluralism is often accompanied by conflicts due to varying beliefs. However after adjusting to such conflicts the voices of the individual groups that emerge shape socially binding decisions. Gonzalez (2013) noted the pluralist theory of policy making suggests different stakeholders are competitors for policymaking. Ultimately the industry/environmental group interactions will result in a compromise to pollution management.

Business Groups Influence

Understanding of the nature and motivation behind stakeholder coalitions is essential to understanding clean water policies in the United States. Gonzalez (2013) stated coalitions can be powerful political actors in water pollution control. Economic elites with substantial investments in pollution control technology will look for ways of protecting their investments. In issues concerning the environment such as in land use planning Chiodelli and Moroni (2015) recommend that anticorruption measures should be part of the structure for any planning system. Such a structure is to guard against unequal opportunities. Gonzalez pointed out that the role of technology in promoting economic growth should be an important dimension in assessing stakeholder collaboration. He noted

that capitalism propelled by developments in technology and not necessarily interest group competition lies beneath the history of water pollution politics in Chicago.

Capitalism may also foreshadow contemporary environmental discourses embraced by the public as the driving force for pollution abatement. In Chicago in the 19th century, such local economic elites as landholders, land developers, and owners of regional media outlets were at the forefront for controlling the city's water pollution (Gonzalez, 2013, p. 106). The financial resources of the economic elites give them an edge in developing policy goals and political agreements that protect their interests. Economic elites tied to specific locations due to the nature of their economic interests may constitute powerful local stakeholder coalitions on water pollution issues. Therefore, clean water regulations must be seen not only from the perspective of the immediate interests of coalition groups but also from a larger perspective of a tool that can foster economic growth and sustainability of an area.

The role of 19th and 20th-century economic elite coalitions in addressing Chicago's water-borne pollution was duplicated in other U.S. cities (Gonzales, 2013). Business owners who led efforts at improving urban water supplies became advocates for technological change due to the profitable investment climate. In contemporary times, Melosi and Handey (2000) associated local economic growth to tightening of pollution regulations. Melosi noted that the tightening of pollution regulations creates opportunities for economic elites to invest in pollution control infrastructure. According to Galishoff (1980), U.S states with the busiest economic activity are those with the most stringent pollution control regulations because tightened regulations are required to address

increased pollution in large urban centers. Melosi attributed the direct relationship between local economic growth and water pollution regulations to the reliance on technological and manufacturing activities required in minimizing pollution and the treatment of polluted water.

Environmental Groups Influence

Environmentalists fight for struggles around social justice, economic development, and ecological restoration. According to Mihaylov and Perkins (2015), the environmental movement emerged in the second half of the 19th century as two environmental perspectives (preservation and conservation) competed and complemented each other. Preservation efforts were directed toward keeping parts of the natural world apart from human society and with a fundamental value that is undisturbed by industry but rather for such human purposes as recreation. Conservation had a clear utilitarian concern. It is aimed at ensuring the sustainable use of natural resources for posterity. Mihaylov and Perkins attributed preservation and conservation environmental discourses to the effects of early capitalism and noted that public concern over toxic contamination of air, water, land, and food and a general environmental degradation increased during the 1960s and 1970s.

Despite governmental and corporate responses, enduring concerns about various environmental threats have sustained a growth of the environmental movement of activists, supporters, organizations, and members. Mihaylov and Perkins (2015) estimated that as at the turn of the millennium more than 6,000 national and regional environmental movement organizations existed in the United States. There has equally been a global increase in the number of grassroots and professionally staffed environmental advocacy organizations. In

the Chicago, area the Illinois Environmental Council (IEC; 2018) supports environmental justice by supporting those environmental activists who build stronger relationships within minority communities, work toward environmental stewardship and sustainability, and build programs that support future generations. Chicago has been affected by the activities of the IEC. The organization is involved in education and outreach that rallies environmentalists, while also serving as an advocate for the environmental community (para. 1). The organization supports advocacy campaigns and projects that enable environmental organizations to work together and collectively create a higher profile on environmental matters. The IEC would be a strong advocate in mitigating microplastic pollution based on its previous activities, which were instrumental to passing a regulatory act for preventing lead in drinking water, the formation of the safer pest control project, and s campaign on mercury-free Illinois.

Chicago does not lack the infrastructure to campaign for the mitigation of microplastic pollution. Environmental activists in Chicago are often vocal and can to come together on issues of environmental concern. According to Colias, Lavalley, and Napoleon (2017), each has taken a different path with the same goal in mind, often alerting residents to invisible dangers while working to maintain a healthier landscape for future generations. According to McKendry and Janos (2015), environmental groups in Chicago were actively involved in enlightening the public on the dangers that chrome pollution from the steel industry pose to Lake Michigan. The history of activism against industrial pollution in Chicago dates back to the 20th century and include activities of the Anti-Smoke League, which campaigned for the railroads to reduce smoke emissions (McKendry & Janos, 2015).

The impact of environmental activism originating from Chicago extends beyond the city. The Izaak Walton League, which supports wetlands protection, is a national environmental organization headquartered in Chicago. The league pressured Congress into creating an extensive wildlife refuge to protect the upper Mississippi River. Chicago is also home to Hazel Johnson, who pioneered the environmental justice movement. Through networking with other organizations, this movement was able to trace the origin of air and water pollution in the southside of Chicago to a local industry.

Government Players Influence

The influence of government players as stakeholders in pollution control extends beyond the bureaucrats that enforce environmental regulations. According to Murchison (2005) Senator Edmund Muskie of Maine was one of the foremost legislators in the U.S. Congress who argued for laws that would protect the nation's environment. His efforts were greatly contributory to the enactment of the Clean Water Act of 1972. The senator noted that the federal system of government made it difficult to establish jurisdictional responsibility on matters of pollution control. Murchison (2005) and Andreen (2003) attributed the difficulty in establishing jurisdictional responsibility to the system that assigns the responsibility for public health and welfare to state and local governments. Such a system creates the difficulty of tracing a direct connection between pollution sources when people affected reside outside the origin of the contaminants because of different policy subsystems in different jurisdictions. Zafonte and Sabatier (2004) described how federal and regional differences in air pollution (similar to microplastic pollution) in the United States create a persuasive boundary for studying policy subsystem dynamics and

coalition stability among stakeholders over time. Zafonte and Sabatier (2004) and Sabatier (1998) showed that government organization stakeholders are unlikely to change their policy positions over time. However, government players may be affected by perturbations depending on the issue of pollution under consideration. Such differences are illustrated by Sabatier (1999) and Weible and Sabatier (2004), who showed the impact of unexpected external influence on the policy positions in relation to pollution control in Lake Tahoe, whereas perturbations did not seem to affect government players in the formulation of automobile pollution control (Zafonte & Sabatier, 2004).

Stakeholder Collaboration

Collaboration among stakeholders is a potent approach for formulating lasting environmental policies. Weible and Sabatier (2009) noted that by using collaborative instead of adversarial approaches, the intensity of conflict among stakeholders is often diminished from high to intermediate levels. Leach et al. (2014) suggested that compared to a conventional rule-making process, participants in collaborative, negotiated rules are more satisfied with other aspects of the rule-making process and the outcome from such processes. According to Meijerink (2006) and Zafonte and Sabatier (2004), one fundamental assumption of ACF is an individual's self-interest within a rational boundary where preexisting beliefs are used in analyzing and simplifying the world. This assumption means that belief convergence is a yardstick for measuring the level of success of collaborative policy among contentious participants. Weible and Sabatier (2004) noted that adversarial policy subsystems are characterized by minimal coordination and agreement among participating stakeholders, who often resort to seeking redress from institutions

where they find favor without compromise. On the other hand, collaborative policy subsystems are marked by consensus where trust and goodwill abound. The authors noted that the use of empirical rather than normative policy core beliefs is more likely to result in the formulation of policy preferences in collaborative policy subsystems as against adversarial policy subsystems.

Collaboration among stakeholders is not without criticism. Leach et al. (2014) cautioned the convergence of views on controversial issues in science and policy among stakeholders may hinder instead of enhancing learning. According to Leach et al., it is important to understand how stakeholders learn new ideas when coalitions are formed because of the importance of learning in the policymaking process. The authors further suggested that it is the context that drives collaboration, rather than trust and fairness that enhances collaboration among stakeholders. Understanding individual and collective factors that influence learning enable the forging of decision-making institutions that better facilitate learning, leading to the emergence of better public policy, implementation, and results. Knowledge assimilation among stakeholders which can be in the form of changes in understanding of policy driving beliefs, facts, and values can result in the melting of the different ideas and beliefs among stakeholders. The result can be the emergence of consensus and collective action. Leach et al. (2014) argued the more stakeholders are challenged in technical competence or unsure of the facts that surround policy issues, the faster they tend to learn. The authors further noted that new information does not always support existing beliefs rather when there is collaboration, stakeholders gain new knowledge that leads them to change their opinions on scientific or policy issues.

Developing a Proactive Pollution Policy

This qualitative case study was designed to fill the gap in knowledge of how to bridge the gap in stakeholder belief systems that may forestall the formulation of regulations for abating microplastic pollution in Chicago-area waterways. In effect, the study addressed how policymakers can build coalitions among diverse stakeholders to formulate policies aimed at reducing microplastic pollution in Chicago-area waterways. A review of the literature has revealed that microplastic pollutants, which are currently not regulated, are increasing pollutants of concern in waterways, and stakeholders have not been brought together to find a solution. The literature review offers insight on the nature of varying stakeholder belief systems and how factors such as education, perturbation, and empirical information can affect long-held beliefs that constitute obstacles to bringing different coalition interests together to find a solution to a common problem.

Historically, the federal government through the EPA had taken some reactive actions towards pollution control aimed at protecting the environment. Some recent examples include the 1972 Clean Water Act, updated in 1977, and the Toxic Substances Control Act (TSCA) of 1976, which was updated in 2015. The 2015 updates in the TSCA include a proactive measure by the Food and Drug Administration (FDA) introduced aimed at controlling microplastics in cosmetics products. The amendment introduced the Microbead Free Waters Act, and prohibited the manufacture of microplastics as cosmetics products by July 7, 2017, and the sale such of cosmetics products that contain microbeads by January 1, 2018. Though the FDA introduced the Microbead Free Water Act on cosmetics products, the EPA, which is the regulatory agency charged with environmental

protection (Baldwin et al., 2016) does not have any regulations on microplastics as a pollutant similar to other pollutants.

Under the existing Code of Federal Regulation (CFR), Title 40, addresses the protection of the environment, and is enforced by the EPA. Part 463 of the 40CFR is the only section of the regulations that relates to plastic pollution. This section simply relates to plastic molding and point source pollutants. According to 40CFR463:

> This part applies to any plastics molding and forming process that discharges or may discharge pollutants to waters of the United States or that introduces pollutants into a publicly owned treatment works. Plastics molding and forming processes include processes that blend, mold, form, or otherwise process plastic materials into intermediate or final plastic products. They include commonly recognized processes such as extrusion, molding, coating and laminating, thermoforming, calendering, casting, foaming, cleaning, and finishing.

The CFR regulations on plastic molding does not have any effluent discharge limits similar to the limits on other toxic elements that are regulated by the EPA under its wastewater pretreatment regulations. In effect, there are no limits to microplastic discharge to public waterways. The federal regulations simply make a provision for local wastewater monitoring organizations to promulgate regulations aimed at protecting wastewater treatment plants. Furthermore, there are other primary sources of microplastic pollution, and the manner in which microplastics interact with wastewater treatment is still not fully understood.

Because microplastics pollution affects a wide array of disciplines and interest groups, an effective proactive solution requires the involvement of a wide range of expertise, such as natural and social scientists, regulators, researchers, environmental protection advocates, business interest groups, and the general citizenry, among other stakeholders. The goal of such an approach is to establish a framework for achieving or maintaining healthy waterways in the Chicago-area. Achieving such a status should not result in environmental injustice; rather, a coalition of diverse stakeholders can formulate policies that enhance a sustainable urban environment. The goal of the present study was to add knowledge to the research question, "How can policymakers build coalitions among diverse stakeholders in order to formulate policies aimed at reducing microplastic pollution in Chicago-area waterways?" Such added knowledge will offer a road map for addressing the research problem.

Jenkins-Smith, Silva, Gupta, and Ripberger (2014) and Sabatier and Jenkins Smith (1993), among others, have recognized the centrality of a hierarchically structured belief system of individuals in how policy change and learning occur. Syberg et al. (2018) noted the importance of learning in involving the participation of citizen stakeholders in environmental problems. Syberg et al. discussed risk communication on the dangers of microbeads improved the risk perception (belief system) of plastic pollution and involvement of citizens in such environmental problem. In addition to the importance of ACF's communication and learning in policy change, Syberg et al. also advocated for a bottom-up approach to citizen stakeholder involvement in policy development. A paradigm that emphasizes expert elicitation, which only includes specified stakeholders in

formulating environmental policies, risks alienating citizens. Involving citizens while developing shared norms and activities can enable the development of a community governance (Syberg et al., 2018). Such an approach is not only more sustainable because citizens are more involved in managing the environment; it also strengthens the scientific foundation for addressing an environmental problem and enabling better scientific foundation for formulating regulations (Syberg et al., 2018).

Markarda, Suter, and Ingold (2016) stressed the importance of understanding the impact of policy change in societal sustainability transition because of long-term transformations guided by sustainability goals. Considering the political nature of sustainability goals that result in different interpretation by different actors, far-reaching changes means that the support of a broad range of actors over a long period of time is needed in characterizing the relevant coalitions for the current study. Characterization of the relevant policy subsystem will involve defining who the key actors are, developing a scheme for coding belief system, and then using the belief system of actors in identifying coalitions.

Summary and Conclusion

Pollution control is vital in maintaining the public's health. Many incidents of disease epidemic can be traced to environmental pollution resulting from inadequate waste disposal (Changnon, 2010; Galishoff, 1980). In recent years, plastic pollution has become of increasing concern (Hoombeek et al. 2013; McCormick et al. 2014). There is inadequate knowledge of how to safely dispose of plastic wastes without harming the ecosystem. Whereas pollution can result from buried plastic materials, microplastic pollution in water

is a concern in the ecosystem. Currently, wastewater treatment plants are not designed to remove microplastic pollutants, and there is no legal requirement for wastewater plants to treat for microplastics in wastewater. Because of the many types of pollutants, researchers believe it will be a difficult challenge to set a universal regulation (McCormick et al. 2014). Disputes are likely to arise because of the diverging interests of different stakeholders on how to mitigate microplastic pollution. Hoppe and Peterse (1993) noted that advocacy coalition is an effective framework for resolving issues when there is a need to address goal conflicts and disputes that involve multiple stakeholders. Many researchers have applied Sabatier's ACF in resolving disputes on matters of the environment as well as in many other fields. In this qualitative case study, I used the ACF to examine circumstances that may bring about a policy for mitigating microplastic pollution in Chicago-area waterways. Although microplastic pollution has common characteristics with other forms of pollution, it is unique in the sense that the phenomenon and its consequences are not yet fully understood. It is also unique because some stakeholders may be resistant to a resolution approach because of different goals and vested interests in plastic products.

In Chapter 3, I outlined the methodology for this research. The chapter includes a rationale for the choice of stakeholder participants. The chapter also includes details for operationalizing the use of ACF as a guide to the research.

Chapter 3: Research Method

The increased accumulation of plastic debris in waterways creates the danger of pollution. This type of pollution is of particular threat in urban area waterways because of the heavy use of plastic products in such highly populated centers (Sutton et al., 2016). Furthermore, microplastic fragments make their way to urban wastewater treatment plants from homes, industries, and commercial centers via wastewater collection systems in urban areas, and eventually to the waterways.

The relatively cheap price of plastic materials makes them popular in manufacturing. On the other hand, the debilitating effects of plastic wastes on aquatic life and the food chain means that plastics are a nuisance in some segments of the society. These different interest groups or stakeholders are broadly classified as government officials, businesses, and environmental protection advocacy groups.

My purpose in this qualitative case study was to seek a common ground among different stakeholders with interests in the plastic pollution of Chicago-area waterways. I examined stakeholder attributes that can lead to the evolution of better policy for controlling microplastic pollution. I also shed some light on the stakeholder influence on environmental sustainability, and the possible role of microplastic pollution in environmental injustice.

In this chapter, I describe the research design and the rationale for the research question. I also present the methods for the study, including analyzing the research population, participant selection, the role of the research as an instrument, and ethical

considerations. I also discuss how data were collected and analyzed and the strategies used for controlling the validity threats. I close the chapter with a summary.

Research Design and Rationale

The central research question for this study addressed how policy makers can build coalitions among diverse stakeholders to formulate policies aimed at reducing microplastic pollution in Chicago-area waterways. The main concept that I explored is how scientific information and the learning it provides can lead to the convergence of belief among different stakeholders. The goal of answering the research question was to provide a possible solution to the research problem and fill the gap in literature. In this case study, I explored why stakeholders make their choices and the barriers holding them from working together.

McCusker and Gunaydin (2015) suggested a quantitative method of research risks losing the contextual detail, thus limiting the collection of detailed data from research participants that qualitative studies provide. Instead, a qualitative case study is the appropriate research design because of its past use by researchers examining contemporary events within a defined geographical entity. According Ravitch and Carl (2016), a case study is a report of descriptive information on data of research in contemporary real-life events, bounded by time and place. Yin (2014) view a case study design as suitable for exploratory studies and obtaining real-world perspectives of organizational and managerial processes. O'Sullivan, Rassel, Berner, and Taliaferro (2017) saw the strength in the use of case studies for programs or research with unique characteristics because of the of depth of knowledge such study can present. O'Sullivan et al. suggested case studies tend to provide

answers to investigators looking for answers to why and how things happened. Case studies often relate to contemporary studies with accessible information. The use of a case study for my research was further strengthened by Rudestam and Newton (2015), who asserted qualitative case studies are popular in urban planning and public administration studies because they provide comprehensive understanding of the case, which allows a researcher to delve into a phenomenon by utilizing reflective skills to unmask meaning.

To gain a broad understanding of object being investigated and enable a deeper understanding of complex issues of the research phenomenon, multiple sources of data are required (Schoch, as cited in Burkholder, Cox, & Crawford, 2016). I used various sources such as government documents and secondary data sources on pollution from such agencies as the EPA, municipal water treatment plants and urban planning agencies. However, most of the data were derived from purposeful, targeted strategy of interviewed subject experts in environmental protection and regional planning. Ravitch and Carl (2016) and O'Sullivan et al. (2017) suggested that qualitative research requires a deliberate selection of individuals who a have unique ability to address a research question.

The study benefited from a case study approach because of the flexibility required for the study to gain a comprehensive understanding of a contemporary real-life phenomenon (microplastic pollution) in a specified location (Chicago-area waterways). Schoch (as cited in Burkholder et al., 2016) asserted case studies allow for extending the principles and lessons learned from one location to another locations. The fact that the impact of microplastic pollution on a particular urban setting cannot be recreated, therefore, was a good reason why a case study approach was thought suitable for my research. The

results of the study offer administrators greater insight on how the phenomenon will affect the city's plans for sustainable future development. My goal is that what is learned from how policy makers build coalitions among diverse stakeholders can later be applied in solving similar problems in other places.

Other qualitative designs were considered unsuitable for the several reasons. Ravitch and Carl (2016) consider phenomenological research both a research method and a philosophy. This approach focuses on the lived experience of participants, which is not the case with the current study. In addition, phenomenological studies do not need to be bounded by space and time as does the current study. Thus, a phenomenological research design whose purpose is to identify how actors perceive a phenomenon was deemed unsuitable for the current study. Similarly, a grounded theory research design, which seeks to develop theory from field data, was not appropriate for this current study.

Role of a Researcher

The role of a qualitative researcher is to uncover trends in thought and opinions and dive deeper into the problem. According to Denzin and Lincoln (2013), qualitative research is a situated activity that locates the observer in the world. Qualitative researchers do not work from the perspective of an all-encompassing static truth (Ravitch & Carl, 2016). My role in this qualitative case study, therefore, was that of a spontaneous participant—that is, I took a reflexive approach in order to improve transparency in data collection and analysis (Darawsheh, 2014). A researcher engages in data collection in the field, recording notes that consider the surrounding in terms of physical, cultural, social, and economic contexts.

As noted earlier, I interviewed stakeholders whose knowledge of the subject matter was thought to add value to the study. My purposive sampling strategy was guided by my experience working in the wastewater treatment industry. During the interviews, field notes and memos were taken to reflect not just the interview response but participants' nonverbal communication. A researcher's neutrality in qualitative research is required to ensure a study's trustworthiness (Patton, 2015). Ravitch and Carl (2016) viewed the subjectivity of participant observation as a limitation and source of human error. To Darawsheh (2014), such limitations can be controlled by making necessary changes that ensure the credibility of the findings. Rubin and Rubin (2012) recommended that, during the interviewing process, interviewers should be aware of their own biases, convictions, and expectations, and that these attributes should not compromise data collection. A researcher's neutrality should be such that participants are not exploited, and personal impressions and sensitive information are not disclosed.

Though the location of the study area in the city where I work increases the odds of personal contacts with the interviewees, the choice of interviewees precluded those that are personally known to me. The choice of participants with whom I did not have a personal relationship beyond limited professional interaction, was to reduce potential study bias. The levels of interactions were not a source of bias to the study. My role as a researcher included implementing a research design, conducting interviews, and gathering other data. To minimize the risk of personal negative influence, Rubin and Rubin (2012) recommended keeping an independent journal with personal feelings, views, and beliefs

during data collection to identify and separate out potential biases. In addition to journaling, I used computer-assisted software for coding to limit bias.

Methodology

An ACF is characterized by policy subsystems that are defined by units of analysis, which may include a set of policy participants or various stakeholders, a policy issue, and a geographic scope. In this study the units of analysis were various stakeholders that were deemed to be of significant importance in tackling plastic pollution. The major sources of data were interviews and the review of relevant documents. My professional experience as a pollution control scientist had provided working background in determining appropriate stakeholders to engage in interviews.

Interviews

Interviewees were drawn from eight different stakeholder groups (regulatory, business advocacy, environmental protection, industrial and commercial enterprises, city administrators, researchers, environmentalists/environmental consultants to industries, and government officials' perspectives) that are frequently involved in issues of water pollution. These stakeholders fall within the three broad categories of environmentalists, business groups, and government players categories. A random sampling strategy, often used in quantitative studies, was inappropriate here because there is no guarantee of a normal distribution in knowledgeable participants that reflect the general population (Flick, 2007). In qualitative studies, samples are often not selected in a random manner; rather, sample selection is a reflection of deliberately selected cases, materials, or events that is best for building a body of practical examples used in studying a phenomenon of interest

(Flick, 2007). Flick (2007) suggested that qualitative sampling should be built around a concept of purpose. Ravitch and Carl (2016) stated qualitative sampling should follow a rigorous, dynamic, and systematic approach that enable a holistic understanding of the people and phenomenon in focus. According to Flick, some sampling approach that offer holistic understanding are those that could reflect extremities or be typical cases.

In this study I used a purposive sampling strategy to gain the divergent views of the different stakeholders in the study. In the view of Rubin and Rubin (2012), qualitative studies necessitate intentional selection of participants that will best answer the research question and who provide the richest information.

My purposive sampling strategy was guided by my experience working in the wastewater treatment industry. I reviewed documents of the Metropolitan Water Reclamation District of Greater Chicago, conducted an Internet search of EPA websites and other environmental groups, such as the Industrial Water, Waste and Sewage Group and the Chicago Department of Sanitation, to find suitable stakeholder organizations from which I choose interviewees. As noted earlier, interview participants represented regulatory, business advocacy, environmental protection, industrial and commercial enterprises, city administrators, researchers, environmentalists, industry environmental consultants, and government bureaucrats' perspectives. Business advocacy participants were limited to stakeholders whose business products are identified as potential sources of microplastic pollutants (examples include textile and plastic bottling companies). All participants were knowledgeable on issues of both pollution in Chicago-area waterways or

the stress factors that contribute to urban sustainability. The information of the selected organizations was part of my final report.

After selecting the stakeholder organizations for interview, I identified leaders in such agencies via personal reference and or through social media. I then approached such individuals and sought their willingness to participate in the study. A recruitment letter for these contacts is include as Appendix A. I used an electronic email in transmitting the letter so as to track receipt. Where invitees refused to participate, I resampled and contacted other stakeholders for their willingness in participating. Stakeholders who declined to participate were contacted via email with a thank-you note indicating no further action was required. I followed up with a recruitment letter for stakeholders that agreed to participate, and, where we reached to an agreement, I conduced the interview.

According to Ravitch and Carl (2016), the goal of purposeful sample size in qualitative research is not to generalize to a larger population. Therefore, there are no set rules on participant size. Rather, sample size depends on what a researcher wants to know that will enable answering the research question in a credible and ethical manner while providing a comprehensive multi perspective understanding of the research results. Sample size is also dependent on what is at stake and what can be done within available time and resources. While size of sample in a qualitative research may not be critical, Rubin and Rubin (2012) argued for inclusion of participants with different points of view. Ravitch and Carl (2016) stressed the importance having adequate representation that will guarantee validity. Thus sampling should continue until saturation is achieved. Saturation, as defined by Mason (2010) and Guest, Bunce, and Johnson (2006), occurs when collecting additional

data results in no additional information. Rubin and Rubin (2012) recommend that interview participants should be drawn from the various stakeholder groupings. I interviewed 12 participants with one or two participants from each of the eight broad diverse stakeholder groups.

Documents Review

I analyzed documents to supplement data from interviews. Bowen (2009) stressed the importance of documentary and institutional documents in qualitative research, especially in case studies, so that data can be examined and interpreted to develop empirical knowledge. Types of documents to be that were reviewed were newspapers, meeting transcripts, and public letters. The documents provided an historical context to how pollution control regulations have evolved from such agencies as the state and federal environmental protection agencies. Such documents added context to the research phenomenon and added more meaning to how interview questions were interpreted. Bowen (2009) indicated that reviewing documents can help researchers generate interview questions. An additional advantage for using documents was to provide a means of triangulation that supported data derived from interviews.

Instrumentation

The study involved face-to-face, open-ended, semistructured interviews with the identified stakeholders, along with document review, where applicable. The interviews were audio-recorded. The development of the interview questions was guided by my experience in enforcing regulations for pollution control in Illinois and by the literature I reviewed, as discussed below. The interview questions were designed to encourage

participants to provide elaborate answers about their knowledge of microplastic pollution, their beliefs about the impact of microplastic pollution, their thoughts on mitigating such pollution, and their views of how scientific information can enable their cooperation with other stakeholders in working collaboratively to prevent the expansion of microplastic pollution.

The interview questions were developed to address the various themes that emerged from literature review and cover (a) stakeholder cooperation, (b) pollution control regulatory awareness, and (c) sustainability impact analysis. More themes may emerge from the interview transcripts. A uniform interview pattern was adopted among all participants. (The interview questions and a script are included in Appendix B.) I explained the reason and nature of the interview, the need to obtain written consent, that the interview was anonymous, and that I would record the interview. An open-ended interview approach was adopted to encourage the emergence of free ideas from participants. According to Rubin and Rubin (2012), open-ended questions can result in a rich, in-depth exploration of the research question. The open-ended semi structured nature of the interview questions provided each participant with the flexibility to answer questions as he or she deemed fit. As a researcher I avoided asking leading questions and did not offer my personal views on issues. I did not disclose any confidential information.

The interview questions were designed to solicit stakeholder input that will answer the research question and address the main themes that were covered in this study. Leach et al. (2014) noted that stakeholders often disagree on how to balance conflicts of interests between social equity, economic growth, and environmental quality. The interview

questions aimed at deciphering the how learning or scientific information enhances the development of coalitions among stakeholders with different core and policy beliefs. Leach et al. noted that scientists working with rival coalitions often disagree on how expansive problems are, what caused them, and the effectiveness of proposed solutions. The interview questions also aimed to understand the individual and group factors that work against the formulation of better public policy for combating plastic pollution.

The sufficiency of the data collection instruments to answer the research question was established after reviewing the major concerns of participating stakeholder groups. The relevant questions from the stakeholder groups and knowledge gained from the review of documents were adapted as interview questions to address the study themes and answer the research question.

Pilot Study

A mock or pilot interview was conducted prior to administering the interview questions to the designated participants (Rubin & Rubin, 2012; Yin, 2016). The pilot interview was designed to verify that the content of the instrument is appropriate. The participants for the pilot program were not involved in the study were chosen through a convenience sampling strategy of knowledgeable experts on issues of pollution. Professional organization databases were consulted while selecting participants for the pilot program. The interviewees were debriefed after the interview to verify the clarity and alignment of the interview questions for the purpose of the study. There were no changes to the structure of the interview questions based on the feedback from the pilot interviews.

Data Collection Procedures

According to the Walden University guidelines, data should not be collected without the approval of the IRB. Therefore, data collection only began after the IRB approval process. The IRB approval number (04-01-19-0571600) was included in the consent form

Interviews

The interview process started with the targeted selection of representatives among businesses and city administrators, researchers, environmental consultants, environmentalists, and government officials. The choice of whom to interview was determined by directed or targeted strategy of selecting individuals who by their education or professional exposure possess a unique ability to understand the phenomenon of research. Rubin and Rubin (2012) differentiated between focus group and individual interviews. Focus group interviews aim at gathering information about the perceptions and behaviors of a small, nonrepresentative sample of a population in order to gain deeper understanding of a phenomenon. On the other hand, individual interviews provide the opportunity to explore decisions and compare differences and similarities among targeted reference group members.

All the interviews took place face-to face. Interviews were conducted on-site at a quiet private location, mostly in an office setting and at a time when there was minimal distraction. The setting was negotiated with the interviewees ahead of time. Each interview lasted approximately between 20 and 35 minutes. The entire interview data collection process spanned of approximately four weeks. I used a semistructured interview format to

encourage the interviewees to supply information in their own words (Roulston, 2010). The semistructured interview format gave me a chance to explore and develop particular themes and or responses. I did not want to be confined to an open-ended interview format because, according to Patton (2015), open-ended questions restrict the flexible and natural nature of questions and answers. Prior to beginning the interview, I reviewed the interview protocol and consent form with the participants. The essence of the interview was explained to the participants, and I answered any questions they had. To minimize bias, I kept a reflexive journal on my observations during the interviews.

Participation was voluntary, and participants were informed that those who so wish may end the interview at any time. The interview was recorded for later transcription in an MS Word document. The interviewees were provided with a copy of the transcript to verify that the contents accurately reflect their intended responses. Most participants indicated that the transcripts correctly reflected their intensions. Three participants indicated minor changes to the written transcripts. Participants were informed that the transcript will be stored in a secure location free of tamper for 5 years before destruction.

The initial recruitment procedure resulted in enough participants, and so there was no need for recruiting additional participants or requesting participants for recommendation of other individuals who meet the eligibility criteria.

Document Review

Document review in qualitative research is valued for the added boost it offers to the interview process. Rubin and Rubin (2012) noted that document analysis improves the quality in many ways such as offering the interviewer a leverage in discussing the contents

of the documents with the creators during in-depth interviews. The authors noted that interviewees are more likely to recognize and appreciate an interviewer's competence when the interviewer shows familiarity with their organization. Document analysis, therefore, offer supplementary research data and practical knowledge on the topic of discussion. According to Yin (2016), using multiple data sources in a qualitative case study helps in boosting the study's validity. Bowen (2009) noted that analyzing documents in combination with other research methods provide converging evidences that breeds credibility in a study.

For this study, I reviewed public documents on environmental policies and other environmental protection regulatory processes of the Illinois and federal EPA. I then compared the information with the views presented by research participants. According to Bowen (2009), a variety of useful document can be used to support a study, including meeting agendas and minutes, event programs, letters, and memoranda. Documents from organizations that aided in the study were examined. Such documents provided background information and the historical context. The documents also provided added information that enhanced understanding of the research concept. Bowen cautioned that low retrievability of documents is a potential flaw when using documents as an instrument but such a flaw was not encountered because the documents were available in the public domain, and were used to supplement data from interviews.

Data Analysis Plan

Data analysis involves data examination, classification, and various displays, searching for patterns, insights, and concepts (Yin, 2014). I reviewed the interview

transcripts, field notes, and memos for a better understanding of the emerging concepts related to the single research question. Synthesizing information in the memos and notes into Word documents facilitated the report writing. I transcribed the interview recordings and manually coded the data after reviewing the transcripts for recurring phrases. I used Microsoft Excel to organize data in a matrix form of rows and columns to facilitate coding and make it easier to identify emergent themes from the interview transcripts. Coded data only included participants' perspective of the research questions and did not include their personal information.

I reviewed the transcripts a few more times after an initial coding process to include any themes I may have missed. For a unified analysis, themes that emerged from the different stakeholder groups were merged with themes of stakeholder cooperation, pollution control, regulatory awareness, and sustainability impact analysis, which were identified in the literature review. I used a secure data storage and also created backup files for all the data in the cloud.

The coding and data characterization process and coding process was enhanced using the NVivo software which enabled data organization and management. The coding process involved condensing or aggregating related data in related categories. According to Smith and Firth (2011), researchers use NVivo to code data from paper-based exercises into appropriate classes, from which critical concepts will emerge. NVivo was also used when data were reexamined for the emergence of any themes that related to the theoretical foundation of the study (Tessier, 2012). Corbin and Strauss (2008) asserted a researcher should sift through information in documents for the purpose of deriving relevant

information. Documents were be analyzed and evaluated for the purpose of establishing meaning that lead to the emergence of practical knowledge relevant in answering the research question.

Issues of Trustworthiness

Because of the relational dynamics between researchers and participants and between participants' experience in the study phenomenon, the researcher can be receptive to research with sensibility (Ravitch & Carl, 2016). Hence, trustworthiness in qualitative research is often questioned by those who believe that knowledge is based on natural phenomena and not on a phenomenon that is based on context and contextualization. Shinto (2004) noted that part of the skepticism in trustworthiness of qualitative studies can be traced to positivists' belief that validity and reliability in qualitative research cannot be addressed in a similar manner as in naturalistic work. Ravitch and Carl noted that qualitative researchers should be ready to address such differences. Thus, a means of ensuring quality and trustworthiness in a qualitative research is by recognizing that a study measures or tests what is intended. Houghton et al. (2013) established that the criteria for establishing trustworthiness in a qualitative research should include credibility, transferability, dependability, and confirmability.

Credibility

For a research to be credible, the accuracy of its findings should be such that the interpretations are consistent with the data that support the study (Munn, Porritt, Lockwood, Aromataris, & Pearson, 2014). According to Thomas and Magilvy (2011), the credibility of a study can be enhanced by increased time spent with participants and

presenting findings in the words of participants. To abide by this level of credibility, I allocated substantial time reviewing documents analyzing the interview transcripts and ensuring that participants` views are correctly portrayed. Some routine procedures I built in for enhancing the credibility of the study included using weekly journal during data collection and audio-recording interviews for ensuring accuracy of transcripts. I ensured that I accurately represented participants' perspectives by following up with the interview participants on any responses whose meaning were not clearly understood.

Study credibility can be enhanced by triangulation and having an audit trail of the researcher's decision-making process. Study credibility can also be enhanced through triangulation by combining the data from interviews, field notes, and observations (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014). Such a trail enabled me to track the perspective of different stakeholders. Piloting the interview questions served as a means for establishing study credibility.

Transferability

For the results of a research study to be trusted, research findings must be replicated under similar conditions but in different settings. (Shinto, 2004; Watkins, 2012), also noted that transferability can be enhanced by a comprehensive description of a study (Ravitch & Carl, 2016; Shinto, 2004). I provided a detailed description of the processes for data collection and analysis, and in Chapter 4 I explain how themes emerged.

Dependability

Research dependability will lead to trustworthiness if, as Ravitch and Carl (2016) noted, original research is viewed as a prototype that enables future work to be replicated,

resulting in the same result. Thus, the audit trail and reflexivity also serve as tools for promoting dependability. My research design included the plan of work and how it was executed, including a reflexive journal on personal reflections and field occurrences. I periodically evaluated the effectiveness of the inquiry process.

Confirmability

Research confirmability is defined as a researcher's ability to be objective in conducting an unbiased research. Confirmability requires that research results accurately reflect findings that portray informant's experiences and ideas that have not been diluted by those of the researcher (Cope, 2014; Shinto, 2004). These and many more authors note that triangulation can be used to minimize investigator bias. I achieved triangulation by combining the data from interviews, field notes, and observations. Ravitch & Carl, 2016 also stated that a researcher's beliefs that guides his or her decisions should be acknowledged and documented. In this regard I kept an audit trail of all my actions during the research process. My research report contains a documentation for the choice of methods used to gather and analyze data. My study focused on seeking answers to the research question and was not shaped by my personal perspective but on information from informants.

Ethical Procedures

I abided by Walden University's (2014) ethical requirements and was guided by the informed consent process. I obtained an approval to conduct the study from the Institutional Review Board before starting to gather data. The study did not involve foreseeable risks to the study participants as listed in the guidelines for conducting research

on protected groups. I passed out an invitational email to study participants in which the criteria for participating was clearly stated. Among other things, the information in the email listed the entire interview process, such as why the interview was being conducted, the option on the interviewee to discontinue participation at any given time, and the absence of compensation for taking part in the interview (Creswell, 2013; Flick, 2014). In line with the consent guideline, the interview was administered only after I received a signed consent form. I fully explained how collected data would be used, how the data would be stored, and how confidentiality of the interviewee would be maintained. Participants were asked only to provide honest information and avoid answering questions they were uncomfortable with.

Ethical requirements include conducting a study in a way that guarantees respect and justice for the researcher and the study participants (Aluwihare-Samaranayake, 2012). I instituted measures that guaranteed the anonymity of study participants. Interviewees had the opportunity to review the interview transcripts, which were provided to them for review within 72 hours of my completing the transcription.

Data collected in nondigital format, such as interview notes and tape recordings, are privately stored in a protected enclosure to which only I have access. Electronically derived digital data, such as uploaded documents, are stored in a password-protected computer. Unless there are any unforeseen reasons, data will be destroyed after being preserved for 5 years.

Summary

The aim of this qualitative case study was to better understand how scientific information and learning can lead to the convergence of beliefs among different stakeholders with varying interests in microplastic pollution in Chicago-area waterways. The purpose of the study was to develop a proactive approach to managing microplastic pollution and its impact on urban sustainability. The study included data derived through interviews and document reviews. A case study approach was considered the most suitable approach for this study because such a research method leads to an in-depth understanding of the complex nature of stakeholder relationships. I identified interview participants based on their willingness to participate through personal work experience and consultation with various experts on environmental sustainability.

Knowledgeable participants were chosen for interview from each of the identified stakeholder groups using a semistructured, open-ended interview approach. The interviews were recorded and transcribed. Participants were able to review their contributions after transcription. A document review protocol was adopted and used to identify patterns, which aided in recognizing emergent themes in the transcripts. The supplementary use of computer-assisted coding in the review of documents collaborated interview responses from participants.

Chapter 4 includes a description of the outcomes of the pilot study as well as the setting and demographics of the study. I discussed how data were collected and analyzed, results from data analysis, and the trustworthiness of the research results. The extent to which the research question was addressed, and the outcome were also discussed.

Chapter 4: Results

My purpose in this qualitative case study was to improve understanding about how conflicts of interests among stakeholders about plastic pollutants can impede efforts at developing or revising microplastic pollution mitigation laws. I intended for this study to improve stakeholder cooperation, pollution control regulatory awareness, and sustainability impact analysis. I collected data through a semistructured interview pattern of purposively sampled participants identified as environmentalists, government, and business interest stakeholder groups frequently involved in water pollution matters in the Chicago-area. Each of the stakeholders fell within a broader group relating to regulatory, business advocacy, environmental protection, industrial and commercial enterprises, city administrators, researchers, environmentalists/environmental consultants to industries, and government officials' perspectives. Among the 12 interview participants were representatives drawn from environmental, governmental, and business interest stakeholder groups. The participants were chosen to adequately address the research question, "How can policymakers build coalitions among diverse stakeholders in order to formulate policies aimed at reducing microplastic pollution in Chicago-area waterways?" In this chapter the demographics and perspectives of the interviewees are presented, along with the method of data collection and analysis. The chapter includes the results and a chapter summary and the transition to Chapter 5.

Pilot Study

A pilot interview was conducted prior to administering the interview questions to the designated participants. The pilot interview was designed to verify that the content of

the instrument was appropriate. The participants for the pilot program were retired officials previously involved in monitoring water pollution, active officials, were not involved in the study, and I chose them from the Industrial Waste and Sewage Group professional organization databases. The interviewees were debriefed after the interview to verify the clarity and alignment of the interview questions to the study. There were no changes to the structure of the interview questions based on the feedback from the pilot interviews.

Data Collection

The groups from which participants were sought for the research included the Illinois Pollution Control Board (IPCB), policy makers for the prevention of pollution in Chicago-area waterways, business groups, nongovernmental environmental advocacy groups engaged in protecting Chicago-area waterways, environmental consultants working with industries for compliance limits of pollutants to the waterways, urban and city planners, university researchers on pollution matters, and wildlife advocates. I started collecting data from the 12 research participants after obtaining approval from the Walden University's Institutional Review Board (No. 04-01-19-0571600). Although most people I approached for participation showed great enthusiasm, several individuals who initially agreed to participate did not respond to subsequent follow-up invitations.

I used an email invitation for purposeful recruitment of participants in the identified fields. Upon obtaining agreement from prospective participants, I scheduled one-on-one, face-to-face interviews at a time that best suited the research participants. Participants were offered to review the informed consent form after they expressed willingness to participate. Some participants chose to sign the informed consent form on the day of the interview;

others signed it before the interview date. The interviews were semistructured, and the data collection process was facilitated by an interview protocol (see Appendix B). The interviews were recorded with a portable electronic device on the day of the interview, whereas another recorder was used for a backup recording. All recordings were made with the full consent of the research participants.

As part of the data collection process, I kept field notes and noted relevant situations and reflections during the interviews. The data gathering process also involved reviewing public documents and audit reports of the EPA and the Illinois Pollution Board. Data gathered from the review of documents were compared with the participants' interview responses.

The data gathering process was conducted from early April to the middle of May 2019. Each of the interviews lasted between 20 and 35 minutes. The recorded interview was transcribed using an NVivo computer-assisted transcriber, which I downloaded in the recording device. After listening and reading the interview transcript, I manually updated the transcripts to ensure accuracy of what was recorded. After the manual update, I sent the transcripts as MS Word documents to participants to verify for accuracy and to make any changes that may not have reflected their views or perspectives. Four of the interviewees made some editorial corrections to the transcripts of the interview recordings. There was no variation between the data collection plan as described in Chapter 3 and the actual data collection.

Participant demographics are shown in Table 1. Participants included private company owners, business environmental directors, elected and appointed board members,

retired and serving directors and executive directors, a university professor, an organization's vice president, and a taxpayer who is an appointed board member. All belong to the three broad categories of environmentalists, business groups, and government players categories. Participants included five women and seven men.

Table 1

Distribution of Research Participants

Stakeholder category	Males	Females
Environmentalist	1	1
Government		1
Environmentalist		1
Environmentalist		1
Government	1	
Business	2	
Environmentalist	1	
Business	1	
Government		1
Government	1	

Document Review

I reviewed EPA and the IPCB permitting documents and EPA audit reports to become more familiar with existing processes through which these organizations regulate environmental pollutants. The documents I reviewed included EPA National Pollutant

Discharge Elimination System (NPDES) permitting documents, EPA wastewater pretreatment audit reports, and the IPCB water quality standards regulations in effect under the CWA. The documents were reviewed as a means of cross-checking participants understanding of how pollution control regulations are made and how microplastic pollution can potentially be monitored. Bowen (2009) recommended a document review process to corroborate organizational reports and public records with interviews.

Permitting documents. IPCB documents were also retrieved online from the agency's website. The agency monitors the water quality standards in the state. Under the provisions of the CWA, Illinois state water quality standards can be stricter but not less stringent than CWA specifications. Environmental rules from 1999 to 2015 covered in Title 35 of the Illinois Administrative Code were reviewed.

Audit report. I reviewed the MWRD's three previous EPA audit reports, conducted in 2005, 2009, and 2018. The MWRD is the largest permit holder that discharges to the Chicago-area waterways (more than two billion gallons of treated wastewater discharged daily). As the largest permitted wastewater discharger to the Chicago-area waterways, the MWRD is audited by the EPA for compliance with the standards established in the CWA and the IPCB. The documents were retrieved from the libraries of the MWRD monitoring and research department.

Data Analysis

During the analysis of the data, I did not deviate from the procedure as previously outlined in Chapter 3. I adhered to the plan as outlined. Interviews were primarily recorded with an iPad to which a transcription program was downloaded. This enabled the

immediate transcription of the voice-recorded interviews after which the transcripts were converted to an MS Word document. The confidentiality and anonymity of interview participants was enhanced by identifying participants only as a letter of the alphabet (Participant A, Participant B, etc.).

Interview Data Analysis

After I transcribed and edited the transcripts for clarity, I engaged in a rigorous analysis (Yin, 2014) for trends and patterns. I also looked over the notes and my memos that were associated with the interview process. I compiled and examined sentences and phrases that were displayed, coded, and examined for emergent themes. Such themes formed the basis for drawing conclusions on the interview participants' perspectives about the research phenomenon.

The initial data analysis process involved manually coding the data from each stakeholder group. This was done after rounds of reviewing the interview transcripts of the stakeholder groups for recurring phrases. I used MS Excel to organize the data in a matrix form of rows and columns, which helped me through the coding process and identify emergent themes. Only the participants' perspectives of the research questions were included in the emergent coded data. No data revealed the names of participants. After the initial coding, I reviewed the transcripts a few more times for a confirmation of the patterns that emerged from the earlier process as well as looking for any themes that I may have overlooked. I then merged the themes that emerged from the various stakeholder groups for the purpose of understanding common areas of agreement and concern among different

stakeholders. The themes were compared with those I identified in the literature review process to facilitate inferences from the study.

Data were stored in my password-protected personal computer as well as in my iCloud account. Firth (2011) noted that the use of such computer-assisted software enhances the emergence of concepts. Using CAS also removes the elements of human bias, thus increasing the reliability of the study.

Document Review Analysis

The analysis involved reviewing the established permitting and auditing procedures for trends and patterns. The trends and patterns from the document review process which relate to established regulatory procedures were then compared to the responses from interview participants. The comparison was to enable me to appreciate how the interview participants understood the efficacy of existing pollution regulation regulatory mechanisms. Next, I associated the emerging patterns with different themes that emerged from my interpretations of the interview responses.

NPDES wastewater discharge permitting and regulations. EPA documents were retrieved online from the agency's website. The review involved a manual coding for terms that relate to the various themes derived from the interview process. After the initial determination of codes that relate to the emergent themes from the interviews, I reviewed the documents a few more times for a confirmation of the patterns and how such patterns relate to existing NPDES permitting requirements and procedures. The document review also involved searching for terms that signify importance in the NPDES development process.

Audit report. The document review protocol enabled tracking the audit reports for recurring themes or areas of emphasis that the EPA considers critical in maintaining high water quality. The audit report was used to collect and manually analyze the themes of pollutant limits and pollutant management practices found in the reports. The theme which occurred in all the audit reports show that, with EPA approval, the MWRD can institute local limits for microplastic pollution as well as have the authority to require best management practices to minimize plastic pollution if EPA establishes that this pollutant should be regulated.

Evidence of Trustworthiness

Demonstrating that a study is trustworthy is an essential part of an outcome required to ensure that a research study is valuable. I made no changes on the issues of trustworthiness from what was presented in Chapter 3. I retained all the elements of credibility, transferability, dependability, and confirmability described by Houghton et al. (2013). The supplementary use of NVivo for analyzing data created an audit trail for enhancing trustworthiness of the study. The use of NVivo was also to enhance the retrieval and management of data. According to Maher, Hadfield, Hutchings, and de Eyto (2018), using digital analysis software like NVivo can complement data from literature.

Credibility

As described in Chapter 3, a research study is credible when the accuracy of its findings is such that the interpretations are consistent with the data that support the study (Munn et al., 2014). According to Thomas and Magilvy (2011), the credibility of a study is enhanced by time spent with participants and presenting findings in the words of

participants. I made no changes to the credibility supporting strategies for the study from what was described in Chapter 3. Thus, I allocated substantial time reviewing documents, analyzing the interview transcripts, and ensuring that participants` views were correctly portrayed. After transcribing the audio-recorded interview responses, I presented the transcripts to the participants as a means of member checking (Cope, 2014), for confirming that the transcripts reflected participants views. Four of the participants responded with slight modifications that enabled me to update the transcripts of their interviews. I also utilized weekly journal during data collection.

I utilized triangulation for enhancing credibility by having an audit trail of the decision-making process. Maher et al. (2018) noted credibility can be enhanced by a researcher's creative interpretation of the data when a research process includes aspects of data, as a source of experimental information and as inspiration for creating imaginative understandings. Credibility was enhanced through triangulation by combining interview data, field notes, and observations (Carter et al., 2014). Such a trail enabled me to track the perspective of the different stakeholders.

Transferability

Shinto (2004) and Watkins (2012) described transferability as an evaluation of the extent to which the findings from a study can be applied in different settings under similar conditions. According to Ravitch and Carl (2016) and Shinto (2004), research findings must be replicable under similar conditions but in different settings if the results from such research are to be trusted. The detailed descriptions of the natural setting and the detailed description of the data collection process that were presented earlier in this chapter were

strategies for assuring the transferability of this study. The study might be transferable to other watersheds in the United States where similar conditions prevail.

Dependability

During the process of gathering and analyzing data, there were no deviations from the elements of the study dependability as discussed in Chapter 3. According to Ravitch and Carl (2016), original research should be a prototype with elements that enable future work to be replicated with the same result. In order to improve on dependability, I clearly documented the research approach in a manner aligned to answer my research question. As previously described in Chapter 3, an audit trail was maintained by keeping a reflexive journal on personal reflections and field occurrences. I evaluated the effectiveness of the inquiry process by reviewing the interview questions for how they align with the research question.

Confirmability

Confirmability, or a researcher's ability to be objective and unbiased, requires that the results accurately reflect findings based on participants' experiences. According to Cope (2014), for a study to be confirmable the results must not be diluted by the researcher's ideas. The emergent themes from my study contained quotes from the participants. I used triangulation in minimizing bias by combining the data from interviews, field notes, and observations (Watkins, 2012). According to Ravitch and Carl (2016), a researcher's beliefs guide his or her decisions and should be acknowledged and documented. I kept an audit trail of all my actions during the research process. My report documents the choices of methods I used to gather and analyze data and focused on seeking

answers to the research question based on information from informants and not my personal perspective.

Results of the Study

The results from this case study reflect the data gathered from the interviews and documents I reviewed. The interview responses from this study were first analyzed individually. After the individual participant analysis, responses from similar stakeholder groups were compared, and then all stakeholder groups were compiled. Responses from the participants based on the protocol were used to formulate the themes for the study outcome. Saldana (2016) recommended that the coding process should be based on a strong consideration for the essence of the study as summarized in such attributes as the study goals and research question. I therefore embarked on an extensive review of the interview transcripts in search of information that addressed the research question. The research question for the study was: How can policymakers build coalitions among diverse stakeholders in order to formulate policies aimed at reducing microplastic pollution in Chicago-area waterways? In line with the views of Yin (2014), the data analysis process included searching for insight that addressed the research question. This process included examining, compiling and classifying data that led to the patterns, insights and the concepts that emerged.

Emergent Themes

I sorted and deduced codes from recurrent words and phrases from the interview transcripts. The codes and themes that emerged are presented in Table 2 and are presented based on how frequently the interviewees responded on issues.

Table 2

Emergent Codes and Themes

Interview Questions	Emergent codes	Emergent themes
1, 2, 3, 4, 6	Education, research, information	Plastic pollution perception and awareness of dangers of microplastic pollution
3, 4, 5, 7	Pollution control, regulations, policy, monitoring, data collection, permits	Policy and regulatory development
3, 5	economic interest, ideology, political inclination, collaboration	Stakeholder cooperation, and coordination
5, 7	Cost, finance, research, pollution source, engineering, material science	Pollution prevention
3, 5, 6, 7	Coordination, collaboration	Watershed management
5	Plastic litter, plastic bags and straws	Environmental damage and injustice
2, 3	Stakeholder role	Existing pollution control efforts

Theme 1: Plastic pollution perception and awareness of dangers of microplastic pollution. All the interviewees indicated some awareness of the impact of plastic pollution but were concerned that a large majority of the general population is unaware of the problem. The records from my field notes and the review of pollution permitting and auditing documents show that many of the interview participants did not know about the existing regulatory processes listed in the EPA and IPCB permitting documents. According to a participant from the environmentalists' stakeholder group, "I will admit ignorance to knowing all the policies that are in place, so I don't feel like I can

really comment on this [and I cannot] evaluate their efficacy." Such unawareness creates a gap in information, which can be filled only through leaning and improved public education.

The codes that point to the need for improved research, public education, and more information were used to develop the theme identified as *plastic pollution perception and awareness of dangers of microplastic pollution*. This theme cuts across various interview questions and was shared by all the stakeholders. The responses from the first four interview questions often addressed the need for increased research and public education on plastic pollution. The first interview question required participants to address their perceptions of plastic pollutants in the Chicago-area. The second interview question sought information on the efficacy of any existing pollution control policy instruments in curtailing microplastic pollution. The third question solicited for stakeholder roles in addressing plastic pollution, while the fourth interview question related to stakeholder views on how other stakeholder groups can contribute in abating plastic pollution. Interview Question Number 6 linked the need for public education in understanding environmental injustice.

A close review of interview responses showed that environmental activists/advocate stakeholders see plastic pollution mainly from the prism of large debris. They are also familiar that the microplastics are derived from the decay of large plastic litter. Other than the research stakeholder group, most of the other participants were unfamiliar with other vectors of microplastic pollution; hence, the interviewees agreed there was a need for increased research to better understand the nature and extent of the problem. According to a

participant in the environmental consulting stakeholder group, “My perception [of microplastic pollution], at this point, is not well grounded because I have no information about the extent of plastic pollution in the waterways. Without that kind of information, you can’t form a judgment as to whether, or not it is serious.”

Participants viewed microplastic pollution as a contemporary problem that currently lacks enough monitoring instruments. According to one interviewee from the urban and city planning stakeholder group, “This is one of those emerging problems.” Participants’ comments were backed by data gathered from the EPA permitting documents, which made no reference to plastic pollutants. Participants with vast knowledge in the formulation of environmental regulations indicated that public interest organizations such the National Resources Defense Council can help improve stakeholder cooperation by educating and informing the public about the problem of microplastic pollution. The general understanding was that the efforts of public interest organizations will be more effective if they are supported by governmental entities, which are often better funded.

Participant A of the government stakeholder group said the biggest obstacle is the lack of basic information needed to define the extent of the problem and that most people are unaware that plastic is a problem because it is such a common material in our daily lives. Participant I of the government stakeholder group and Participant K of the environmental advocacy group echoed the sentiments, noting that the public does not usually get involved in the acquisition of basic data. Without such basic data, they said, people have a sense of denial about problems unless such problems are brought to their attention in graphic terms.

Participant J of the environmental advocacy group noted the role of research and education in creating awareness that will inform policy development on the problem of plastic pollution.

> We can't really understand the extent of the problem, but I see organizations having a role in communicating the results of research into policy solutions and into more public awareness about the problem and then stakeholders like industry and businesses [following suit].

Participant K, a science researcher, noted:

> Educating the public on the topic of plastic pollution can open people's minds to understanding all of the various ways in which we pollute our environment, and I say that because people can really see the garbage, they can see the plastic pollution, they get their hands on it and they recognize that it is there because of us.

A vital to solving any problem is a good understanding of its magnitude. The contemporary problem of microplastic pollution is not an exception. Getting the public to see plastic pollution as a problem that merits urgent attention requires public awareness through education backed by scientific data on the debilitating effects of plastic pollution.

Theme 2: Policy and regulatory development. The theme of policy and regulatory development was developed from codes derived mainly from responses to Interview Questions 3, 4, 5 and 7. All the interview respondents indicated the need to create public policies for effectively addressing the emerging problem of plastic pollution. Participants stated that the Clean Water Act does not address plastic pollution. As noted in previous paragraphs the absence of such regulations is supported by the review of

permitting and pollution auditing documents. Participant A, who also had extensive work experience in the formulation of environmental regulations, stated:

> I'm not confident that our existing pollution regulations under the Clean Water Act at the federal level or under the Illinois Environmental Protection act at the state level or even our own local ordinances here in the Chicago-area are effective in addressing the problem of plastic pollution.

A review of documents revealed that Public Act 98-0638 in Illinois (effective January 1, 2015) banned manufacture and sale of cosmetic products intentionally containing microbeads, including plastic microbeads. The city of Chicago's bag tax is intended to reduce use of disposable plastic bags at retail stores, and there are limitations on "floatables" released to the waterways through combined sewer overflows (CSOs). Of such existing policy instruments, Participant I of the government stakeholder group noted, "While I believe these measures can have a positive effect on reduction of plastics to the waterways, I don't believe they go far enough to mitigate the problem." Based on my review of EPA procedural documents as well as responses provided by interview participants, it is the government's role to take the initiative in collecting data, monitoring the waterways, and determining the extent of plastic pollution and also to try to identify the sources. Participant A noted "I think the fundamental part at this point in time is to gather data to find the extent of this pollution." Participants suggested that the role of local, state or federal agencies in controlling pollution will only come after government initiates data collection for identifying pollution sources.

Most participants across all stakeholder groups advocated for environmental groups and other organizations to play a leading role in communicating plastic pollution research results and creating more public awareness about the problem. They agreed that industry and businesses stakeholder groups should push for transforming the results on the impact of plastic pollution into policy solutions. A participant of the government stakeholder group, with years of work experience as a city planner and in public interest advocacy organizations, noted, "Government entities should take a big responsibility for the management of waste so things like litter control in our waterways, reducing the occurrence of combined sewer overflow so that we have less pollution going into our waterways." Participant L, a business interest stakeholder, noted that developing an effective policy for controlling plastic pollution is not going to happen all at once. "Simply banning the products is not realistic. Rather there should be a gradual get away from plastic products with legislation and the policies tailored to the source of the plastic products." As part of targeting the source of pollution, this participant and others argued for a higher tax on plastics, which manufacturers can build into their production cost toward pollution control. According to Participant B, an environmental advocacy stakeholder, "If people show their responses through their wallets, it will have an impact that will make it easier for making policy changes." The economics of cost approach of most participants is that if there is a cost involved in using plastics and other materials that pollute, there should be a way to account for those costs earlier in the process. Participant C noted that an effective pollution control approach would be to internalize production cost. Accordingly, he stated that "if there's a cost involved with cleaning up milk cartons, for example, the milk

producers and consumers should be paying for the cost of collecting plastic milk cartons and disposing of those plastics rather than just buying milk for cheap." Participant I suggested that "even without waiting for governmental controls business must be motivated to seek more environmentally friendly alternatives to plastic products." A participant of the business stakeholders group involved in the production of plastic materials and the paper alternative noted that "we stand to benefit from people changing their behaviors away from using plastic straws, single-use plastic straws, and using paper straws as an alternative." The dominant opinion among participant is the need to gradually get away from plastic products and accept that in the long run the emerging problem of plastic pollution is an obvious problem.

Theme 3: Stakeholder Cooperation and Coordination. Interview Questions 3, 4 and 5 related to stakeholder cooperation in addressing the problem of plastic pollution in Chicago-area waterways. All the interviewees offered recommendations on stakeholder cooperation. The popular opinion is that public interest organizations such as the National Resources Defense Council can take a lead role in educating and informing the public. Because public interest organizations usually lack the resources for such programs, it was suggested that such efforts should be with support of governmental entities that will do the monitoring to define the problem.

Whereas participants were in universal agreement on the importance of mitigating the problem, there were mild variations on how stakeholders can cooperate. The general impression was that the main obstacle for business owners and for consumers is that plastic started off as a solution to certain kinds of problems and has created a different problem.

Thus, reducing people's use of plastic means that consumers must find other way to solve that problem. Participant B, from an environmental advocacy group for protecting wildlife noted, "The biggest obstacle is having multiple stakeholders working collaboratively to come up with plans to tackle the issue on all fronts and then maybe have a funding to do so as well would be an obstacle." Participant D of the government stakeholder routinely involved in formulating policies on water quality noted, "Another obstacle maybe different stakeholder groups may have different emphases on what they consider to be the biggest challenges." According to Participant C, who is also involved in policy development, "The major obstacle in government will be the partisan divide on environmental questions." He noted that there are a lot of people in the Democratic Party who will probably be strong supporters of any kind of environmental legislation, and a lot of Republicans would fear that environmental policies will harm business. Participant C, however, noted that such ideological differences may not be as intense with city or state legislators albeit very pronounced on the federal level. Participant E, of the business stakeholder group, noted that stakeholder groups must realize how serious the issue is.

Participant L, from the business stakeholder group, committed to finding better alternatives to plastics expressed concern about the influence of large corporations. "Money tends to be at the core of everything. Large corporations have lobbying groups and they have folks who have an influence." Participant L noted getting rid of a particular product which is big business that provides jobs for people would create a hole if you trying to get rid it. With different arguments for products, he stated, "We need to find a way to sort of bridge that and say, 'Okay, it is not going to happen all at once, but we need

to gradually get away from these plastic products that we are so used to, accepting at the end of the day that there is a problem.’”

Participant K, a scientific researcher, expressed optimism in stakeholder cooperation.

> One of the things I find surprising about this work is that stakeholders of all types about this particular topic are motivated and are curious. I don't know if it's temporary. Right now, whenever I talk to people about the work, they're genuinely curious and you know as a scientist, that doesn't always happen. Even skeptical individuals don't carry that political baggage when it comes to trash in the environment.

Participant K indicated that he had limited exposure to people in the plastics industry, but, at conferences with researchers on plastic pollution from all over the world, representatives from some of the major plastic manufacturing companies were not afraid to ask questions. Such questions challenge scientists from the perspective of the plastics industry which has a financial interest in making sure that their industry is not disrupted.

In the opinion of Participant K, plastic pollution involves a wide array of materials with many potential solutions. There can be no finger pointing to someone innocent or to somebody guilty when it comes to generating plastic trash. On the other hand, participant L was of the opinion that the nature of the economy suggests all people are part of the problem and should also be a part of solution. Both participants agreed that the topic of plastic pollution is relatively young when compared to many other issues about water

quality and will require patience in the pace of innovation in engineering and material science as preventative measures.

Theme 4: Pollution prevention. Questions on participants perceptions, efficacy of pollution control instruments, and policies for mitigating pollution led to the theme of pollution prevention. Participants were more aware that microplastic pollution originates from the decay of plastic materials than from other sources, such as microfibers and microbeads from laundry or other household uses. Many of the ideas that the participants proffered for abating microplastic pollution relate to means for abating microplastic from decay of larger plastic materials. These ideas ranged from ways of curtailing pollution from industrial sources, to efforts at preventing the entry of large pieces of plastic materials into the waterways, to suggestions on developments in material science that will reduce or eliminate sources of microplastics. Environmental advocacy stakeholders, urban city planners, and business advocacy groups showed greater concern for preventing pollution by curtailing floating large plastic materials into the waterways. Researchers, environmental consultants, and regulatory stakeholder groups showed more understanding of microplastic pollution originating from both secondary and primary sources. There was a shared suggestion that more research need be done for better understanding of the sources and effects of microplastic pollution.

Participant B of the environmental advocacy stakeholder group suggested the major problem with plastic pollution is the deposition of large plastic materials into the waterways, as well as insufficient trash receptacles for collecting plastic garbage. Participant C, who is regularly involved in developing policies and regulations on matters

of pollution, noted, “We get called in this office from constituents and from elected officials who complain about the accumulation of plastic in the river and the other waterways.” Participant E of the business stakeholder group indicated that as a plastic manufacturer, he realized the potential for plastics from factories like his to be introduced into the waterways. In his opinion the focus should be on developing physical barriers for limiting the introduction of large plastic materials into the waterways. Participants F and G representing governmental and environmental advocacy stakeholder groups said that pollution control response efforts by the City of Chicago and the MWRD are not adequately coordinated, and these organizations efforts at reducing plastic pollution using skimmer boats designed to skim out floatables are inadequate. In addition to the perceived lack of coordination between the City of Chicago and the MWRD, the stakeholders want all dischargers to the river system (the City of Chicago, MWRD, and other municipalities) to take care of litter as they are obligated to under the rules of the Clean Water Act. In addition, these stakeholders want such government agencies who monitor discharge into the river system to be permitted by the state. According to these stakeholders, the goal for requiring permits is to show the citizens that the government agencies who should be in charge of water and garbage collection by their permits are actually doing so.

All the participants believed policy guidelines were needed for controlling floatable plastic materials. But more important was supporting effective policy development by collecting information on the nature and the precise sources of plastic pollution that are most prevalent to the waterways. According to Participant K, gathering such information would be helpful in understanding the path of microplastics in the wastewater treatment

process and thus in the development of engineered controls such as the engineering of methods to filter out pollutants from washing machines similar to lint trap for the dryers. He noted that, although the problem of microplastic pollution is not fully understood, "Ultimately, a real solution isn't going to be the end of the pipe but a long-term and multifaceted program that addresses the sources of the material that is getting into wastewater treatment plants and the waterways." Most governmental stakeholders with background in scientific research and policy development as well as environmental consulting stakeholders were also inclined to believe that, over time, materials science solutions with different kinds of biodegradable plastic polymers that maybe moored in textiles will evolve.

Theme 5: Watershed management and environmental injustice. The theme of watershed management arose from Interview Question 3 on stakeholder cooperation, Question 5 on obstacles for finding common ground among stakeholders, Question 6 on environmental injustice, and Question 7 on policy development. All participants agreed that environmental, business, and governmental entities must work together to solve the problem. All the respondents of the environmental advocacy and business stakeholder groups faulted the lack of coordination between the various arms of local government such as the city of Chicago and the MWRD, who according to one participant, "are obligated under the rules of the Clean Water Act to take care of litter" in Chicago-area waterways. Another participant noted that the role of NGOs like environmental advocacy groups is to "help to add to existing data collection efforts to build a more robust data set and to look at holistic watershed solutions that can help the different players coordinate." Accordingly,

this participant noted organizations like MWRD and the city of Chicago, who both own skimmer boats for skimming floatables from the waterway, do not coordinate. On the other hand, governmental stakeholder participants believe environmentalists often focus on ideal endpoints that may not be practical to reach through control of nonpoint sources of pollution. According to participants A and I, who belong to the governmental stakeholder groups, it is hard to control the behavior of every person who uses plastic in the metro area. These participants indicated that environmentalists try to saddle governmental agencies such as MWRD with the unrealistic expectations under the impression that government entities have the financial resources.

The participants understood the dynamics of how the Chicago-area river system works and most expressed concern about the potential of environmental injustice resulting from pollutants. Participants of the environmental advocacy stakeholder group believed the river system flow dynamics creates an immediate environmental injustice as it collects trash from the northern, more affluent parts of the watershed as it flows downstream into other less affluent communities. Most interviewees related the level of efficiency in watershed management to environmental injustice while a minority indicated that available data on the nature and extent of this form of pollution is not enough to decide on the possibility of environmental injustice. One participant said,

> Visible plastic is not pleasant if you're out on a boat but doesn't hurt anyone that I'm aware of but for microplastics that are unseen, we don't know and need to find out if there is an impact on aquatic life and other organisms.

The participants acknowledged that the population in Illinois is concentrated in Chicago, where people have more money, stronger voice, and more influence on the society. A business stakeholder group participant noted:

> People who are outside Chicago have a much more difficult time being heard and much more difficult time fighting for their environmental rights because they are just not in this concentrated area where there is focus. I think it is something to watch very closely because you can have something similar to the garbage that is generated locally that being sent overseas. We are creating garbage and we are sending it for someone else to deal with. Scale that down and what we do in Chicago trickles down to the southern Illinois, central Illinois, and we have got major waterways in Mississippi where you could potentially be impacting as well, and you got people who depend on water resources in those areas and they are just much less likely to be heard.

In terms of differences in watershed management, all the stakeholder groups observed that in Chicago people are careful about how they take care of the north shore channel in the north branch of the Chicago River. However, the river-banks along the Calumet River or anywhere on the southside of Chicago are not used for recreation because the waterways are polluted and not a priority for cleaning up. A government stakeholder group participant with working knowledge of urban and city planning noted that people in the southside neighborhoods often are worried about getting to work or finding a job taking care of their families and have little time to engage in volunteer river-cleaning activities.

Their political concerns are not focused on environmental issues because they are focused on questions of survival.

Theme 6: Existing pollution control efforts. The theme of existing efforts on controlling microplastic pollution was derived from the first two interview questions. Most stakeholders are aware of current efforts at controlling pollution, although how the different stakeholders understood the existing control measures varied. For example, there was some differences between stakeholder priorities in the theme from what was determined from documents review regarding site-specific water quality standards. Section 301.101 of Title 35 of IPCB authorizes the board to issue rules and regulations for maintaining good water quality standards in the waters of this state. Under this authority, site specific water quality standards are prescribed for the different uses for which the waters are designated. Stakeholders did not relate to how this management strategy may impact issues of microplastic pollution or associated environmental injustice.

The study participants believed that the efficacy of pollution control measures will be in doubt without details of plastic pollution in the waterways. Government stakeholder groups were better informed than other stakeholders about existing pollution regulations under the federal Clean Water Act, Illinois Environmental Protection Act, and local ordinances in the Chicago-area.

Existing pollution control measures referenced by the interview participants included community efforts aimed at separating plastic from other household wastes. Such efforts are not universal among all communities that are tributary to the Chicago-area water basin. Other efforts included positioning of trash receptacles which is one of the most

visible efforts aimed at controlling pollution in Chicago city. In addition, the Shedd Aquarium and Friends of Chicago River organize volunteers for removing plastic from the waterways through beach clean-ups and working with other stakeholders to remove the plastics in the river. The City of Chicago and the MWRD, as previously mentioned, use boats to skim out plastic floatables from the waterways. Besides these physical pollution control efforts, regulatory efforts include the banning of the manufacture and sale of cosmetic products containing plastic microbeads (effective January 1, 2015) by the state of Illinois; the city of Chicago plastic bag tax ,which is intended to reduce use of disposable plastic bags at retail stores; and imposition of limitations on "floatables" released to the waterways through CSOs. A researcher in the government stakeholder group noted:

> While I believe these measures can have a positive effect on reduction of plastics to the waterways, I don't believe they go far enough to mitigate the problem. For instance, the bag tax will result in reduction of plastic bag use at stores however, the option to obtain and use plastic bags still exists and for many the small tax is not enough deterrent to forego their use.

These efforts were perceived as inadequate and without adequate scientific information on the origins, and full understanding of the effects of microplastic pollution these efforts may be ineffective in addressing the problem of plastic pollution.

A Comparison of Themes Among the Stakeholder Groups

One approach for driving policy change is for the public to demand changes. Such demands are often facilitated through lobbying of an active and dominant coalition. In this section I explore how different stakeholders can build dominant coalitions for advancing

effective policy options. The grouping of stakeholders is based on similarities of their policy objectives

The different stakeholder groups shared similarities and differences in their emphases. The differences in emphasis on dominant themes between the three major stakeholder groups is presented in Tables C1 to C3 in Appendix C. The tables were compiled from quotes derived from interview responses from participants. These tables serve to illustrate the differences as well as similarities between the perceptions of the different stakeholder groups on how best to approach the formulation of regulations for controlling microplastic pollution. The differences enable an understanding of barriers that may be encountered in forming coalitions best suited for bringing policy change on the regulation of microplastic pollution, while the similarities indicate which groups are better suited for forming coalitions. The stakeholder perceptions denote group priorities that may lead to an increase in the profile of an emergent coalition best suited to form a winning coalition with a policy version that results in the regulation for controlling plastic pollution.

Codes and themes of specific leaders of thought whose influence drive epistemic community of professionals that help shape policy are presented in Tables 3 and 4. The emergent codes and themes of the environmentalist advocacy group showed that participants in this group are more passionate than others on the effects of large floatable plastics on scenic beauty and wildlife. The interview analysis showed that participants with advanced educational and research background showed wider understanding of the complexity of the origins of microplastic pollution. These participants were less likely to

lay blames and were more inclined to look at a long-time solution from engineering and materials science development.

Codes and themes generated from participants identified as public interest nongovernmental groups showed active involvement in creating awareness on plastic pollution by organizing public education creating volunteer groups for litter clean-up. Codes and themes generated from participants identified as elected officials are presented showed willingness in participating in the formulation of legislation for banning any materials that contribute to endangering the environment. This group of participants acknowledged their lack of authority in terms of regulating the inputs necessary for banning plastic polluting products as the authority for such evaluation belongs to the EPA. The stakeholders under this category emphasized that public education will create mass awareness that will nudge legislative debate for stronger pollution control action.

Table 3

Emergent Codes and Themes Common Among Interest Participants.

Environmental advocacy leaders	Research leaders	Public interest nongovernmental organizations	Elected leaders
Plastic pollution perception and awareness of dangers	Plastic pollution perception and awareness of dangers	Plastic pollution perception and awareness of dangers	Plastic pollution perception and awareness of dangers
Policy and regulatory development	Policy and regulatory development	Policy and regulatory development	Policy and regulatory development
Stakeholder cooperation, and coordination	Stakeholder cooperation, and coordination	Stakeholder cooperation, and coordination	Stakeholder cooperation, and coordination
Pollution prevention	Pollution prevention	Pollution prevention	Pollution prevention
Environmental damage and injustice	Environmental damage and injustice	Environmental damage and injustice	Environmental damage and injustice

Table 4

Themes Illustrating Issues of Unique Interest to Participant Groups

Environmental advocacy leaders	Research leaders	Public interest nongovernmental organizations	Elected leaders
Aesthetic and ecological damage	Public health and environmental protection		
Watershed management		Watershed management	
Existing pollution control efforts			

Table 3 shows that issues relating to perception of the awareness of plastic pollution, stakeholder cooperation, pollution prevention, and environmental injustice are of concern to all the groups. Table 4 illustrates that there are few areas where issues of concern in developing pollution control regulations are not universal. However, I did not determine if the levels of passion held by these groups are strong enough as to prevent stakeholder cooperation.

Summary

Chapter 4 included the description of the setting of the study and the demographics of the 12 purposefully selected research participants with extensive knowledge of pollution in Chicago-area waterways. These participants represented the broad stakeholder categories of regulatory, business advocacy, environmental protection, industrial and commercial enterprises, city administrators, researchers, environmentalists/environmental consultants to industries, and government officials' perspectives. During the interview, it

was observed that most of the participants have had varying working and professional experiences that could place them in more than one stakeholder category. Such relationships are important in understanding the conditions for forming coalitions that can influence policy development among stakeholders.

The information the participants provided illustrates areas for potential policy differences among different stakeholder groups. Their perspectives on plastic pollution and finding a solution create a navigational path for forming the necessary coalitions that can advocate for the policy required for mitigating microplastic pollution in Chicago-area waterways. The results are interpreted in Chapter 5, which also includes the limitations, recommendations, and implications for positive social change.

Chapter 5: Discussion and Recommendations

Introduction

My purpose in this qualitative case study was to explore how conflicts of interests and belief systems about plastic pollutants among stakeholders can impede efforts at developing microplastic pollution mitigation and regulations in Chicago-area waterways. In intended this study to improve public understanding of the damaging effects of plastic pollution and enhance stakeholder cooperation in formulating pollution control policies. The implementation of such regulations will result in improved urban sustainability and growth.

Using a qualitative case study approach, I explored the perceptions of subject experts in different stakeholder groups regarding obstacles to formulating plastic pollution control regulations. The theoretical foundation of this study, ACF, suggests stakeholders may be grouped based on similarities of their policy objectives. In that light, an analysis of participants' interviews revealed areas of policy difference as well as possible avenues for coalition among the environmentalists, government, and business stakeholders. Six major themes emerged: (a) Plastic pollution perception and awareness of dangers of microplastic pollution, (b) policy and regulatory development, (c) stakeholder cooperation and coordination, (d) pollution prevention, (e) watershed management and environmental damage injustice, and (f) existing pollution control efforts. An analysis of the stakeholder interviews showed differences in how the major stakeholder groups preferred to approach policy for abating plastic pollution in Chicago-area waterways. The findings suggested stakeholders desire more research on the nature, sources, and effects of microplastic

pollution. The research did not point out intense disagreement among the major stakeholders; rather, policy disagreement among stakeholders can be smoothened by learning about the problem.

Interpretation of the Findings

In the preceding section I noted that there are areas of agreement as well as areas of disagreement between the principal stakeholder groups. These differences were evident from the variations in emphasis on dominant themes between the three major stakeholder groups. This finding is in line with a vital aspect of the ACF as noted by Zafonte and Sabatier (2004), who indicated that policy core beliefs can be exemplified by prioritizing the importance of stakeholders' welfare and aligning the fundamental value priorities within the subsystem while screening out information that does not agree with the core beliefs of actors. The interpretation of the emergent themes and how they impact stakeholder inputs on developing policies are presented in this section.

Plastic Pollution Perception and Awareness of Dangers

One theme that emerged from the study was the general perception and awareness of dangers of microplastic pollution. The study revealed variance in the fundamental value priorities between the three major stakeholder groups on the extent of the problem, the sources of the problem, and what should be of priority in addressing the problem. Environmentalists were often eager to attribute visible large plastic source of pollution as a critical area to be addressed in controlling plastic pollution, whereas the business and government stakeholder groups were more likely to see large floatables as nuisance. These two groups emphasized the need for more scientifically backed data on the dangers of

microplastic pollution in the waterways. The differences in emphasis on what the priorities to pollution control must be rise to the level of differences in stakeholder policy core beliefs. According to Sabatier and Jenkins-Smith (1999), policy core beliefs relate to fundamental perceptions of how serious problems are, their driving causes and the feelings of the adequacy of the structure of institutions to solve the problems.

For environmentalists, the fundamental perceptions of the problem of microplastic pollution must address visible plastic litter and not just microplastic in waterways. The environmentalist stakeholder groups were convinced that an effective way for influencing policy on plastic pollution would be to raise public awareness on large floatable plastic litter. Environmentalists held the belief that an effective way for influencing policy on plastic pollution would be to raise public awareness by raising fund and including other activists. To the environmentalists' group, an expanded coalition of activists need to work together to fight well-funded industry groups and push for legislation to ban many plastic products. According to Andraka-Christou (2015), it was a similar approach that triggered the creation of the Orphan-Drug Act due to pressure mounted by a coalition of orphan drug advocacy groups led by the NORD. A similar approach was also described by Thom et al. (2016) for addressing the issue of alcohol abuse as a national health issue in the United Kingdom. On the contrary, the preferred policy approach on the perception and awareness of dangers of microplastic pollution of business and government stakeholder groups was that the existing information and scientific data on microplastics need to be enlarged to raise public awareness on the dangers of microplastic pollution to humans and wildlife.

In a study relating to water pollution in Lake Tahoe, Harrinkari et al. (2016) described how conflicting interests on how to protect water quality pitted economic interests against environmental protection advocates. Though this study did not establish the level of intensity and conflict of the sort described Harrinkari et al. in Lake Tahoe, differences in preferred policy approach were noted among different stakeholder groups.

Policy and Regulatory Development

Policy problems are often defined through the interaction of a coalition of actors who are guided by their belief systems. According to Khayatzadeh-Mahani et al. (2017), such coalition of actors aim at implementing solutions based on their belief systems. The theme of policy and regulatory development that emerged from this study serves as a vehicle in conveying how the different stakeholder groups can best attain potency by forming coalitions. Sabatier and Jenkins-Smith (1993, 1999) noted that major policy changes result from the lobbying of an active and dominant coalition. As noted in Table 3, participants concurred on the need to develop policy and regulations to combat microplastic pollution. The government stakeholder group exhibited a better understanding of existing mechanism for formulating pollution control and environmental conservation guidelines than the other stakeholder groups. The regulations for controlling pollution generally fall under the federal Clean Water Act, Illinois Environmental Protection Act, and local ordinances in Chicago and neighboring communities. All stakeholder groups believed these regulations fail to address the problem of plastic pollution.

The policy path preference of the different stakeholder groups mirrors the differences in perception of plastic pollution discussed earlier. The preferred approach to

policy development among the government and business stakeholder groups is to emphasize greater research and additional scientific data on the dangers of microplastic pollution. To the business stakeholder group, it is not realistic to create policies that ban plastic products. Because of the economic impact on the product manufacturers, the policy preference of the business stakeholder group is for a gradual approach that targets the source of the pollutants in the form of higher taxes on products determined to be sources of plastic pollutants. Such an approach contrasts with the environmentalist group's preference: advocating for direct confrontational approach with large corporations like Nestle, which are seen as the source of most of the large plastic litters in the environment. The environmentalists point to a 40% decrease in the use of plastic bags as a result of increased taxation on plastic bags as a successful approach in curtailing pollution. The government stakeholder group approach to developing microplastic pollution regulatory policy is for more research that will support current state and federal pollution regulatory mechanism. This policy uses pollutant impact on aquatic life and organisms that survive in waterways in assessing tolerable pollutant levels. The differences in stakeholder approach gave rise to the policy differences.

Developing policies based on a mechanism that demonstrates the impact of microplastic pollution on organisms is in line with the impact of perturbation in policy development noted by Sabatier and Jenkins-Smith (1993). According to Sabatier and Jenkins-Smith major policy changes within a subsystem can arise if there are significant perturbations outside of a policy subsystem. According to Meijerink (2006) perturbations

galvanize opposition interest groups in gaining the attention of key decision-making officials.

Stakeholder Cooperation

Noteworthy was the moderate level of intensity of disagreement in stakeholder cooperation and coordination. Although the different stakeholder groups had their preferences on the direction that policy development should take, there were indications that each of the stakeholder groups would have little difficulty resolving policy issues. All stakeholder groups found the need for improved research for knowledge on the impact of microplastic pollution. The study showed only a small adversarial stance by the business community, whose economic interest might otherwise drive them to intensely work against legislation for stricter restriction of plastic products. The findings on stakeholder cooperation indicated that stakeholder differences are only constrained by policy beliefs rather than deep core beliefs. Meijerink (2006) and Zafonte and Sabatier (2004) suggested such core beliefs can be a major stumbling block in stakeholder cooperation. Based on this finding, it appears that as more scientific information on the dangers of plastic pollution becomes available, the policy objectives of adversarial stakeholders will be moderated. However, because the data did not include large multinational corporations with interest in plastic products, it cannot be assumed that the input of the local plastic producers will translate to a universal line of approach by the business community stakeholder group.

The findings on stakeholder cooperation showed a close alignment of stakeholder attitudes on the themes of awareness and pollution prevention. All stakeholders saw the need to prevent pollution. The major difference on the stakeholder approach to pollution

prevention is on environmental activists' emphasis for policies to mitigate large plastic floatables in waterways by emphasizing the effectiveness of combined sewer overflows in screening out large floatables. The differences in stakeholder policy preferences on pollution prevention was not found to be so intense as to generate intense disagreements.

Watershed Management and Environmental Injustice

The study findings on watershed management also mirrored the theme of environmental damage and injustice. Stakeholders suggested the way the area rivers were engineered to flow creates an environmental injustice as wastewater with huge amounts of trash and pollutants move downstream from the densely populated Chicago urban area. The upstream population comprises people with more money, a stronger voice, and influence compared to the people who live downstream. The study found injustice in the way that Chicago thrash is funneled to less privileged communities downstream. More attention is given to cleaning the North Shore channel in the north branch of the Chicago River, where there are more affluent residents compared to the riverbanks along the Calumet River and the southside of Chicago. People who live in those neighborhoods must worry about getting to work and finding a job taking care of their families rather than engaging volunteer activities cleaning thrash. The political concerns in the poor neighborhoods are focused not on environmental issues but on questions of survival.

Issues on environmental injustice revealed in this study are supported by Wing et al. (2000), who argued environmental injustice arises from disparate burden of pollution on the poor and minorities in rural communities. In this study, environmental injustice mirrored the scenario described by Wing et al. (2000) regarding pollution from pig farms in

North Carolina. Kelly-Reif and Wing (2016) characterized the 2011 Fukushima Daiichi nuclear disaster in Japan as environmental injustice to poor rural dwellers. Danta (2010) described the U.S. Army's decision to incinerate its stockpile of chemical weapons in rural Texas as an example of environmental injustice to poor rural dwellers. The study found that government stakeholders were unlikely to admit to environmental injustice on the sources of plastic pollution.

Study Interpretation and Theoretical Framework

The theoretical framework of this study, (ACF), sought to explain belief and policy change among policy elites managing a wide range of resources. As noted in Chapter 2, ACF structures policy participants into three tiers: deep core beliefs, policy core beliefs, and secondary aspects based on their belief systems (Meijerink, 2006; Zafonte & Sabatier, 2004). Sabatier and Jenkins-Smith (1999) noted that deep core beliefs are concerned with a comparative appraisal of the freedom of the individual as against social equity and the interaction between people and nature. Policy core beliefs relate to fundamental perceptions of how serious problems are, their driving causes, and the feelings of the adequacy of the structure of institutions to solve the problems.

In this study, whereas environmentalists favored confronting large multinational corporations like Nestle, the popular approach among other stakeholders is for additional research for improved knowledge on the origins and extent of plastic pollution in the waterways. There were no differences in deep core beliefs, which are often a major hindrance in forming coalitions. In the case of the Lake Tahoe water dispute described in Chapter 2, Harrinkari et al. (2016) noted the conflicting interests from economic interests

pitted against environmental protection advocates' interests of protecting water quality. The current study indicated a moderate level of intensity of disagreement in stakeholder cooperation and coordination in policy core belief among major stakeholders.

The analysis of the themes that emerged from this study point to an overwhelming agreement of the need for the development of policy and regulations to combat microplastic pollution among most stakeholders. According to Olofsson et al. (2018), ACF can guide the attributes of policy stakeholders that can lead to policy change. The study did not show intense adversarial stand by the business community, whose economic interest, according to Harrinkari et al. (2016), often drives conflicts between economic and conservation interests. However, because the data excluded large multinational corporations who manufactured plastic products, it cannot be assumed that the input of the local plastic producers will translate to a universal line of approach by the business community stakeholder group. Sabatier and Jenkins-Smith (1993) noted that irrespective of policy differences among coalitions, the advent of a perturbation can result in the replacement of the previously dominant coalition by a minority coalition. Though this study did not establish a dominant coalition, if microplastics pollution results in a disease epidemic, citizens might demand to regulate plastic pollution like other pollutants in the environment. According to Huang et al. (2015), citizen demand could be required to generate the political and institutional will to find a proactive public policy.

Limitations of the Study

The primary instruments in this study were the interviews. Thus, my personal philosophy that comes with my professional background in the field of environmental

protection is paramount to establishing the study's credibility. As noted in the opening chapter of this study, Ravitch and Carl (2016) and Silverman (2016) viewed such relational considerations as ethical issues that may create personal bias and thus must be accounted for in establishing study credibility.

Typical of a case study, the relatively small number and the purposeful choice of study participants enabled me gather rich data from knowledgeable experts. The results, however, are not generalizable. This case study involved a sample size of 12 knowledgeable experts on pollution in Chicago-area waterways. Guest et al. (2006) suggested a sample size of 16 or fewer may be enough for identifying common themes. The sample size of 12 in this study resulted in saturation as no new codes emerged.

Another limitation to this study was my place as the primary instrument. I have many years of work experience in environmental protection. Researcher bias can influence how data are collected and analyzed if personal feelings, philosophical beliefs, and a researcher's worldview affect the study outcome (Silverman, 2016).

The semistructured nature of the interview questions constituted a limitation because study participants may have provided false or misleading responses. Additionally, some participants may have exaggerated some points to support their positions or may have purposely omitted ideas that did not support their views.

The credibility of the study was enhanced by allocating substantial time reviewing documents and analyzing the interview transcripts so that participants` views were portrayed accurately. The credibility of the study was also enhanced by using weekly journal during data collection and keeping an audit trail of my decision-making process and

by documenting guidelines that may affect the study before the study begins. By combining the data from interviews, field notes, and observations of the interview participants as recommended by Carter et al. (2014), I established a triangulation process that enabled me to track the perspective of the different stakeholders. Triangulation was used for controlling researcher bias. In addition, during the interviews I refrained from asking leading questions and did not communicate personal impressions or views to the interviewees that may have biased their thoughts.

Recommendations

Based on the results and the literature review, I have several recommendations for further research. The findings showed the need for stakeholder cooperation in solving microplastic pollution in Chicago-area waterways. I identified several areas of stakeholder agreement and differences in understanding on preferred remedial approaches. Though business stakeholder groups participated, I included no input from large multinational producers of plastic and microplastic products that impact the Chicago-area waterways. The results from the current study point to a moderate intensity of conflict among stakeholders. Further research might reflect a higher level of intensity of conflict, especially between environmental activist groups and multinational companies that use or produce plastic materials.

This study was designed to evaluate stakeholder perceptions of the impact of microplastic pollution in the waterways. Further research focused on gaining in-depth information about the extent of plastic pollution in the waterways will arm citizens with concrete knowledge with which to form better judgment on the severity and dangers of this

problem. According to Meijerink (2006), such knowledge about environmental damage can give rise to a shift in agenda and attract the attention of key decision-making officials to an issue. Furthermore, I found that environmental injustice resulting from plastic pollution can be traced to watershed management. Future researchers should, therefore, address watershed management, with the goal of understanding and improving how the river dynamics impact environmental injustice.

Finally, despite all the advantages of the case study approach, the results from this study cannot be applied to other watersheds outside the Chicago-area waterways. According to Ratvich and Carl (2016), there is no linearity in qualitative research because the researcher lays no claim to a universal truth. A qualitative case study approach was deemed most appropriate for this study because of the richness and depth of knowledge it provided. According to O'Sullivan et al. (2017), case studies provide answers to investigators looking for answers to why and how things happened. This qualitative case study approach provided a comprehensive understanding of the case and allowed for utilizing reflective skills to unmask meaning. Despite all the advantages, the universality of the results from the study can best be confirmed when followed by a quantitative study.

Implications

The rise in plastic materials as pollutants in the modern environment makes it imperative that all major stakeholders should cooperate proactively to address the problem. An important outcome of this research is the generation of awareness of the dangers of different forms of plastic pollutants to the waterways in large population centers like Chicago. Baldwin et al. (2016) noted that the majority of the population is unaware of the

sources of these pollutants, their impact, and what the citizens can do to reduce microplastic pollution. Citizens need not wait for a repeat of the 19th century epidemic in water diseases in Chicago before acting to protect its waterways from this new pollutant. The awareness generated by this study can effect social change by changing the attitude of the public to protecting the waterways from microplastic and other forms of pollution.

The Gap in the Literature and Significance to Theory

Various management strategies have been advocated by researchers for the management of common resources such as water. Conflict of interests among business, city, civic and environmental advocate leaders constitutes an obstacle in finding a solution. According to Hoombeek et al. (2013), the best management practices may involve collaboration among these different interest groups. Such collaboration was instrumental in formulating the Clean Water Act (Hoombeek et al., 2013). However, because there is a knowledge gap on the sources of microplastic pollutants, their impact, and what the citizens can do to reduce microplastic pollution (Baldwin et al. 2016), there is a gap in literature on how stakeholders might collaborate in finding a solution to the problem of plastic pollution.

This study addressed the gap in literature on how potential conflict of interests among different stakeholders affect the implementation of policies designed to reduce the impact of plastic pollution. As noted earlier, the current study pointed to a moderate intensity of conflict among stakeholders though the level of intensity might change with further studies. The overwhelming view across all stakeholder groups is the need for further research on the level of microplastic pollution in the waterways as well as the impact of such pollutants on aquatic and human life. This finding is significant for the

application of ACF in this study because an essential aspect of the framework is that education enables potential adversaries to learn and moderate their policy stands and arrive at a compromise. According to Sabatier and Weible (2014), ACF views public policies from the angle of individual or organizational convictions, and such convictions, as noted in Chapter 2, can be moderated by policy-oriented learning that result in policy changes for improved water quality of the Chicago-area waterways.

The importance of empirical data in triggering cooperation as stressed in the ACF was illustrated in Weible and Sabatier's (2014) study of Lake Tahoe by the extent of belief change between collaborative institutions of different advocacy coalitions. The authors showed that participants' belief systems were moderated between 1984 and 2001 as more data on water pollution and its impact became available. The theoretical implication of the current study is that the results might reinforce the impact of learning on changing stakeholders' beliefs and lead to policy change.

Significance to Practitioners and Policymakers

The emergent themes from this study suggested that stakeholders see education as the best avenue for improving societal awareness of the dangers of plastic pollution. Thus, environmental science school syllabi should focus on the dangers of plastic pollution and its impact on urban growth and sustainability. Future generations will have increased knowledge of how to protect the environment from plastic pollution.

An important takeaway from the study was the acceptance that the existing pollution regulations under the federal Clean Water, the Illinois EPA at the state level, and the local ordinances in the Chicago-area have not addressed the problem of plastic

pollution. Recognizing the inadequacies in the existing regulations will enable policy makers to urgently work for the emergence of effective pollution control policies required to prevent an increase in the scourge of plastic pollution. Furthermore, the inadequacies of the current river basin management practice, river maintenance, and environmental injustice in poor neighborhoods should lead policy makers to devise equitable ways for river basin management. From the results of the study, practitioners and policy makers can realize the importance of involving the participation of citizen stakeholders in river basin management. Syberg et al. (2018) noted that including only specified stakeholders in formulating environmental policies risks alienating a vital segment of the population. Conversely, involving citizens while developing shared norms and activities can enable the development of community governance.

Implications for Social Change

The application of the research findings will improve societal knowledge of the dangers of plastic pollution, facilitate stakeholder cooperation, and engineer the societal pressure necessary in pushing for regulatory policies geared toward environmental and ecosystem protection. New pollution control regulations could lead to cleaner and safer water supplies in the Chicago-area. An additional contribution is the call for more research on the dangers of microplastic pollution, which can lead to a better understanding of the dynamics of environmental stress factors necessary to address policies on the location and intensity of urban activities (Zellner et al., 2016). The awareness of plastic pollution created by this study will add knowledge on the impact of plastic pollutants on the vulnerability of water supplies as the use of plastic products increases. The knowledge that

effluent from urban wastewater treatment plants is the principal source of microplastic pollutants to waterways will enable city planners to factor plastic pollutants as a stress factor while zoning urban activities.

The research result revealed that plastic pollutants in Chicago-area waterways can give rise to environmental injustice because the current structure of the watershed management in Chicago favors environmental injustice in less privileged neighborhoods. Danta (2010) noted that current environmental policies and the enforcing judicial system focus on acceptable levels of pollution and the best rules to enforce them without adequate consideration for inequities in the distribution of pollutants. Therefore, new environmental policies should be based on equity and not just on acceptable levels of pollution and the best rules to enforce them. Finally, the knowledge gain from this study can lead to an improved environment by creating awareness of the dangers of the plastic pollutants to aquatic and human lives. Applying the research findings to improve the waterways not only has the potential for improving scenic beauty but the lives of the citizens.

Conclusions

The aim of the study was to explore stakeholders' beliefs system about how plastic pollutants impact the health of Chicago-area waterways. I also explored how conflict of interests among stakeholders and differing belief systems can hamper efforts to develop or revise existing microplastic pollution regulations. The study creates the opportunity to forge a pollution control regulation that can prevent continued degradation of area water resources. The results can be used to increase awareness of the impacts of microplastic

pollution, engineer stakeholder cooperation, and how regulations for reducing the damaging effects of plastic pollution can improve sustainability and urban growth.

Planning any community requires a strong knowledge of the resources that will sustain such communities over time. The results add knowledge on the impact of plastic pollutants on the vulnerability of water supplies considering the increased use of plastic products. The stakeholders who took part in this study were determined to find ways to craft sensible approaches that reduce unforeseen negative consequences of plastic pollution on water supply. Among the advantages of local stakeholder involvement in crafting policies for preventing microplastic pollution is the prevention of environmental injustice.

In this case study, different stakeholders disagreed moderately about how to prevent plastic pollution. The disagreement appears to be more pronounced between environmental advocacy/activist groups and the government and the government stakeholder groups. Scientists, elected officials, and environmental consultants favored an approach that is supported by the increased research findings on the dangers of plastic pollution. They also favored innovative engineering and material science to address the problems. Contrary to the expected intense adversarial stand of business stakeholders on efforts to control microplastic pollution, business stakeholders showed a willingness to find a commonsense solution. Regardless of varying stakeholder interests and beliefs, the study showed that stakeholders were curious, open-minded, and determined to find an environmentally friendly solution.

The study findings illustrated the need for more scientific backed research focused not just on the extent of plastic pollution in the waterways but the effects of such pollution

on aquatic and human life. The details from such scientific research will enable different stakeholders to evaluate the balance between the economic values of the use of plastic materials and environmental degradation that result from pollution caused by such use. Such impact details will encourage stakeholders to form non-adversarial coalitions that will facilitate the push for policy to prevent plastic pollution. The outcome can be positive social change when new regulations and policies are enacted that can lead to cleaner water resources required to sustain generations to come.

References

Abrar, S., Lovenduski, J., & Margettts, M. (2000). Feminist ideas and domestic violence policy change. *Political Studies, 48*(2), 239–262. doi:10.1111/1467-9248.00258

Acharya, A. S., Prakash, A., Saxena, P., & Nigam, A. (2013). Sampling: Why and how of it? *Indian Journal of Medical Specialties, 4*, 330–333. doi:10.7713/ijms.2013.0032

Alberts, E. C. (2014). Recycled plastic clothing: Solution or threat. Retrieved from http://www.earthisland.org/journal/index.php/oeuvre/Elizabeth-Claire-Alberts/

Aluwihare-Samaranayake, D. (2012). Ethics in qualitative research: A view of the participants' and researchers' world from a critical standpoint. *International Journal of Qualitative Methods, 11*, 65–81. doi:10.1177/160940691201100208

Andraka-Christou, B. (2015). Policy process lessons from the Orphan Drug Act: Applications for health policy advocates. *Journal of Entrepreneurship & Public Policy, 4*(3), 278–297. doi:10.1108/JEPP-12-2013-0052

Andreen, W. L. (2003). The evolution of water pollution control in the United States—State, local, and federal Efforts, 1789-1972: Part II. *Stanford Environmental Law Journal*, *22*(2), 215. doi:10.2307/1227226

Baldwin, A. K., Corsi, S. R., & Mason, S. A. (2016) Plastic debris in 29 Great Lakes tributaries: Relations to watershed attributes and hydrology. *Environmental Science. Technology, 50*(19) 10377–10355. Doi:10.1021/acs.est.6b02917

Blakeney, A. B., & Marshall, A. (2009). Water quality, health, and human occupations. *American Journal of Occupational Therapy, 63*(1), 46–57. doi:10.5014/ajot.63.1.46

Bowen, G. A. (2009). Document analysis as a qualitative research method. *Qualitative Research Journal, 9*(2), 27–40. doi:10.3316/qrj0902027

Burkholder, G. J., Cox, K. A., & Crawford, L. M. (2016). *The scholar-practitioner's guide to search design.* Baltimore, MD: Laureate.

Camagni, R., Capello, R., & Nijkamp, P. (2001). Managing sustainable urban environments. In R. Paddison (Ed.), *Handbook of urban studie*s (pp. 124–140). London, England: Sage. Doi:10.4135/9781848608375.n8

Carter, N., Bryant-Lukosius, D., DiCenso, A., Blythe, J., & Neville, A. J. (2014). The use of triangulation in qualitative research. *Oncology Nursing Forum, 41*, 545–547. doi:10.1188/14.ONF.545547

Changnon, S. A. (2010). A unique solution to Chicago's water pollution: Tunnels and reservoirs. *Transactions of the Illinois State Academy of Science, (*3–4), 119–125. Retrieved from https://search-ebscohost-com.ezp.waldenulibrary.org/login.aspx?direct=true&db=edsgea&AN=edsgcl.249136264&site=eds-live&scope=site

Childers, D. L., Pickett, S. T., Grove, J. M., Ogden, L., & Whitmer, A. (2014). Research Paper: Advancing urban sustainability theory and action: Challenges and opportunities. *Landscape and Urban Planning, 125*, 320–328. doi:10.1016/j.landurbplan.2014.01.022

Childers, D. L., Cadenasso, M. L., Grove, J. M., Marshall, V., McGrath, B., & Pickett S. T. A. (2015). An ecology for cities: A transformational nexus of design and ecology to

advance climate change resilience and urban sustainability. *Sustainability, 7*(4), 3774–3791. doi:10.3390/su7043774

Colias, M., Lavalley, A., & Napoleon, C. (2017, April 20). Three environmental activists sound off on the future of the Calumet region. *Chicago Tribune*. Retrieved from https://www.chicagotribune.com

Cope, D. G. (2014). Methods and meaning: Credibility and trustworthiness of qualitative research. *Oncology Nursing Forum, 41*, 89–91. doi:10.1188/14.ONF.89-91

Corbin, J., & Strauss, A. (2008). *Basics of qualitative research: Techniques and procedures for developing grounded theory* (3rd ed.). Thousand Oaks, CA: Sage. doi:10.4135/9781452230153

Creswell, J. W. (2013). *Qualitative inquiry and research design: Choosing among five approaches* (3rd ed.). Los Angeles, CA: Sage.

Daniel Béland, A., & Cox, R. H. (2016). Ideas as coalition magnets: coalition building, policy entrepreneurs, and power relations, *Journal of European Public Policy, 23*(3), 428–445. doi:10.1080/13501763.2015.1115533

Danta, V. R. (2010). VX in TX: chemical weapons incineration and environmental injustice in Port Arthur, Texas. *Fordham Environmental Law Review*, (2–3), 415. doi:10.7551/mitpress/8157.003.0009

Darawsheh, W. (2014). Reflexivity in research: Promoting rigour, reliability and validity in qualitative research. *International Journal of Therapy & Rehabilitation, 21*(12), 560–568. doi:10.12968/ijtr.2014.21.12.560.

Denzin, N. K., & Lincoln, Y. S. (2013). Chapter 1: Introduction: The discipline and practice of qualitative research. In *The landscape of qualitative research* (4th ed., pp. 1–44). Thousand Oaks, CA: Sage. Retrieved from http://www.sagepub.com/sites/default/files/upm-binaries/17670_Chapter1.pdf

Drevno, A. (2016). Policy tools for agricultural nonpoint source water pollution in the U.S. and E.U. *Management of Environmental Quality: An International Journal, 27*(2), 106–123. doi:10.1108/MEQ-12-2014-0177

Driedger, A. G. J., Dürr, H. H., Mitchell, K., & Van Cappellen, P. (2015). Plastic debris in the Laurentian Great Lakes: A review. *Journal of Great Lakes Research, 41,* 9–19. Retrieved from https://uwspace.uwaterloo.ca/handle/10012/11956?show=full

Fischer, C. T. (2009). Bracketing in qualitative research: Conceptual and practical matters. *Psychotherapy Research,* 19, 583–590. doi:10.1080/10503300902798375

Flick, U. (2007). *Qualitative Research kit: Designing qualitative research.* London, England: Sage. doi:10.4135/9781849208826

Galishoff, S. (1980). Triumph and failure. In M. V. Melosi (Ed.), *Pollution and reform in American cities, 1870–1930* (pp. 35–57). Austin, TX: University of Texas Press.

Gasteyer, S. P. (2008). Agricultural transitions in the context of growing environmental pressure over water. *Agriculture and Human Values, 25*(4), 469–486. doi:10.1007/s10460-008-9137-x

Georgescu, M., Chow, W. T. L., Wang, Z. H., Brazel, A., Trapido-Lurie, B., Roth, M., & Benson-Lira, V. (2015). Prioritizing urban sustainability solutions: coordinated approaches must incorporate scale-dependent built environment induced effects.

Environmental Research Letters, 10(6). Retrieved from http://iopscience.iop.org/article/10.1088/1748-9326/10/6/061001/meta

Goldman, D., Pe'er, S., & Yavetz, B. (2017). Environmental literacy of youth movement members: Is environmentalism a component of their social activism? *Environmental Education Research, 23*(4), 486–514. doi:10.1080/13504622.2015.1108390

Gonzalez, G. A. (2013). The U.S. politics of water pollution policy: Urban growth, ecological modernization, and the vending of technology. *Capitalism, Nature, Socialism, 24*(4), 105–121. doi:10.1080/10455752.2013.845587

Guest, G., Bunce, A., & Johnson, L. (2006). How many interviews are enough? An experiment with data saturation and variability. *Field Methods*, *18*(1), 59–82.

Henley, J. G. (2000). The sanitary city: urban infrastructure in America from colonial times to the present. *Urban History Review. Revue D'histoire Urbaine, 29*(1), 75–76.

Harrinkari, T., Katila, P., & Karppinen, H. (2016). Stakeholder coalitions in forest politics: revision of Finnish Forest Act. *Forestry Policy and Economics*, *67,* 30–37.

Henry, A. D., Ingold, K., Nohrstedt, D., & Weible, C. M. (2014) Policy change in comparative contexts: Applying the advocacy coalition framework outside of Western Europe and North America. *Journal of Comparative Policy Analysis: Research and Practice, 16*(4), 299–312. doi:10.1080/13876988.2014.941200

Hoombeek, J., Hansen, E., Ringquist, E., & Carlson, R. (2013). Implementing water pollution policy in the United States: Total maximum daily loads and collaborative

watershed management. *Society & Natural Resources*, 26(4), 420–436. doi:10.1080/08941920.2012.700761

Hoppe, R., & Peterse, A. (1993). *Handling frozen fire*. Boulder, CO: Westview Press.

Houghton, C., Casey, D., Shaw, D., & Murphy, K. (2013). Rigor in qualitative case-study research. *Nurse Researcher, 20,* 12–17. Retrieved from http://journals.rcni.com/journal/nr

Huang, T. T. Cawley, J. H., Ashe, M., Costa, S. A., Frerichs, L. M., Zwicker, L., Kumanyika, S. K. (2015). Mobilisation of public support for policy actions to prevent obesity. *The Lancet, 385*(9985), 2422–2431. doi:10.1016/S0140-6736(14)61743-8

Illinois Environmental Council. (2018). *Who we are.* Retrieved from https://ilenviro.org/who-we-are/

Ingold, K., Fischer, M., & Cairney, P. (2017). Drivers for policy agreement in nascent subsystems: An application of the advocacy coalition framework to fracking policy in Switzerland and the UK. *Policy Studies Journal*, *45*(3), 442–463. doi:10.1111/psj.12173

Irvin, R. A., & Stansbury, J. (2004). Citizen participation in decision making: Is it worth the effort? *Public Administration Review, 64*(1), 55–65. https://doi-org.ezp.waldenulibrary.org/10.1111/j.1540-6210.2004.00346.x

Jager, N., Challies, E., Kochskämper, E., Newig, J., Benson, D., Blackstock, K., Collins, K., et al. (2016). Transforming European water governance? Participation and river

basin management under the EU water framework directive in 13 member states. *Water*, *8*(4), 156. Retrieved from http://10.3390/w8040156

James, P. (2015). *Urban sustainability in theory and practice: Circles of sustainability*. New York, NY: Routledge.

Jenkins-Smith, H., Silva, C. L., Gupta, K., & Ripberger, J. T. (2014). Belief system continuity and change in policy advocacy coalitions: Using cultural theory to specify belief systems, coalitions, and sources of change. *Policy Studies Journal,* (4), 484.

Johnson, J. E., Kramer, A. J., & MacDonald Gibson, J. (2015). Community perspectives on the risk of indoor air pollution arising from contaminated groundwater. *New Solutions: A Journal of Environmental & Occupational Health Policy, 25*(1), 59–77. doi:10.1177/1048291115569026

Kaushal, S. S., McDowell, W. H., Wollheim, W. M., Newcomer Johnson, T. A., Mayer, P. M., Belt, K. T., & Pennino, M. J. (2015). Urban evolution: The role of water. *Water, 7*(8), 4063. doi:10.3390/w7084063

Kelly-Reif, K., & Wing, S., (2016). Urban-rural exploitation: An underappreciated dimension of environmental injustice. *Journal of Rural Studie*s, *47*, 350–358.

Khayatzadeh-Mahani, A., Breton, E., Ruckert, A., & Labonté, R. (2017). Banning shisha smoking in public places in Iran: an advocacy coalition framework perspective on the policy process and change, *Health Policy and Planning*, *32*(6), 835–846. doi:10.1093/heapol/czx015

Kim, Y., & Darnall, N. (2016). Business as a collaborative partner: Understanding firms' sociopolitical support for policy formation. *Public Administration Review, 76*(2), 326–337. doi:10.1111/puar.12463

Kulcsar, L. J., Selfa, T., & Bain, C. M. (2016). Privileged access and rural vulnerabilities: Examining social and environmental exploitation in bioenergy development in the American Midwest. *Journal of Rural Studies, 47,* 291–299. doi:10.1016/j.jrurstud.2016.01.008.

Leach, W. D., & Sabatier, P. A. (2003). *Consensus-based environmental politics: testing the importance of institutional design and advocacy coalitions.* Conference Papers of the American Political Science Association, 1–18.

Leach, W. D., Weible, C. M., Vince, S. R., Siddiki, S. N., & Calanni, J. C. (2014). Fostering learning through collaboration: knowledge acquisition and belief change in marine aquaculture partnerships. *Journal of Public Administration Research & Theory, 24*(3), 591–622. doi:10.1093/jopart/mut011

Leedy, P. D., & Ormrod, J. E. (2013). *Practical research: Planning and design* (10th ed.). Boston, MA: Pearson Education.

Leslie, H. A., van der Meulen, M. D., Kleissen, F. M., & Vethaak, A. D. (2011). *Microplastic litter in the Dutch marine environment: Providing facts and analysis for Dutch policymakers concerned with marine microplastic litter*. (Report No. 1203772-000). Amsterdam, Netherlands: Deltares / IVM-VU.

Maher, C., Hadfield, M., Hutchings, M., & de Eyto, A. (2018). Ensuring rigor in qualitative data analysis: Aa design research approach to coding combining Nvivo with

traditional material methods. *International Journal of Qualitative Methods, 17*(1). doi:10.1177/1609406918786362

Maor, M. (n.d.). Policy entrepreneurs in policy valuation processes: The case of the coalition for environmentally responsible economies. *Environment and Planning C-Politics and Space, 35*(8), 1401–1417. doi:10.1177/2399654417700629

Markarda, J., Suter, M., Ingold, K. (2016). Socio-technical transitions and policy change–Advocacy coalitions in Swiss energy policy. *Environmental Innovations and Societal Transitions*, *18,* 215-237.

Marshall, C., & Rossman, G. B. (2011). *How should one go about designing a qualitative research project?* [Streaming video]. Retrieved from doi:10.4135/9781412993746

Mason, M. (2010). Sample size and saturation in Ph.D. studies using qualitative interviews. *Forum Qualitative Social Research Sozialforschung, 11*(3).

Matti, S., Lundmark, C., & Ek, K. (2017). Managing participation: Prospects for learning and legitimacy-creation in Swedish water management. *Water Policy*, *19,* 99–114.

McCusker, K., & Gunaydin, S. (2015). Research using qualitative, quantitative or mixed methods and choice based on the research. *Perfusion, 30,* 537–542. doi:10.1177/0267659114559116

McKendry, C., & Janos, N. (2015). Greening the industrial city: Equity, environment, and economic growth in Seattle and Chicago. *International Environmental Agreements: Politics, Law & Economics*, *15*(1), 45–60. doi:10.1007/s10784-014-9267-0

McCormick, A., Hoellein, T. J, Mason, S. A, Schluep, J., & Kelly, J. J. (2014). Microplastic is an abundant and distinct microbial habitat in an urban river.

American Chemical Society, Journal of Environmental Science Technology, *48*, 11863–11871.

Meijerink, S. (2006). Understanding policy stability and change. The interplay of advocacy coalitions and epistemic communities, windows of opportunity, and Dutch coastal flooding policy, 1945–2003. *Journal of European Public Policy, 12*(6), 1060–1077. doi:10.1080/13501760500270745

Melosi, M. V., & Hanley, J. G. (2000). The sanitary city: Urban infrastructure in America from colonial times to the present. *Urban History Review, 29*(1), 75–76.

Menahem, G., & Gilad, S. (2016). Policy stalemate and policy change in Israel's water sector 1970-2010: Advocacy coalitions and policy narratives. *Review of Policy Research, 33*(3), 316–337. doi:10.1111/ropr.12172

Metson, G. S., Iwaniec, D. M., Baker, L. A., Bennett, E. M., Childers, D. L., Cordell, D., & . . . White, S. (2015). Urban phosphorus sustainability: Systemically incorporating social, ecological, and technological factors into phosphorus flow analysis. *Environmental Science & Policy*, 47, 1–11. doi:10.1016/j.envsci.2014.10.005

Mihaylov, N. L., & Perkins, D. D. (2015). Local environmental grassroots activism: Contributions from environmental psychology, sociology and politics. *Behavioral Sciences, 5*(1), 121–153. doi:10.3390/bs5010121

Miles, M. B., Huberman, A. M., & Saldana, J. (2014). *Qualitative data analysis: A methods sourcebook*. Thousand Oaks, CA: Sage.

Mitchell, R. K., Weaver, G. R., Agle, B. R., Bailey, A. D., & Carlson, J. (2016). Stakeholder agency and social welfare: Pluralism and decision making in the multi-objective corporation. *Academy of Management Review, 41*(2), 252–275. doi:10.5465/amr.2013.0486

Munn, Z., Porritt, K., Lockwood, C., Aromataris, E., & Pearson, A. (2014). Establishing confidence in the output of qualitative research synthesis: The ConQual approach. *BMC Medical Research Methodology, 14*(108), 1–7. doi:10.1186/1471228814108

Murchison, K. M. (2005). Learning from more than five-and a half decades of federal pollution control legislation: Twenty lessons for the future. *Boston College Environmental Affairs Law Review*, 32(3), 527–598.

O'Connell, F. (1969). *Pluralism in political analysis*. New York, NY: Routledge.

Olofsson, K. L., Katz, J., Costie, D. P., Heikkila, T., & Weible, C. M. (2018). A dominant coalition and policy change: an analysis of shale oil and gas politics. *Journal of Environmental Policy and Planning, 20*(5).

Ostrom, E. (2011). Background on the institutional analysis and development framework. *Policy Studies Journal, 39*(1), 7–27. doi:10.1111/j.1541-0072.2010.00394.x

O'Sullivan, E., Rassel, G. R., Berner, M., & Taliaferro, J. D. (2017). *Research methods for public administrators* (6th ed.). New York, NY: Routledge.

Patton, M. Q. (2002). *Qualitative research and evaluation methods* (3rd ed.). Thousand Oaks, CA: Sage.

Pesmatzoglou, D., Nikolaou, I. E., Evangelinos, K. I., & Allan, S. (2014). Extractive

multinationals and corporate social responsibility: A commitment towards achieving the goals of sustainable development or only a management strategy? *Journal of International Development, 26*(2), 187–206. doi:10.1002/jid.2871

Phillpots, L. (2013). An analysis of the policy process for physical education and school sport: the rise and demise of school sport partnerships. *International Journal of Sport Policy,* 5(2), 193. doi:10.1080/19406940.2012.666558

Ravitch, A.M., & Carl, N.M. (2016). *Qualitative research: Bridging the conceptual, theoretical, and methodological*. Thousand Oaks, CA: Sage.

Register, R. (2006). *Ecocities: Rebuilding cities in balance with nature.* Gabriola Island, BC: New Society.

Romero-Lankao, P., Wilhelmi, O., Hayden, M., & Gnatz, D.M. (2016). Urban sustainability and resilience: From theory to practice. *Sustainability, 8*(12). https://doi-org.ezp.waldenulibrary.org/10.3390/su8121224

Roulston, K. (2010). *Reflective interviewing: A guide to theory and practice.* London, England: Sage. doi:10.4135/9781446288009

Rozbicka, P., & Spohr, F. (2016). Interest groups in multiple streams: Specifying their involvement in the framework. *Policy Sciences, 49*(1), 55–69. doi:/10.1007/s11077-015-9227-8

Rubin, H. J., & Rubin, I. S. (2005). *Qualitative interviewing: The art of hearing data* (2nd ed.). Thousand Oaks, CA: Sage. doi:10.4135/9781452226651

Rubin, H. J., & Rubin, I. S. (2012). *Qualitative interviewing: The art of hearing data* (3rd ed.). Thousand Oaks, CA: Sage.

Rudestam, K. E., & Newton, R. R. (2015). *Surviving your dissertation: A comprehensive guide to content and process* (4th ed.). Thousand Oaks, CA: Sage.

Sabatier, P. A. (1988). An advocacy coalition framework of policy change and the role of policy-oriented learning therein. *Policy Sciences, 21*(2-4), 129–168.

Sabatier, P. A. (1999). Fostering the development of policy theory. In P. Sabatier, (Ed.)., *Theories of the policy process* (pp. 321-336). New York, NY: Perseus.

Sabatier, P. A., & Jenkins-Smith, H. C. (1993). *Policy change and learning: An advocacy coalition approach*. Boulder, CO: Westview Press.

Sabatier, P. A., & Jenkins-Smith, H. C. (1999). The advocacy coalition framework: An assessment. In P. Sabatier (Ed.)., *Theories of the policy process* (pp. 117–166). Boulder, CO: Westview Press.

Sabatier, P. A., & Weible, C. M. (Eds.). (2014). *Theories of the policy process* (3rd ed.). Boulder, CO: Westview Press.

Science for Environment Policy. (2015). *Indicators for sustainable cities: In-depth Report 12.* Produced for the European Commission DG Environment by the Science Communication Unit, UWE, Bristol. Available at http://ec.europa.eu/environment/integration/research/newsalert/pdf/indicators_for_sustainable_cities_IR12_en.pdf

Shen, L., Ochoa, J .J., Shah, M. N., & Zhang, X. (2011). The application of urban sustainability indicators: A comparison between various practices. *Habitat International, 35*(1), 17–29.

Shento, A. K. (2004) Strategies for ensuring trustworthiness in qualitative research projects. *Education for Information, 22*(2), 63–75.

Silverman, D. (2016). *Qualitative research* (4th ed.). Thousand Oaks, CA: Sage

Simon, H. (1985). Human nature in politics: The dialogue of psychology with political science. *American Political Science Review 79*, 293–304.

Simon, M., Lundmark, C., & Ek, K. (2017). Managing participation: Prospects for learning and legitimacy-creation in Swedish water management. *Water Policy, 19*(1), 99–114. doi: 10.2166/wp.2016.023

Smith, C. (2013). *City water, city life: Water and the infrastructure of ideas in urbanizing Philadelphia, Boston, and Chicago*. Chicago, IL: University of Chicago Press.

Smith, J., & Firth, J. (2011). Qualitative data analysis: The framework approach. *Nurse Researcher, 18,* 52–62. doi:10.7748/nr2011.01.18.2.52.c8284

Sutton, R., Mason, S. A., Stanek, S. K., Willis-Norton, E., Wren, I. F., & Box, C. (2016). Microplastic contamination in the San Francisco Bay California U.S.A. *Marine Pollution Bulletin, 109*(1), 230–235

Syberg K., Hansen S. F., Christensen T. B., & Khan F. R. (2018). Risk perception of plastic pollution: importance of stakeholder involvement and citizen science. In Wagner M. & Lambert S. (eds.), *Freshwater microplastics. The handbook of environmental chemistry* (Vol. 58). Boston, MA: Springer.

Tessier, S. (2012). From field notes, to transcripts, to tape recordings: Evolution or combination? *International Journal of Qualitative Methods, 11*, 446–460. doi:10.1177/160940691201100410

Thom, B., Herring, R., Thickett, A., & Duke, K. (2016). The Alcohol Health Alliance: The emergence of an advocacy coalition to stimulate policy change. *British Politics, 11*(3), 301–323. doi:10.1057/bp.2015.50

Thomas, E. & Magilvy, J. K. (2011). Qualitative rigor or research validity in qualitative research. *Journal for Specialists in Pediatric Nursing, 16*, 151–155. doi:10.1111/j.17446155.2011.00283.x

Wagner, M., Scherer, C., Alvarez-Muñoz, D., Brennholt, N., Bourrain, X., Buchinger, S., & Reifferscheid, G. (2014). Microplastics in freshwater ecosystems: What we know and what we need to know. *Environmental Sciences Europe, 26*(1), 12. doi:10.1186/s12302-014-0012-7

Walden University, Center for Research Quality. (2012). *Ph.D. dissertation process and documents.* Retrieved from http://academicguides.waldenu.edu/researchcenter/osra/phd

Watkins, D. C. (2012). Qualitative research: The importance of conducting research that doesn't "count." *Health Promotion Practice, 13*, 153–158. doi:10.1177/1524839912437370

Wei, Y., Huang, C., Lam, P. I., & Yuan, Z. (2015). Sustainable urban development: A review on urban carrying capacity assessment. *Habitat International, 46*, 64–71. doi:10.1016/j.habitatint.2014.10.015

Weible, C. M., & Sabatier, P. A. (2004). *Comparing rational and advocacy models of policy analysis: Changes in Lake Tahoe water quality problems and alternatives*

from 1984 to 2001. Conference Papers -- American Political Science Association, 1-39. doi:apsa_proceeding_30178

Weible, C. M., & Sabatier, P. A. (2005). Comparing policy networks: Marine protected areas in california. *Policy Studies Journal, 33*(2), 181–201. doi:10.1111/j.1541-0072.2005.00101.x.

Weible, C. M., & Sabatier, P. A. (2009). Coalitions, science, and belief change: comparing adversarial and collaborative policy subsystems. *Policy Studies Journal, 37*(2), 195–212. doi:10.1111/j.1541-0072.2009.00310.x.

Weible, C. M., Sabatier, P. A., Jenkins-Smith, H. C., Nohrstedt, D., Henry, A. D., & deLeon, P. (2011). A quarter century of the advocacy coalition framework: an introduction to the special issue. *Policy Studies Journal, 39*(3), 349–360.

Weible, C., Sabatier, P. A., & McQueen, K. (2009). Themes and variations: Taking stock of the advocacy coalition framework. *Policy Studies Journal, 37*(1), 121–140. doi: 10.1111/j.1541-0072.2008.00299.x

Wing, S., Cole, D., & Grant, G. (2000). Environmental injustice in North Carolina's hog industry. *Environmental Health Perspectives, 108*(3), 225–231. doi.org/10.1289/ehp.00108225

Yigitcanlar, T., Dur, F., & Dizdaroglu, D. (2015). Towards prosperous sustainable cities: A multiscalar urban sustainability assessment approach. *Habitat International, 45*, 36–46. doi:10.1016/j.habitatint.2014.06.033

Yigitcanlar, T., Terriman, S. (2015). Rethinking sustainable urban development: towards an integrated planning and development process. *International Journal of*

Environmental Science and Technology. 12 (1) 341–352. doi:10.1007/s13762-013-0491-x

Yigitcanlar, T., Lee, S. H., (2014) Korean ubiquitous-eco-city: A smart sustainable urban form or a branding hoax? *Technological Forecasting and Social Change, 89,* 100–104. https://doi.org/10.1016/j.techfore.2013.08.034

Yin, R. K. (2014). *Case study research: Designs and methods* (5th ed.). Thousand Oaks, CA: Sage. 282 pages. The Canadian Journal of Program Evaluation. Doi:10.3138/cjpe.30.1.108

Yin, R. K. (2016). *Qualitative research from start to finish* (2nd ed.). New York, NY: Guilford Press. ISBN: 978-1-4625-1797-8. 386 pp.

Zafonte, M., & Sabatier, P. (2004). Short-term versus long-term coalitions in the policy process: automotive pollution control, 1963–1989. *Policy Studies Journal*, 32(1), 75–107. doi:10.1111/j.0190-292X.2004.00054x.

Zellner, M. L., Theis, T. L., Karunanithi, A. T., Garmestani, A. S., & Cabezas, H. (2008). A new framework for urban sustainability assessments: Linking complexity, information, and policy. *Computers Environment and Urban Systems, 32*(6), 474–488.doi: 10.1016/j.compenvurbsys.2008.08.003.

Appendix A: Recruitment Letter

Greetings,

My name is Edmund Okoli and I am a PhD student at Walden University. I am conducting a research study about the impact of plastic pollution in Chicago-area waterways and the impact of such pollution on urban development and sustainability. I am seeking an understanding of your views on how available knowledge can lead to societal cooperation in finding a solution to the problem plastic pollution. I am reaching out to you to ask if you would like to participate in a 30-minute interview for this research project. I will provide you with the interview questions prior to our scheduled interview. Participation is completely voluntary and your answers will be anonymous. Your answers will not be attributed to you by name. I will allow you to review a transcript of the interview before I incorporate it in my research. Interviews will take place on-site at your facility or any other location of your choice in a quiet and private setting, preferably your office.

I will also make a copy of my findings available to you if you are interested.

If you are interested, please email me your response. I will also follow up with a phone call to see if you are interested.

If you have any questions, please do not hesitate to contact me.

Thank you for your time.

Edmund U Okoli
PhD Student
Walden University

Appendix B: Interview Script

Interview Script

"Thank you for agreeing to speak with me today."

"The purpose of this interview is to get your perspective on how to improve stakeholder cooperation for improving on the problem plastic pollution in Chicago-area waterways. Specifically, I want to understand any barriers between you and other perspectives and how best to overcome any such barriers."

"I will now review the consent form. The consent form establishes that the subject has (a) been informed about the study; (b) is participating voluntarily; and (c) may exit the study at any time."

"The interview will last about 30 minutes and I will audio record the interview to make sure that your responses are recorded accurately."

"Your answers aren't going to be attributed to you by name, I will allow you to review a transcript of the interview before I incorporate it in my research. I will also make a copy of my findings available to you if you are interested."

"I am happy to answer any questions you have regarding the study. Do you have any questions for me before we begin?"

"Please read and sign the Consent Form."

Interview Questions

1. What is your perception the problem that plastic pollutants pose in Chicago-area waterways?

2. What are your views on the efficacy of existing pollution control policy instruments and their suitability in curtailing microplastic pollution?
3. As a stakeholder in the (environment/business/government) area how do you view (environment/business/government) role in addressing the problem of plastic pollution?
4. How do you anticipate other stakeholder groups to contribute in mitigating the problem of plastic pollution in waterways?
5. What are some of the obstacles you anticipate in finding a common ground among different stakeholders to plastic control?
6. What are your views on environmental injustice that plastic pollution from Chicago-area waterways might cause rural downstream dwellers?
7. Please provide any comments that you feel are important when developing policies to help mitigate microplastic pollution.

Appendix C: Interview Highlights

Table C1.

Theme on Plastic Pollution Perception and Awareness of Dangers

Environmentalist Group	Business Group	Government Group
The focus our organization over the last couple years has been working with restaurants to try to reduce the use of plastic straws and other disposable plastics. Straws and other larger floatables can break down to become smaller plastic and those continue persist in our local waterways.	From what I understand of what the impact is, they are finding microplastics in wildlife, they are finding it obviously physically on the shores. They are finding it in our water and our bodies. So, it is pretty serious problem and needs to be addressed.	The current regulatory framework addresses sources of pollutants. But with microplastics we do not know fully understand where they are coming from. With microplastics that are unseen, we don't know. We need to find out impact on aquatic life, in fish, and other organisms. We need to do more research on sources so that we can pinpoint where these sources are, and then come up with some measures to control these sources.
We bring a lot of volunteers out to do beach clean-ups with us. We collect thousands of pounds of trash every year on both the Chicago River and Lake Michigan Shoreline. I see government entities taking a big responsibility for the management of waste, things like litter control in our waterways, reducing the occurrence of combined sewer overflow so that we have less pollution going into our waterways.	I think you will see things like the micro beads that we used to see. Someone came up with scrubbing micro plastic beads to put into our body cleansers. I think recently they got those banned in Illinois or nationwide, but you know, someone had the smarts to figure out that these are not getting filtered out. They are ending up in the waterways or washing them down the drain	Floatable plastics might have an impact on recreation, but then again, we don't know the extent of the problem. Certainly, visible plastic is not enjoyable if you are out in your boat and you pass a bunch of floating plastic cups. It is not pleasant but doesn't hurt anyone that I am aware of. I am not aware that there is any standardization of testing for micro pollutants in water and without that common agreement on a method to determine concentrations you do not have a sound scientific basis because different researchers will have different methods and come up with different results

For us with water quality and the Chicago River system it has been very valuable to bring people to respond to wildlife concerns regarding large floatables. In the North Branch of the Chicago River for the last month, there has been a mallard duck with a six-pack ring around its neck with volunteers trying to catch it. Of course, it is a duck, so it can swim and fly so no one has got it. It is just like classic horror.	and things like that are not great

Table C2

Theme on Policy and Regulatory Development

Environmentalist Group	Business Group	Government Group
I think the plastic bag fee resulted in like a 40% reduction within less than a year. So, it has been pretty effective but I think there are a lot of places in our policy in Chicago, in Illinois and federally where there could be stronger regulations	You know, I think that creating a policy that simply bans them is not realistic. It has to be a gradual overtime kind of a program where maybe it is a higher tax on bottled water. In a place where we have very good drinking water to begin with why do people use bottled water? Is it for convenience is or for safety? There are different facets to it. But I think the legislation and the policies need to be tailored to where the plastic is coming from.	I think the fundamental part at this point in time is to gather data to find the extent of this of this pollution.
We support and collaborate with other local researchers to try to advance our understanding of the problem of a plastic pollution, especially how it is impacting the waterways. I guess our focus is on wildlife as an aquarium, but we also want to better understand how it is impacting human health too.		Generally, people have a sense of denial about the problem and unless it is brought to their attention in very graphic terms. As we see in the existing regulations for toxic metals and hazardous waste, it can be shown how pollutants impact a person's health. In the case of plastic, a person doesn't think it has any negative impact on human health, and so people will deny or take no interest in the problem. Public education is going to be very important in addressing plastic pollution.
We are looking at the sources of plastic litter in partnership other groups, but we want the city and the Water Reclamation District to be part of that. As far as microplastics I don't know. I know of ongoing research, but I am unaware of any effort on anybody's part other than what we are doing an overall litter picture to address microplastics specifically	I think a lot of that is basically people are going to try and generally try and find the cheapest easiest solution to whatever they are trying to do and the only way to really correct that is to impact their behavior as you know, whether it is monetarily that that's	The state and the federal regulatory mechanism is based on the impact on aquatic life to organisms that survive in our waterways and to my knowledge there has been no research done on this. So, we really can't demonstrate. There's a problem in this

	probably the strongest one. Just have a monetary impact on their choices. If you have an alternative if you have a choice you can make that might be less convenient that is single-use plastic. I think people need to be more aware of making a better choice for the long-term rather than what is easiest for them right now.	When it comes to plastics there is lots of different kinds of materials. Many different shapes, many different chemicals there they are grouped together in this term plastic, but it is a wide array of materials and it has a wide array of sources so the much we can come to is that there is many sources of plastic pollution in the environment. So, there are just as many solutions. You have to keep in mind that it is a diversity of materials at a diversity of places with just as many potential solutions to address In developing policies, I think of patience when it comes the pace of innovation in engineering and material Science. I am thinking about patience when it comes to like to scientific discovery from the ecological perspective. The scientific process that is underway as it relates to engineering is also slow and also takes a long time to discover new materials and test new material. The topic of plastic pollution is relatively young compared to many other issues about water quality that we developed good methods and innovations.

	I don't think the Water Reclamation district is the principal guardian of water quality as the Environmental Protection Agency is in terms of its regulatory authority to oversee water quality both in rivers and streams and in drinking water. However, as the principal sewage treatment agency and Stormwater management agency, the Water Reclamation District should attempt to enact policies and practices to try to reduce or eliminate plastic pollution in our waterways.

Table C3

Theme on Stakeholder Cooperation

Environmentalist Group	Business Group	Government Group
There are a lot of volunteer groups that go to do litter cleanups and help to connect people and to make a bit of a dent in improving it but when it comes to microplastics, I do not know of a lot that is happening to address the problem. We bring a lot of volunteers out to do beach clean-ups with us. We collect thousands of pounds of trash every year on both the Chicago River and Lake Michigan Shoreline I also am hoping that that we can look to other stakeholders to do more around removing the litter that ends up in our waterways. We only have so much capacity by bringing volunteers out to do clean ups. So we rely on others to do more clean up as well and to try to remove the big pieces of litter from these waterways. So yeah, I am also part of a newly-formed Chicago River litter taskforce and what we are trying to do is come up with some ways that we can all collect data in the same way	Money tends to be at the core of everything. Large corporations have lobbying groups and folks who have an influence. What seems like a reasonable logical thing like getting rid of a product that damages the environment; well that product is big business that provides jobs for people that creates a hole if you trying to get rid of that. It seems like something that should be that you were pretty logical and pretty obvious. But at the end of the day you've got folks who have a job and their job is to promote this product or help this product sell and the product comes in up in a plastic container that is maybe not great for the environment but the economics of the product that's how they are.	Environmentalists often focus on ideal endpoints that may not be practical to reach through control of non-point sources. Government agencies such as MWRD or City of Chicago are hesitant to take measures beyond the “minimum legal requirements” because it entails expenditure of public moneys that are not justified by rule of law One stakeholder group that is rapidly growing could be classified as river recreationists or more broadly as river users. These are the public who come in contact with the waterways frequently via paddling, fishing, boating, walking the trails, dinning or socializing along the river, using water taxis for transportation, etc.

	There are different arguments you can make that are for products. So we need to find a way to bridge that and say well, okay. It's not going to happen all at once, but we need to gradually get away from these plastic products that we are so used to accepting at the end of the day that there is a problem for all.	

Table C4

Theme on Watershed Management and Environmental Injustice

Environmentalist Group	Business Group	Government Group
Considering the nature of the Chicago River when we look at pollution, especially in our waterways, pollution cruises downstream from upstream areas of our watershed which is much wealthier at the upstream than the downstream end. So all the river miles that we don't address plastic microplastic pollution or any kind of pollution, frankly all that aggregate on the south side of the city which already has issues. Environmental injustice is absolutely just built into the system the way that the river flows. So I think that is a huge problem that we need to think about the equity about who has got what and make sure that we are doing the same thing for every community and consider such in planning and coordination and then clearly anything that is happening upstream that keeps flowing ends up going all the way down stream and we know that we are helping create Dead Zone in the Gulf of Mexico. I think there is a lot of people that do rely on fishing in our local waterways as a as a source of food. I am just not sure what the full extent is. But I think that diminishing subsistence fishing would be one of the primary areas of environmental Injustice.	I am not directly familiar with the exact impact that plastic pollution can have but I understand that the population in Illinois is concentrated in Chicago and you tend to have people with money, voice and influence. People outside Chicago have a much more difficult time being heard and fighting for their environmental rights because they are simply not in this concentrated area where there is focus. So I think it is something to watch very closely.	This is a question that for a knowledgeable answer, would require to know more about just what the sources of plastic pollution are and how is it affecting rural downstream dwellers I don't know enough though to say that this is a problem or where it is a problem but if it is then certainly I think as an agency that contributes to significant flow in the Chicago waterways that affects downstream communities the Metropolitan Water Reclamation District should be cognizant that there may be environmental Injustice factors.