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(Re)interpreting vulnerabilities in the peri-urban Valley of Mexico: Toward a deeper and more actionable understanding of poverty in Mexico City's urban fringe

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(Re)interpreting vulnerabilities in the peri-urban Valley of Mexico: Toward a deeper and more actionable understanding of poverty in Mexico City's urban fringe

by

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Dedication

To my niece, Aurora Daphne Loder, that she may grow up in a less vulnerable and more resilient world.

Acknowledgements

In addition to my family and friends, I want to thank the countless individuals who helped make this project a reality. Dr. Sarah Dooling taught me to examine the world around me in beautiful new ways. Dr. Patricia Wilson provided constant support and guidance, and provided the initial opportunity to get to know the communities of peri-urban Mexico. Countless friends and colleagues in Mexico helped me along the way, keeping me safe and well fed and getting where I needed to go. They include but are not limited to: Sara Bejarano, Enrique Juárez Nuñez, Cinthya Garfias, Mónica Orduña, Uriel Salceda, Omar Alcalá, Lizbeth Marin, and community leaders in Llano Grande and El Tráfico. I would like to thank all of my interviewees for taking time out of their busy schedules to meet with me and contribute to my research. Back in Texas, my friend and Spanish tutor Giulianna Zambrano has provided endless support throughout the entire process, and Paola Nalvarte provided crucial help with transcriptions in the 11th hour. I also want to thank my friends and colleagues at the University of Texas who helped me come into my own as a Latin Americanist scholar, including Sara McTarnaghan, Samantha Maria Kattan and Dr. Bjørn Sletto. Lastly, I'd like to thank Geovan Salander and all of the wonderful *chilangos* that helped me fall in love with Mexico.

Abstract

(Re)interpreting vulnerabilities in the peri-urban Valley of Mexico: Toward a deeper and more actionable understanding of poverty in Mexico City's urban fringe

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Settlement patterns on the urban fringe can present a host of threats to sociopolitical and biophysical sustainability, at the personal, municipal, and ecosystem scale. Mexico City's expansive growth has forced the region's poorest inhabitants to the farthest margins in the neighboring State of Mexico, where they often live in conditions of personal hardship and settle in patterns that threaten the ecological health of environmentally sensitive areas. Following interviews with practitioners in three peri-urban municipalities in the Valley of Mexico, this report examines how local land use regulators interpret the vulnerabilities facing communities in their jurisdictions and presents a typology of vulnerabilities. The report explores the processes of politicization that produce and re-produce the vulnerabilities facing individuals, communities and ecosystems. Several concrete policy recommendations are made for incorporating holistic thinking about vulnerability into government decision-making, and resources are provided for further research.

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Chapter 1: Introduction

1.1 Purpose

Settlement patterns on the urban fringe can present a host of threats to sociopolitical and biophysical sustainability in any region, at the personal, municipal, and ecosystem scale. Mexico City's expansive growth has forced the region's poorest inhabitants to the city's farthest margins in the neighboring State of Mexico, where they often live in conditions of extreme personal hardship and in settlement patterns that threaten the ecological health of environmentally sensitive areas. Utilizing qualitative data collected in interviews with practitioners in three peri-urban municipalities in the Valley of Mexico, this report examines how local government land use regulators interpret the vulnerabilities facing communities in their jurisdictions. Conditions of vulnerability, as understood by interviewed government practitioners, can be characterized within three distinct categories: socio-economic, ecological, and political. Regulators often conceptualized socio-economic vulnerability at the individual or household scale, and these risks are often overlooked in municipal- and regional-scale decision-making. Ecological vulnerability was well understood at the regional scale, but regional ecological thinking is rarely contextualized with an acknowledgement of local socio-economic hardship. Political vulnerabilities were understood in the abstract but we have yet to see the effects of this awareness in government decision-making. Vulnerabilities are further politicized through interpretation, translation, and rhetoric, as individuals assess and act upon available information. This report begins to unpack the processes of politicization that produce and re-produce the vulnerabilities facing individuals, communities and ecosystems in the peri-urban Valley of Mexico, and makes a case for further research into the unique nuances of these processes in the local context.

1.2 Research Background

It should be noted here for the reader that this study was not chosen at random, nor through an empirical, systematic method for selecting a region or a population that most accurately represents peri-urban communities worldwide. In the summer of 2013, I had the distinct pleasure of getting to know community members and government practitioners in the Valley of Mexico through a Participatory Action Research field course, led by Dr. Patricia Wilson from the University of Texas along with local institutional partners. This engagement work has had a lasting impact on my academic and professional outlook and aspirations, and I have maintained ties with practitioners in the area. The topic of this Professional Report is a result of casual conversation with local regulators and the study was undertaken in hopes that the information will prove useful to local stakeholders.

These circumstances provided me with a great opportunity for a uniquely enriching study, but they also burdened me with a great responsibility. This study presented me with many unique personal challenges, which I have described in great detail in Chapter 3: Methodology. Among them was the challenge of responsibly navigating the nuances of qualitative research and remaining empirically rigorous while motivated by a personal connection with the place and its people. In other words, I found myself grappling with the element of loving-kindness. This personal loving kindness for the communities and individuals in the study area proved to be a strength rather than a weakness in my empirical endeavor, as it provided motivation and inspiration to push the envelope with my research and provide a high-quality and actionable product. I am eternally grateful to countless individuals in the Valley of Mexico for their kindness,

patience and support in this project. And I hope my study findings provide actionable information toward positive change in the region.

1.3 Research Overview

Utilizing qualitative research, this report explores two central questions: 1) How do municipal and regional regulators in peri-urban areas outside of Mexico City interpret vulnerabilities facing communities in their jurisdictions? And, 2) How do institutional interpretations of vulnerability produce and re-produce these conditions of risk in peri-urban areas outside of Mexico City? Chapter 2 provides a thorough review of the relevant literature, framing the conditions of vulnerability in the study area within the context of informal settlements in peri-urban Mexico and Latin America and establishing a model and definition of vulnerability. Chapter 3 provides more physical, social and political context for the study area: the municipalities of Tlalnepantla, Atizapán and Nicolás Romero, outside of Mexico City. Chapter 4 outlines the complete methodology for this study, from the selection of the study area and participants to the development, implementation and analysis of the interview protocol. Chapter 5 presents the study findings in the form of a typology of vulnerabilities in the study and a discussion of vulnerability interpretation and production. Finally, Chapter 6 provides policy recommendations for local policy-makers to better address politicized vulnerabilities in the study area.

Chapter 2: Literature Review

2.1 Framing the Peri-Urban Condition

This chapter aims to frame the study and its results within the context of current literature on the peri-urban condition in Mexico and Latin America, as well as the competing conceptual frameworks regarding vulnerability production. Following a conceptual history of how peri-urban conditions have been understood and addressed over time, the concept of vulnerability is explored in more detail and key terms are defined. The study ultimately aims to address a gap in the literature regarding the political, interpretive and rhetorical facets of vulnerability (re)production.

It is important here to first establish a definition of what is meant here by the term 'peri-urban.' Definitions and parameters for the term can get rather complicated, while others remain strikingly simple. For example, Williams et al. (2001) have defined 'peri-urban' areas as "low-density housing and road development on the periphery of urban areas, still retaining small areas of rural land within networks of suburban buildings." Using the case study of Morelia, Michoacán, which lies very close to the study area for this report, MacGregor-Fors has established a way to measure the "urban-wildland eco-tone of a city … based on the geographic interaction between urban areas and adjacent wildlands, [which] could represent a realistic and measurable way to define and establish 'peri-urban' areas in amoeboid-growing cities with circular/ellipsoid polygons." (MacGregor-Fors, 2010 p. 883) For the purposes of this study, however, the concept of peri-urbanity should remain flexible, referring to areas that were traditionally wilderness or rural agricultural land, and are now being rapidly urbanized. The definition used here

is based largely on David Simon, who defines the "peri-urban interface [as a] zone of (dynamic) transition or interaction between urban and rural areas; usually used in the context of rapidly urbanizing poor countries." (2008 p. 170) Another term used interchangeably in this piece is 'urban fringe,' which is used here as a direct synonym for 'peri-urban.' This latter term often goes undefined in the literature (Boischio et al. 2006) but is defined by David Simon as the "outer edge or transition zone between urban and rural areas; generally used in North American and European contexts." (2008 p. 170)

2.2 Governance and Informality in Peri-Urban Mexico

The peri-urban condition in Mexico is inextricably tied to the history of informal settlement in and around modern Mexican cities. And literature on informal communities in Latin America has evolved greatly over the past 50 years. Part of why post-modernist scholars have had trouble conceptualizing the realities of today's peri-urban informal settlements is because they exist outside of a conventional dichotomy between city and country. (Sánchez, 2009) An understanding of poverty as an either rural or urban condition continued to shape Mexican domestic policy as well as intervention policies on the part of the international community through the 1950s and 60s. Land use regulation began in Mexico City proper as early as 1928, when the Distrito Federal was declared a special entity. The city's approach during this time was to provide formal infrastructure and establish conservation zones on the outskirts of the city. "However, relatively few people engaged at the time in capturing land or undertaking construction in this buffer zone had heard about the plan" (Ward, 1998 p. 173). Full zoning regulations were not adopted in Mexico City until 1980, at which time urban sprawl was already beginning to spill over into neighboring State of Mexico where the Distrito Federal's planning

regulations do not apply. Many policies in Mexico date back to mid-century, pre-peri-urban conditions in Mexico, and decision-makers have been slow to react. (Sánchez, 2009; Ward, 1998)

The late 1960s and 1970s brought in an era of a social technocratic approach to informal settlements throughout Latin America. Central governments, particularly strong federal governments like Mexico's, began providing subsidies and programs for aiding informal communities. Experts from the federal government or international organizations often provided technical assistance, training, and planning. (Chambers, 1994) This era of technocratic developmentalist approach also saw the parallel advent of holistic participatory approaches utilized worldwide, such as participatory rural appraisal (PRA). In 1969, Sherry Arnstein published a watershed piece that laid out a ladder of citizen participation, on which the lowest rungs represent nonparticipation, the middle rungs represent various degrees of tokenism, and the highest rungs represent degrees of genuine citizen power: "Partnership, Delegated Power, [and, ultimately,] Citizen Control" (Arnstein, 1969 p. 217). The PRA framework was one of the earlier efforts to put Arnstein's theory into practice in seeking to facilitate a leveraging of local knowledge toward achieving locally determined goals. In its essence, PRA has stemmed from a reaction to an idea that professionals used to hold, "that their knowledge was superior and that the knowledge of farmers and other local people was inferior; and that they could appraise and analyze but poor people could not." (Chambers, 1994 p. 963) Debate continues over how to engage most meaningfully and effectively in horizontal dialogue, but PRA and subsequent models such as participatory action research (PAR) continue to serve informal communities in Mexico and across the world. (Campbell, 2001; Chambers, 1994; Peet, 2009) Other regions of Latin America began developing other

means of engagement in informal settlements, informed by global social movements, radical economies, radical feminism, and feminist development movements such as Women-in-Development. (Escobar, 1996; Peet, 2009)

The regulatory climate had already changed drastically in Mexico by 1994 when President Carlos Salinas signed the North American Free Trade Agreement. (Watt, 2012) In the early 90s the federal government underwent a vast restructuring and formalization of many sectors of the Mexican economy targeted at consumers in the United States, the signing of NAFTA further galvanized many of these changes, and this new era of economic liberalization spawned international interest in Mexico's informal economy and micro enterprises. Around the world, international agencies and non-profit organizations were finding new ways to facilitate ownership of wealth in the informal sector within the new neoliberal system. Micro-lending and women's borrowers circles burgeoned the in informal sector, promoted by global financial institutions. At the same time, neoliberal policies widened the income gap in Mexico and opened the door for power companies based in the United States to influence decision-makers in Mexico. (Watt, 2012) As these changes were occurring, scholars in the United States were beginning to craft the contemporary understanding of sustainability, among them being Scott Campbell who developed a now ubiquitous triangular model (or 3-legged stool) for sustainability which includes "economy, the environment, and equity: as the three crucial pillars for achieving meaningful sustainability. (Campbell, 1996 p. 298) Neoliberal Mexico was not at the forefront of the sustainability movement, especially as applied to informal settlements, but a slow process of democratization and decentralization has provided unique opportunities for regional and local governments to take an active role. Civil society relations have become extremely important in neo-liberal Mexico, mainly

because government officials favor market solutions and many crucial public services have become privatized.

Today, the international community is seeing a shift in the conceptualization and management of informal settlements. Postmodern theorists write about informal communities as a world functioning completely in parallel with formal communities; the formal cannot exist as it does in today's globalized world without the foil of a parallel informal sector. Bayat (2000) writes about informal settlements and the informal economy as a 'quiet encroachment' on the established neoliberal order. The survival methods for slum-dwellers transcend simple coping mechanisms and become valuable local knowledge about how a place functions. This local knowledge, founded in a community's social capital, can be a useful bargaining chip when engaging with government service providers, for example to secure regular electric service or trash pickup. Strong social capital can also serve communities well in engaging with individuals and organizations from abroad, for example in service-learning environments. (Erfan, 2012; Sletto, 2012)

As cities in Latin America continue to grow, the peri-urban interface is becoming an increasingly volatile point of tension among various development interests. (Sánchez, 2009) In the case of Mexico City, these fringe areas can be found in existing and former agrarian communities and conservation areas, where new middle-class housing developments are subsuming entire municipalities and poorer residents are pushed to the extreme margins. These marginalized communities often face great exposure to environmental risks due to lack of basic sanitation services nor regular access to potable water. This process of rapid and inequitable development at the peri-urban interface is exacerbated in Mexico by the complex legal structures surrounding former *ejido* land.

Following the massive upheaval of the Mexican revolution, hasty land reform put titles into the hands of agrarian communal *ejidos*, but the system fell into crisis in the 1960s. Since that time, aggressive privatization of *ejido* land following a constitutional amendment in 1992 has led to messy land title situations in agrarian areas, particularly those just outside of major cities where rising land value has forced squatters onto peri-urban *ejido* land. (Assies, 2007; USAID, 2011)

In short, the needs of impoverished residents in peri-urban areas and the imperatives of environmental conservation in the Valley of Mexico are in tension. The vital 'green lungs' surrounding the metropolis are under constant threat of settlement as development pressures force the poorest of the poor further outward. While development slowly chips away at these precious green spaces, increasing pollution, specifically from poor communities without access to public sanitation services, further degrade what remains of the region's green infrastructure. These tensions between the basic needs for displaced residents and the pressing need to preserve conservation zones and agricultural areas remain an enormous unsolved challenge for stakeholders in affected areas, while government institutions are just beginning to think creatively about how to address the issue. (Aguilar, 2008; Aguilar, 2010)

2.3 Conceptualizing Vulnerability

As it is utilized in this study, the term 'vulnerability' is meant to signify an exposure to risk combined with a lack of adaptive capacity to respond to that risk. 'Risk' is meant to signify an event or condition that poses a potential threat of survival or livelihood. 'Adaptation' here signifies a change in one's qualities to become more suited to existing conditions; hence 'adaptive capacity' refers to one's ability to make such

changes. Defined in this manner, vulnerability can apply at any scale, from an individual human being to a political or ecological group of individuals such as a watershed, neighborhood or nation-state. This definition is largely informed by Adger, who defines vulnerability as "the state of susceptibility to harm from exposure to stresses associated with environmental and social change and from the absence of capacity to adapt." (2006 p. 268) Susan Cutter and others have further emphasized the importance of spatiality, comparison, and well-defined hazard indicators in the assessment of vulnerability. (Cutter, 2003; Cutter, 2010) This study does not attempt to perform a complete spatial assessment of vulnerability for the study area, but rather aims to explore which indicators and measures are important to local regulators and why.

The academic community has produced many competing conceptual frameworks regarding vulnerability. More recent literature reflects the politicized nature of vulnerability as it is interpreted in the political realm, both through the discourse of laypeople and in political decision-making. In advocating for a new science of vulnerability, Cutter notes that "one must be mindful of how vulnerability science is affected by some of the vulnerabilities of science itself – rationality, expert versus lay judgments, uncertainty." (2003 p. 6) Similarly, Pelling claims vulnerability "has three components; exposure, resilience and resistance. These components are simultaneously the products of political and socio-economic structures and the capacity of individual actors and social institutions to adapt to hazard stress." (1999 p. 250) Simon and Dooling build on the notion that vulnerabilities are produced through translation and action, developing a social-material vulnerability model in which material vulnerabilities are interpreted and politicized, creating political vulnerabilities which are acted upon, producing material vulnerabilities. Applying Simon and Dooling's model in this study,

living conditions resulting from Mexico's weak regulatory framework expose residents to great risks, producing and reproducing vulnerabilities in a recursive and cascading process.

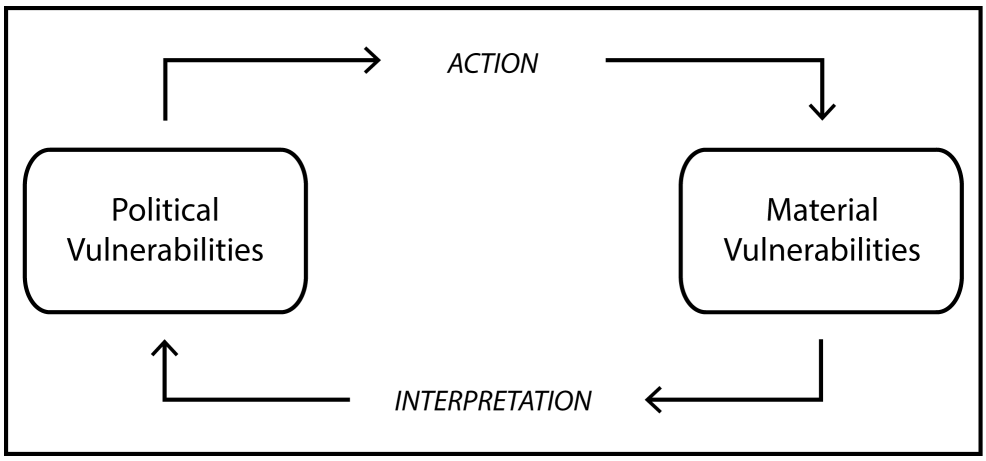

Figure 1: Simplified Material-Political Vulnerabilities Framework (Adapted from Simon and Dooling, 2013)

This study is based on a notion of "the production of vulnerability as a series of cascading effects where perceptions of landscapes and vulnerabilities contribute to the rise of new material vulnerabilities, which are in turn interpreted in the political sphere to generate new actionable conception of vulnerable landscapes." (Simon and Dooling, 2013 p. 13) More specifically, the study aims to explore the process of interpreting vulnerabilities through qualitative analysis of interviews conducted with local government regulators, those whose purview includes regulating land use and/or shaping settlement patterns. Operating within this framework, this report aims to contribute to the body of literature on vulnerability by further examining the element of interpretation in reproducing vulnerabilities. Additionally, this study aims to operationalize these concepts of social-material vulnerability production in the context of the Valley of

Mexico and make concrete policy recommendations on how to better address these vulnerabilities in the study area. As will be discussed in Chapter 3, vulnerability may not be commonly incorporated into city planning discourse within the study area, and is more commonly couched as marginalization, which is a static concept and does not incorporate the feedback loops of interpretation and production. With this in mind, this study aims to answer two central questions: 1) How do municipal and regional regulators in peri-urban areas outside of Mexico City interpret vulnerabilities facing communities in their jurisdictions? And, 2) How do institutional interpretations of vulnerability produce and re-produce these conditions of risk in peri-urban areas outside of Mexico City?

Chapter 3: Introduction to Case Study

3.1 The Valley of Mexico and the Peri-Urban Condition

As will be explained in Chapter 4, the municipalities of Nicolás Romero, Atizapán and Tlalnepantla, which form the study area for this report, represent a wide spectrum of peri-urban conditions. The study area lies to the northwest of Mexico City, in the State of Mexico. Much of the study area lies within the Guadalupe Reservoir River Basin, which encompasses the northern portion of the Valley of Mexico, bordering Mexico City to the south. Also within the study area lays the Sierra de Guadalupe conservation area, one of the most important protected open spaces in the region and one of the last remaining conservation areas in the metropolitan area. The area to the northwest of Mexico City was once known for rugged natural landscapes but has undergone a massive transformation, as Mexico becomes an increasingly urban nation. In recent decades, the State of Mexico has seen explosive population growth in areas closest to the neighboring Distrito Federal, as Mexico City's population growth has led to rapid development on the city's edges.

Different socio-demographic groups experience the peri-urban condition differently in the Valley of Mexico. Some of the poorest residents of these outlying areas have been displaced from their land by development pressures and have set up informal communities on the urban fringe over the past few decades, often with tenuous or nonexistent land tenure.

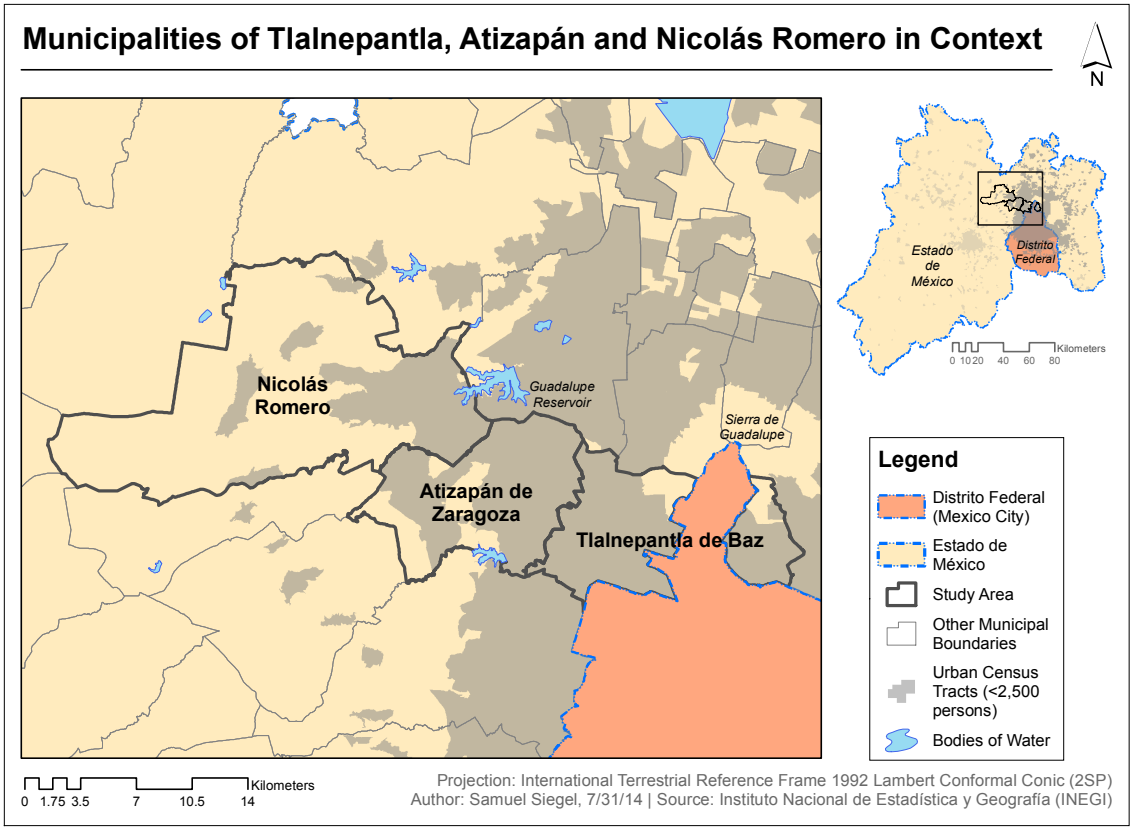

Figure 2: Context Map depicting the Study Area.

As noted in the preceding chapter, such informal settlements are not unique to Mexico; as Bayat writes: "a major consequence of the new global restructuring in the developing countries has been the double process of integration, on the one hand, and the social exclusion and informalization, on the other." Informal settlements and conditions of marginalization have been on the rise in Mexico as rapid urbanization has continued for half a century.

Informal settlements are often located in dangerous or contaminated areas because these are the areas in which squatters can find available land. This exposes residents to numerous environmental hazards such as soil, air, and waterborne contaminants. The

effects of this contamination can affect other communities as well, as the ecological health of the area degrades. For example, streams in the study area ranked lowest in the nation for biochemical oxygen demand, or B.O.D. Streams in the Valley of Mexico have a B.O.D. well over six times worse than those in the region with the second-worst B.O.D. Mexico's Secretariat of Environment and Natural Resources, SEMARNAT, the federal agency in charge of environmental protection, releases regular reports on the ecological health of watersheds in the country.

Figure 3: Causes of contamination in the Guadalupe Reservoir include runoff from inadequate wastewater infrastructure (pictured) and illegal dumping of trash.

According to SEMARTNAT, rivers and streams in the Valley of Mexico consistently contain the highest concentrations of virtually every common contaminant, including phosphates, nitrates, and human waste. Furthermore, these informal settlements do not have regular access to crucial municipal services such as potable water, garbage collection, and solid waste management. (López, 2012) These are the types of conditions which local regulators are attempting to interpret and address in the study area.

3.2 Local and Regional Governance

Beneath the socio-economic, natural and physical geography of the study area lies an even more complex system of layers of governance that control land use and distribution of services. These socio-political layers range from the federal, state, regional and municipal level. Mexican governance is exerted at three main scales: at the federal, state, and municipal level. The 125 municipalities in the State of Mexico are split into 16 administrative regions, based loosely on total population. Together, Atizapán and Tlalnepantla form an administrative region on their own because they are so densely populated. Nicolás Romero forms a region with 4 other less populous peri-urban municipalities.

Central to this study are the tools that local regulators use to assess conditions of vulnerability in their jurisdictions. In Mexico, the primary tool for spatial analysis regarding vulnerability is the Marginalization Index developed by Mexico's National Population Council (CONAPO), an armature of the federal government that interprets demographic data. While CONAPO's methodology changes slightly every ten years or so, the most recent index is based on the following ten socio-economic indicators from the 2010 census:

- Percentage of population aged 6 to 14 that does not go to school
- Percentage of population aged 15 or older without basic education
- Percentage of population without direct access to health services
- Infant mortality rate by mothers aged 15 to 49
- Percentage of occupied homes without running water inside the house
- Percentage of occupied homes without sewer or septic hookup
- Percentage of occupied homes without water hookup
- Percentage of occupied homes with dirt floor
- Percentage of occupied homes with some level of overcrowding
- Percentage of occupied homes without a refrigerator

Based on these factors, many of the most highly marginalized census areas based on this index in the entire Mexico City metropolitan area are found in peri-urban areas of the State of Mexico, namely in the farthest reaching municipalities of the Valley of Mexico, such as Nicolás Romero.

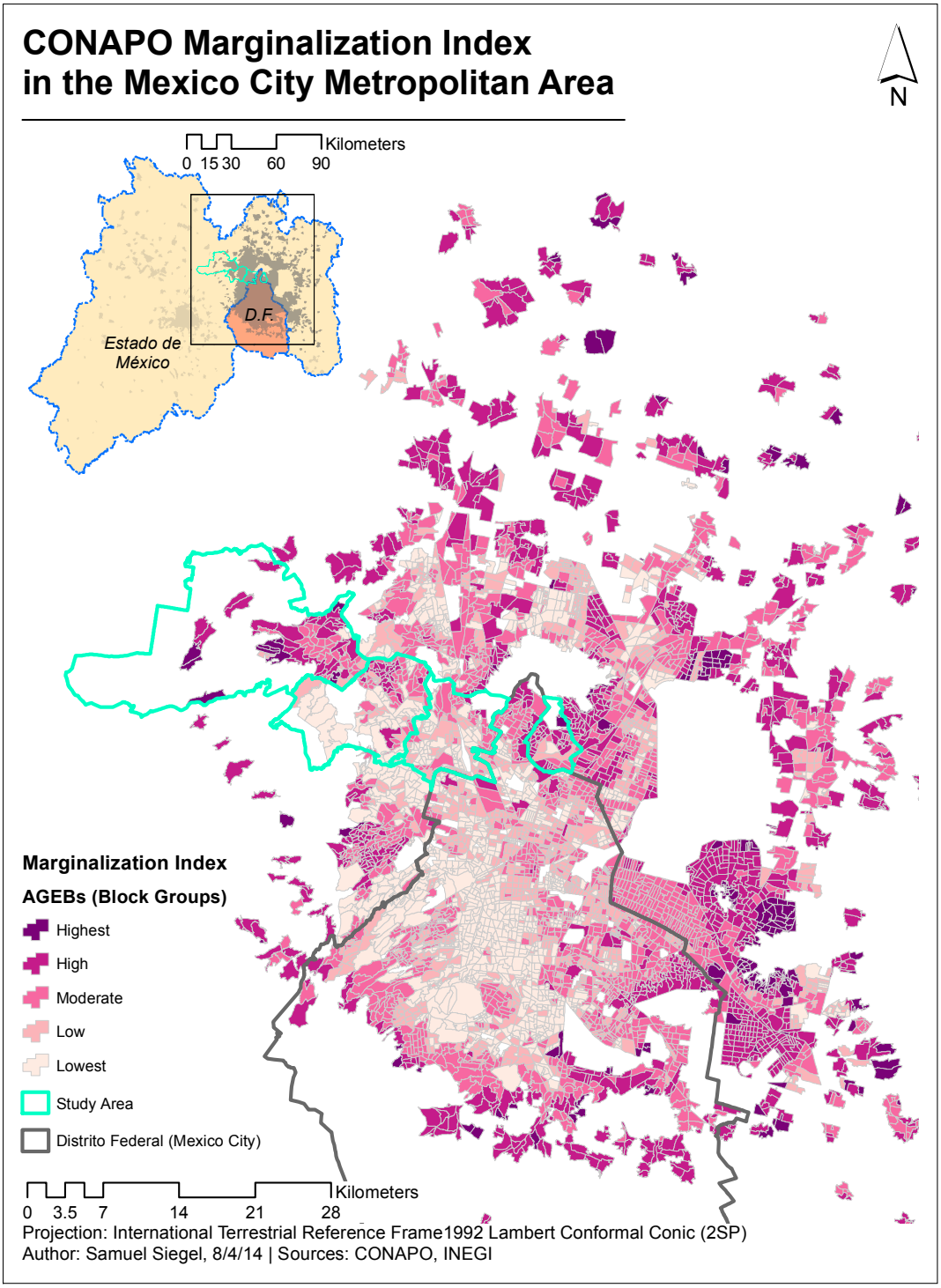

Figure 4: Map depicting the CONAPO Marginalization Index in the Mexico City metropolitan area.

As discussed in Chapter 5, however, the index is extremely limited in its prescriptive capacity because it does not include informal settlements that do not participate in the national census and exist outside of census geographies. Such areas may be even more vulnerable than those marked with the highest marginalization index.

Government interpretation and action in the region can be rendered inefficient in part because of the complicated relationship between federal, state, municipal agencies. One study participant noted, while local governments have gained more decision-making power in recent years, the federal government still holds the lion's share of funding from tax money. This and other discrepancies between scales of government complicate the processes of institutional interpretation and action, as is discussed later in Chapter 5. The presence of regional organizations that overlap various jurisdictions, such as the River Basin Commissions that manage local watersheds, provide crucial services that connect various stakeholders but also further complicate the bureaucratic landscape to be navigated by constituents.

Chapter 4: Methodology

4.1 Case Study Selection

The municipalities of Tlalnepantla, Atizapán and Nicolás Romero were chosen as the study area for this report for several reasons. Geographically and socioeconomically speaking, the study area represents a full peri-urban transect, as it is called in this report. Tlalnepantla is the most urbanized of the three municipalities, bordering the Distrito Federal, which is Mexico City proper. To the northwest of Tlalnepantla lies Atizapán, which represents a more transitional peri-urban zone. Even further to the northwest lies Nicolás Romero, which is still comprised of wilderness and agricultural areas as well as burgeoning new working class, poor, and informal settlements.

The three municipalities also represent a wide spectrum of socio-economic groups, with more upper- and middle-class residents living in Tlalnepantla and more underserved and impoverished communities in Nicolás Romero. (INEGI, 2007) As noted above, the Nicolás Romero represents some of the most marginalized areas in the Valley of Mexico. Using this transect aims to represent the full spectrum of peri-urban experience on the edges of a Latin American megalopolis.

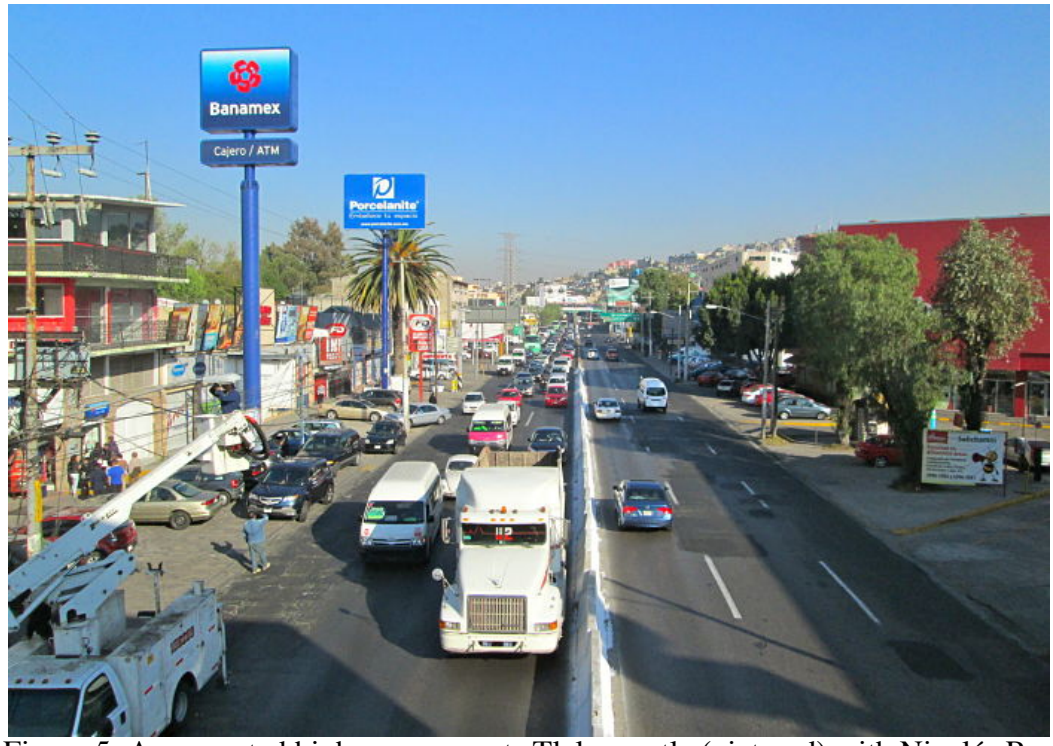

Figure 5: A congested highway connects Tlalnepantla (pictured) with Nicolás Romero, Atizapán and nearby Mexico City.

Navigating the complicated, layered physical, political and societal geographies of the peri-urban fringe is no easy task, necessitating the decision to focus on three municipalities that span the peri-urban transect, from the most urbanized to the most rural. Other reasons for selecting these specific sites for the study area include the author's personal, emotional connection to the region and unique opportunities to gain unprecedented access to local government offices and interview subjects. Unique connections with people working at the local and regional scale in the area enabled a study of wide breadth and deep scope, the likes of which have never before been undertaken in this portion of the Valley of Mexico.

4.2 Interviews and Analysis

In developing the interview protocol for this study, a priority was placed on determining how local government practitioners conceptualize vulnerability. This information would be useful not only for understanding how these regulators interpret vulnerabilities facing communities in their jurisdictions, but also how such institutional interpretations of vulnerability produce and re-produce the very vulnerabilities facing peri-urban areas. The interview questions were intentionally written as open-ended to allow participants to answer freely, encouraging responses unanticipated by the investigator and covering issues that participants found most relevant and important. The approved interview protocol has been included in the appendices of this report as a reference for anyone wishing to conduct similar research or to build upon the results of this study in the Valley of Mexico.

Following approval from the Internal Review Board for research with human subjects and travel permission from the International Oversight Committee at the University of Texas at Austin, I spent approximately one week in the Valley of Mexico, conducting semi-structured interviews with policy-makers based on the interview protocol I developed. In order to get a sense of how vulnerability is conceptualized in different contexts, great care was taken to recruit interview subjects from each level of government, and from across the entire peri-urban transect within the study area. The target population for the study included male and female adult professional land use regulators, that is to say individuals whose purview includes regulating land use and/or shaping settlement patterns. This sample included those working for or volunteering at government agencies, universities and non-governmental organizations in Tlalnepantla, Atizapán and Nicolás Romero. Potential participants were selected based on referrals from Dr. Patricia Wilson at the University of Texas and faculty at local Mexican

universities Universidad Albert Einstein and Universidad Tecnológica Fidel Velázquez. Many potential participants had participated alongside University of Texas students in Dr. Patricia Wilson's Sustainable International Community Development service learning course in August 2013. Potential participants were contacted first via email, and then by telephone or during site visits. Additional contacts were made during fieldwork through personal introductions, e-mail and networking. All participants speak Spanish and the interviews were conducted in their native language. Anyone who did not work in a professional capacity for a government, NGO, educational or other institution within the State of Mexico was excluded from the study. The interviews were audio recorded, and a total of 19 interviews were conducted. This study was confidential, meaning participants have been assigned pseudonyms for the purposes of publishing study results. All participants were fully informed about the nature of the study and about the completely voluntary nature of their participation. Additionally, participation in the study was purely voluntary and no compensation of any kind was offered to participants at any time.

Upon my return from the field, I began transcribing the interview recordings and reviewing my notes from each meeting. Ultimately, nine of the original 19 interviews were selected as the final dataset for my analysis. The scope and timeframe of the study could not accommodate transcription, coding and translation for 19 full interviews, so the nine most informative and representative recordings were chosen systematically. The sample of nine practitioners includes five males and four females. Five participants work exclusively at the municipal scale, three participants work at the regional scale for a larger state or federal government agency, and one participant works exclusively at the regional scale. Three of the practitioners work in sanitation and provision of potable water; two are from the field of urban development and land use; two are ecological

conservation practitioners; one works in watershed management; and, one is an elected representative whose work integrates urban development, conservation and peace education.

All nine interviews were transcribed in full and assigned a pseudonym to protect the participant's anonymity. I then used hyperRESEARCH software to code the interview transcripts and begin building up meaning from the collected responses. Coding was conducted using transcripts in Spanish, and only quotes that have been included in this text have been translated into English. To conduct the narrative analysis, I first went through the transcripts and coded the texts with the specific conditions of vulnerability to which the respondents referred. Examples of these codes related to conditions of vulnerability include: Personal Hardship, Access to Services, Informal Settlement, Data Limitations, and Contaminated Water. The hyperRESEARCH software was useful in its flexibility to apply different types of codes to excerpts of different lengths, and to adjust the codes as I refined my analysis. Code counts were also useful in determining which conditions of vulnerability were the most commonly referenced by study participants.

In examining the responses in more detail, I developed a typology of three distinct types of vulnerability within the dataset: Socio-economic, Ecological, and Political. I then went back to hyperRESEARCH and coded larger portions of each interview by vulnerability typology. Seeing which conditions of vulnerability fell within each typology, where there was overlap and where there was not, was fruitful in developing the findings presented in this report.

Socio-Economic	Ecological	Political
Access to Services*	Access to Services	Access to Services
Contamination	Contamination*	
Data Accuracy		Data Accuracy
Decision-Making	Decision-Making	Decision-Making
Education	Education	Education
Gov't Paternalism	Gov't Paternalism	Gov't Paternalism
Municipal Scale	Municipal Scale	
Peri-Urban	Peri-Urban	Peri-Urban
Personal Hardship		
	Informal Settlements	Informal Settlements*
		Data Limitations
		Economic Development
		Regional Scale

Figure 6: A table of all coded conditions of vulnerability split into 3 categories. The most commonly referenced condition in each category is marked with an asterisk.

Ecological/ Social	Ecological/ Political	Socio-Econ./ Political	Socio-Econ./ Political/Ecological
9 : 4	5 : 3	5 : 4	2 : 2

Figure 7: A ratio of code overlaps to number of interviews in which overlaps appear helped decipher which tensions to explore in further detail.

To make meaning of the disparate interview responses and subsequent codes, I built a conceptual framework of vulnerability (re)production based largely on Simon and Dooling's material-political vulnerabilities conceptual framework (2013). Understanding vulnerability as exposure to risk coupled with a lack of adaptive capacity to respond to

changes, Simon and Dooling explore how material vulnerabilities are translated into political vulnerabilities through interpretation, and how political vulnerabilities in turn produce and reproduce material vulnerabilities through institutional action. My analysis focuses in on the former portion of this cascading process, namely the process of interpreting material vulnerabilities. Within my conceptual framework, socio-economic, ecological and even political vulnerabilities bear a materiality to be interpreted by institutions and individual practitioners.

Pseudonym	Level of Gov't	Socio-Econ. Count	Ecological Count	Political Count
Mauricio	Regional	4	3	*9*
Raul	Municipal	*4*	1	3
Claudia	Regional	3	2	3
Maria	Regional	5	5	*7*
Betina	Regional	*6*	4	5
Christiana	Municipal	*4*	0	2
Valentino	Municipal	*2*	0	1
Ismael	Municipal	1	*4*	1
Adalberto	Municipal	2	4	4

Figure 8: Study Participants (listed by Pseudonym) and their Coded Responses

Following my exploration of socio-political, ecological and political vulnerabilities in the Valley of Mexico through the lens of Simon and Dooling's framework, the recommendations presented at the close of this report have been informed

largely by the literature on Participatory Action Research (PAR) and my own experience utilizing PAR techniques in the municipality of Nicolás Romero.

4.3 Challenges and Limitations

Like any other valuable research project, this study is fraught with challenges and limitations that should be acknowledged. Challenges included the cost and logistics of traveling to the study area and conducting interviews in person. Mebane scholarship funds from the University of Texas at Austin School of Architecture helped defray costs such as airfare, and hospitality and assistance from local friends in the Mexico City area proved crucial to the success of the project. A main challenge was navigating cultural differences and language barriers in my data collection and analysis. As a non-native speaker of Spanish, I had to approach every aspect of my research carefully and intentionally so as to avoid any misrepresentation or misinterpretation. Native Spanish speakers assisted in editing the interview protocol as well as transcribing and making sense of interview recordings. Conducting interviews in person in the interview subject's native language, and coding transcripts in their original Spanish, helped reduce the possibility of responses getting lost in translation. Another major challenge for analysis was simply making sense of a foreign system of governance and cultural norms surrounding the themes of the study. Again, Mexican friends and colleagues provided unending support in providing local knowledge and clarifying confusing elements. While every step has been taken to ensure sensitivity to differences in language and culture between the primary researcher and the study participants, it must be noted here that this study has been conducted by a non-native Spanish speaker and in a cultural and political context that is not his own.

Another significant challenge to the success of this study lay within the sensitive nature of some of the interview topics. Most of the study participants do not regularly discuss the theme of vulnerability, particularly in their professional capacities. Many interviewees were unfamiliar or even uncomfortable with the rhetoric of vulnerability. Furthermore, this study addressed topics that may be considered confidential or incriminating subjects when associated with specific institutions or individuals. To address these unfortunate realities, study participants were assured of the complete confidentiality of the study and they were assigned pseudonyms in their transcripts. No participant was pressed to share information which he or she was not comfortable talking about. Under these terms, participants were surprisingly candid and personal in their responses regarding issues of vulnerability.

Given these challenges, a project of this breadth and scope is not without its caveats and limitations, which must be acknowledged regarding the validity of findings and the utility of discussion and recommendations. An important limitation of this study to note is the small sample size and the subjective nature of qualitative analysis. The results of this study could have looked different if 19 different practitioners had been interviewed, or if nine different interviews had been selected for transcription and coding. Facts stated by interviewees have been verified through secondary sources, but much of what has been analyzed here is based on opinion, and it must be noted that the study results are based largely on the opinions expressed by study participants. Furthermore, it should be noted that the opinions of those regulators willing to participate in an academic study about vulnerability do not necessarily represent the opinions of regulators in the study area overall. Lastly, one must question how translatable these findings are to other regions, given they are based on the unique character of the study area. The area was

carefully chosen as representative of the peri-urban condition outside of a growing Latin American megalopolis, but every community in every region will of course have its own unique set of opportunities and challenges that shape the landscape of vulnerability. With these caveats in mind, the following findings and recommendations provide great insight into conditions of vulnerability and the unique peri-urban condition in the Valley of Mexico and similar communities worldwide.

Chapter 5: Findings and Discussion

5.1 Types of Vulnerability

Residents in Tlalnepantla, Atizapán and Nicolás Romero, on the outskirts of Mexico City, are exposed to various socio-economic, ecological and political risks. Furthermore, many residents lack the adaptive capacity to withstand or respond to hazardous situations or events, rendering them extremely vulnerable as the region undergoes rapid changes. Municipal and regional government practitioners in these peri-urban areas interpret these vulnerabilities facing communities in three distinct ways. Vulnerabilities facing communities can be categorized as socio-economic, ecological, or political. Vulnerabilities are further politicized through the act of assessing and translating information about material conditions of vulnerability. This chapter will explain the emergent typology of vulnerabilities as articulated by study participants as well as explore the process of translation that occurs when conditions of vulnerability are re-interpreted and re-produced through rhetoric and action.

Government practitioners who participated in this study often conceptualized socio-economic vulnerability at the individual or household scale, and these risks were rarely articulated in relation to municipal- and regional-scale decision-making. Ecological vulnerability was generally well understood at the regional scale, but regional ecological thinking was rarely contextualized with an acknowledgement of local socio-economic hardship. Political vulnerabilities were understood in the abstract but they are not conventionally taken into account in government decision-making. Later in this

chapter, the interactions and reactions between these different types of vulnerability will be explored.

Type	Definition	Frequency Count
Socio-Economic Vulnerability	Conditions of poverty comprising exposure to personal hardship and financial risks as well a lack of adaptive capacity.	31
Ecological Vulnerability	Threats to the ecological health of a bioregion, political region, or watershed.	23
Political Vulnerability	Risks related to politicized processes of data collection, decision-making and resource allocation, and their effects on individual adaptive capacity.	35

Figure 9: A typology of three distinct categories of vulnerability and a frequency count for codes in interview responses.

Vulnerability in Mexico is well documented as a social and economic problem, particularly within the field of social work. (Bayón, 2010) When study participants were asked about risks facing communities in their respective jurisdictions and the adaptive capacities of those communities, conditions of socio-economic vulnerability were the most explicitly articulated conditions. As conceptualized in this report, socio-economic vulnerabilities encompass those articulated in modern social work literature, namely economic hardship (i.e.: poverty). These conditions of poverty comprise exposure to traditional risks such as high crime, as well a lack of adaptive capacity manifest in

substandard services ranging from education to trash pickup. Individuals, households, communities and larger regions can all be vulnerable in this sense, due to the uneven distribution of risks and uneven distribution of adaptive capacities across a complex and changing landscape.

Socio-economic risks threaten individuals and households at the most basic level. A lack of adaptive capacity is manifest in conditions of very personal hardship, such as a household not being able to afford food, or a child who does not have access to adequate healthcare or education.

Figure 10: Services such as potable water delivery (pictured) do not reach all communities in the study area.

When expressed at the regional scale, study participants often listed socio-economically vulnerable groups in official or semi-official categories that are used in

government decision-making. One elected official included in her list: "children, teenagers, a very vulnerable group are mothers of the family, that is a very vulnerable group within our municipality; children with different capacities, [and] the elderly." Another official, who uses socio-economic metrics to determine who is eligible to receive discounts or waivers for potable water delivery, articulated much more narrow and distinct categories. "We have them categorized," he says, "as widows with fixed incomes, single mothers, elderly people, that is, 65 years and older, and included, we also consider people who earn less than three minimum wages." The minimum wage in the region is currently $64 pesos, equivalent to less than $5 US dollars. Says one local regulator, "we're talking about earning less than $200 pesos [($15.38 US dollars)] a day. Sometimes, we suppose, they don't have enough for basic necessities."

Many measures of socio-economic vulnerability are quantitative, such as daily wages (in pesos), age (in years), and familial status (in marital status and number of children). Others are harder to quantify, such as exposure to contamination and disease, mainly from contaminated water bodies and ground water, open-pit dumping sites and other point sources of contamination. Airborne contaminants are also a threat to physical health in the region. Study participants also mentioned access to services and other barriers to adaptive capacity as a condition of socio-economic vulnerability, which is also challenging to quantify.

In their interview responses, regulators often conceptualized socio-economic vulnerability at the individual or household scale. To be "at-risk" was often understood as an individual or family who needed monetary compensation or other government assistance. Many interviewees understood vulnerability as a concept used exclusively or primarily in the realm of social work. When asked how his department addresses issues

of vulnerability, one land use regulator simply stated, "Normally the Department of Social Work manages that," and declined to use the word "vulnerability" in his interview responses. Many other participants were confused at the thought of applying information about personal hardship to decision-making at a community or regional scale, for example in land use decisions. One example of social programming at the regional level, however, is the effort of regionalization, through which federally funded social services are allocated at the regional and municipal level. Using the example of a camera for a youth art project, one interviewee explained that local communities can submit applications to the government to receive equipment and other services they may require for planned projects. Overlap in the scope of work between social workers and land use regulators, however, seems very limited in the study area. And socio-economic hardship at the individual and household scale, several participants noted, are not prioritized in municipal- and regional-scale decision-making.

Participants also articulated a tension between urban and rural conditions of vulnerability. Mexico is a nation that is rapidly urbanizing but remains a nation with a sharp divide between the customs and quality of life of urban versus rural populations. (Ward, 1998) The process of urbanization itself is driven by low wages and personal hardship in the countryside, and peri-urban areas such as the Valley of Mexico encompass the interface between urban lifestyles and rural problems as rapid urbanization has drastically changed the local context from a remote or rural area to an increasingly urban one. The municipality of Nicolás Romero is currently bearing the brunt of these socio-economic changes; as one local official explains:

> I differ greatly from the people who say that the rural communities are the most vulnerable in every aspect. I differ a little bit because, if we go from an urban context– where a family... five people living in one little room, and paying rent,

> and having to buy all of their food– to a rural area, where, well, they have a relatively large space, their own house, a plot for cultivation, a little animal, well, there you have it, no? And that's very different.

According to this participant, living conditions in rural and urban areas differ greatly – and the increasingly urban conditions in her peripheral municipality are threatening individuals' future capacities to do well economically, health-wise and in terms of educational attainment. In the ever-shifting context of peri-urban communities, regulators are struggling to parse out the differences between urban and rural problems, just at the time when rural areas are becoming more urban and traditionally rural populations are facing more urban problems.

In contrast to socio-economic vulnerabilities facing individuals and households, the Valley of Mexico also faces great ecological risks as a regional ecosystem. In the broadest terms articulated by study participants, ecological vulnerabilities encompass any threats to the ecological health of a bioregion, political region, or watershed. Watershed health and water quality were of great concern, because many of the practitioners who participated in the study work for national, regional and municipal water management organizations. Generally speaking, the subjects or entities that interviewees defined as ecologically vulnerable were natural resources, ecosystems or areas of land, rather than communities or human beings.

Major conditions of ecological vulnerability facing the study area include rapid deforestation, water contamination and the otherwise degrading watershed. Decades of informal settlement have taken a serious toll on the agricultural land in the foothills and even threaten the Christmas tree farms in the mountains that currently provide an economic mainstay for municipalities in the study area. Conservation areas also continue to face great risks of people moving in illegally and forming settlements, which threaten

the ecological vitality of the entire Valley of Mexico and Mexico City. These areas not only face direct risk of being completely displaced by settlements, but also many indirect effects, including inadequate infrastructure in informal settlements leading to contaminated water table, and the dumping of garbage leading to contaminated water and soil. Perhaps the most poignant example of vulnerable conservation zones is the Sierra de Guadalupe, which is a large mountainous area in Tlalnepantla that borders Mexico City and the municipality of Ecatepec. One of the only remaining open spaces in such close proximity to the center of the megalopolis, this conservation area is under constant threat from informal settlement.

Figure 11: A satellite image depicts the Sierra de Guadalupe Conservation Area being asphyxiated by sprawl.

For study participants from state and municipal government, a main tool for mitigating ecological vulnerabilities is the use of environmental education, for example

with protecting the Sierra de Guadalupe from illegal dumping. One interviewee explains that their goal is to teach a new generation that the Sierra de Guadalupe "is [their] only remaining lung, that is to say, to conserve a little bit of what is the wilderness, natural resources." In stark contrast, a common approach to preventing further informal settlement in conservation zones such as the Sierra de Guadalupe is to create elaborate security systems and fortification.

Another area of concern in the study area is the Guadalupe Reservoir in Nicolás Romero, an important water source for the region that has been very badly contaminated, interviewees said, because of informal settlements and illegal dumping along the *barrancas* and streams throughout the peri-urban areas of Nicolás Romero.

Figure 12: Plastics and other waste collect in a cove of the Guadalupe Reservoir.

Water contamination remains a central ecological issue in the region because potable water sources are under threat as well as the health of larger ecosystems that rely on a healthy water table.

In interviews, vulnerability of local water supply was well understood at the regional scale. Threats to ecological health were often articulated at the scale of the watershed, namely the Guadalupe Reservoir River Basin, which encompasses all of Nicolás Romero, most of Atizapán, and pieces of some other neighboring municipalities. Federal, state, and municipal agencies all play a role in addressing vulnerabilities in the watershed, but a unique entity called the Comisión de Cuenca Presa Guadalupe (Guadalupe Reservoir River Basin Commission) represents multiple stakeholder groups in the management of the watershed. This and other river basin commissions are unique entities in Mexico, aiming to manage ecological risks in regions that cross political boundaries. To combat failing sanitation infrastructure and the effects of decades of illegal dumping, the Guadalupe Reservoir River Basin Commission is planning a complete overhaul of the entire water sanitation system that feeds into the reservoir. But regional ecological thinking, it would appear, is rarely contextualized with an acknowledgement of local socio-economic hardship. Individuals and households also face ecological risks. For example, as urban growth continues unregulated in the region, settlements bear a greater risk in the event of flooding, landslides and other natural disasters.

Unique risks also face individuals and communities as a result of institutional interpretation and political decision-making. Study participants rarely articulated political risks facing their constituents in concrete terms, but the theme was pervasive throughout the interviews. As conceptualized in this report, political vulnerabilities

encompass all risks related to politicized processes of data collection, decision-making and resource allocation, ranging from the limitations of census data in a rapidly changing area to the effects of party affiliation on individual adaptive capacity. As discussed in the following chapter, the main element of what is labeled here political vulnerability is in fact an interpretive vulnerability resultant from limited or misleading data and how government actors use them. Additionally, socio-economic and ecological vulnerabilities also contain political or politicized elements.

In the study area, these risks can face individuals, households, or entire communities, particularly in informal settlements and other marginalized areas. Some residents in the study area are rendered politically vulnerable in that they do not have access to basic government services, such as health care and education. This is the political dimension of socio-economic hardship. Even in cases where information is sufficient and accurate, other political forces affect decision-making about land use and resource allocation. The State of Mexico is known as a stronghold for the national ruling political party, the *Partido Revolucionario Institucional*, or PRI. The party is known for favoring political allies in the allocation of resources through various means. (Tejada, 2005; Watt, 2012; Galván, 2014) Additionally, the federal government controls much of the funding for government projects, and top-down "executive projects" often become funding priorities over local initiatives. Overall, political vulnerability can potentially take the form of government ignorance of conditions of poverty in certain areas, be it intentional or unintentional. For residents living in informal settlements, political vulnerability can also often take the form of a risk of being displaced from one's home. Study participants articulated these purely political vulnerabilities in the abstract, and some noted they are rarely taken into account in government decision-making. This may

be true for myriad reasons, including a lack of capacity on the part of clunky bureaucratic government institutions, as well as the potential dangers of party favoritism and corruption.

Vulnerability can be further politicized when conditions of socio-economic vulnerability engage in a feedback loop with conditions of ecological vulnerability. The prime example articulated by study participants is the highly politicized local issue of informal settlements on agricultural and in conservation areas, such as the Sierra de Guadalupe. While the lower-lying areas of Tlalnepantla have thrived on industrial activities since the 1950's (Ward, 1998), the higher areas in Atizapán and Nicolás Romero have traditionally relied on agriculture, according to study participants. The mountainous wooded areas in the western portion of the study area are also home to several Christmas tree farms, which remain a major economic provider for the region. These traditional sources of economic livelihood depend on the availability of land and the ecological health of the watershed, and continued informal settlement threatens both the availability of land as well as the ecological health of productive lands.

And while settlements are threatening the ecological health of certain areas, the poor ecological health of other areas is in turn threatening the health of individuals. For example, two different study participants, both from the field of environmental conservation, referenced the existence of *pepenadores* as an extremely vulnerable population in the study area. *Pepenadores* are trash-pickers. They are individuals, often with families and young children, who live in the trash dumps and sort trash, looking for items they can sell back to recyclers and junk dealers. Study participants described the extreme personal hardship and unsanitary conditions with which these populations live. Mexico City's trash problems are well documented (Medina, 2005; Guillermoprieto,

1990), but it is notable here that local environmental practitioners describe the effects of this structural problems at the human scale. In this sense, those who are exposed to the greatest socioeconomic risks, and have the least adaptive capacity, often bear the brunt of regional ecological risks as well. Additionally, the risks to which vulnerable populations are exposed can negatively affect ecosystems as well. As illustrated in these examples, the adaptive capacity of individual human beings and of ecological regions are intertwined, rendering socio-economic and ecological vulnerabilities politicized, as political decision-making is necessary to address how the two exacerbate each other.

In the case of the Sierra de Guadalupe conservation area, described above, vulnerability production can also be politicized because of a tension between ecological and socio-economic vulnerabilities. One regional environmental protection practitioner described the current state of affairs in the Sierra de Guadalupe as follows:

> There are trees, there's vegetation, there are animals, landscape. It is not flat; it's like a steep mountain. So, around it spreads the urban footprint, which is we human beings, who don't have any more land around that area in which to live, so, what is it that we do? We're strangling this area. So, it is a vulnerable zone because people do not have space in which to live.

As articulated here, the ecological health of the Sierra de Guadalupe area is threatened by human invasion, while informal settlement in the area is one of the last remaining adaptive strategies for vulnerable populations at risk of becoming (or remaining) homeless. The processes of preservation and/or change in the conservation are inherently politicized in the sense that social adaptive capacity and ecological risk are in tension. The outcomes, therefore, are a result of political decision-making based on limited information, as well as counter-decisions made by those who choose to act illegally in the face of great hardship.

5.2 (Re)interpreting and (Re)producing Vulnerabilities

To unpack the politicized- or rhetorical- elements of vulnerability a bit further, let us explore the ways in which conditions of vulnerability are assessed and translated into action by institutional actors. As explained above, the various conditions of vulnerability in the Valley of Mexico articulated by study participants either fall into one of three distinct categories, or exist within the feedback loops between two or more types of vulnerability, which either exacerbate or exist in tension with one another. Generally speaking, the three types of vulnerability expressed were socio-economic, ecological, or political in nature, and notable feedback loops include those between the socio-economic and the ecological, which form a dynamic and politicized landscape of vulnerability. Conditions of vulnerability are then further politicized as government practitioners assess conditions with the information available to them and use this assessment in their decision-making. It is through this process of interpretation and reinterpretation that vulnerabilities can be produced and reproduced.

Perhaps the clearest example of interpretive vulnerability production expressed by study participants is the problem of limited or inaccurate data. When asked about how data limitations specifically affect their work, many study participants noted that their frustrations with available data lie within the limitations of nationalized data sources in the local context. This is a structural problem in any governance structure based upon powerful federal government agencies. Data at the national level are often limited to particular time period or to particular geographies, and large bureaucratic agencies lack the capacity to react with agility to explosive growth, particularly in the informal sector. Information gathering has not kept pace with the level of growth that has been seen in the

Valley of Mexico since the turn of the century. The census in Mexico is conducted every 5-10 years, and an informal settlement with hundreds of families can appear literally overnight. Information also tends to be collected in large aggregates, which can be unusable or even misleading in the local context. A prime example is the National Population Council (CONAPO)'s marginalization index, which uses an identical rubric for every census block in the entire country. Several interviewees pointed out that the CONAPO index can be difficult to use in practice because it does not take unique local conditions into account. One practitioner who works in the Guadalupe Reservoir River Basin noted the extremely low CONAPO marginalization scores for some of the most impoverished communities in the watershed. She also went on to explain that the index does not take conditions such as topography and hydrology into account, which can be predictors for who will be adversely affected by events such as water contamination, flooding and landslides.

In addition to information being limited, study participants also noted concerns about the accuracy of the information they use. Several study participants cited concerns about the accuracy of available information as a major weakness when using socio-demographic information in vulnerability assessment. One practitioner at the state level pointed out, "We do not know how certain, or real, this data could be, no?" A national census in any large country is bound to be fraught with challenges and limitations, and the census in Mexico is no exception.

Figure 13: Representatives from several jurisdictions performing a site visit at a water treatment facility.

The validity of published information is constantly in question, particularly in light of trends such as migration and informal settlement. In addition to this mistrust of information from other government agencies, one study participant expressed mistrust for the citizens in his jurisdiction. Noting that much of the information he uses in vulnerability assessment is self-reported, he explained:

> The weakness is that in Mexico the economic system is too informal. So there are instances in which people say they are vulnerable, but when inspectors arrive at their home they find that there are three microbuses parked out front, two late model cars, a house with three stories... That is a great risk [for government agencies] and it's very difficult because most of the time, well, it's reported by the user. … We do not have an economic system … where everything is clearly registered, everyone clear about who owns what, and who doesn't have

> something. So, this informality in the economy makes us ourselves vulnerable to providing support to those who do not need it.

In other words, interpretive vulnerability is a double-edged sword in the informal context. Residents are rendered vulnerable when their presence is not recognized, while political actors themselves can be rendered vulnerable in their limited access to accurate information. For these and other reasons, many practitioners question the validity of the numbers at their disposal for the analyses that influence their decision-making. This mistrust is central to the concept of political vulnerability in the study area.

Politicized rhetorical factors also exacerbate the rural-urban divide described above, both in the availability of data and in decisions about resource allocation. According to the National Institute of Statistics and Geography (INEGI), the statistical cut-off point between a rural area and an urban one is that an urban area should have 2,500 residents or more. These numbers can mean very little in the peri-urban context, where rural-seeming areas can often be surrounded by very built-up areas and face very urban problems. The numbers mean even less when the population estimates are assumed to be inaccurate. The distinction, however, makes a vast difference in how information is collected and distributed about a given area. Areas with rural designation, for example, are not divided into urban census geographies, called *manzanas* (blocks) and AGEBs (block groups). This informational divide makes it difficult to conduct spatial analysis on urban- and rural-designated places simultaneously, and nearly impossible to include both types of places in the same analysis.

In short, what is labeled here as political vulnerability addresses the translation of material conditions of vulnerability into the political realm. Citizens, officials and institutions bear the risk of crucial information regarding conditions of vulnerability being unavailable, misinterpreted or intentionally manipulated. These risks encompass

the politicization of vulnerability, or how institutional interpretations of vulnerability produce and re-produce conditions of vulnerability in the study area. Both practitioners and citizens lack adaptive capacity to address these interpretive and rhetorical hazards, but it is the citizenry who risk adverse effects on their quality of life as a result. Furthermore, socio-economic, ecological and political vulnerabilities engage in feedback loops as practitioners assess and interpret conditions, and translate those interpretations into institutional action. In these feedback loops, rhetoric bears the risk of a disconnect between political processes, data collection, and interpretation of conditions of poverty. Thusly, land use and resource allocation decisions have the potential to create and exacerbate conditions of poverty and exposure to material risks.

Chapter 6: Recommendations and Conclusion

6.1 Recommendations

The above insights regarding the (re)interpretation and (re)production of vulnerabilities provide a basis for several substantive policy recommendations. The following recommendations are meant to address two main tenets of vulnerability production explored in this study. Firstly, vulnerabilities can be categorized as: socio-economic, ecological, political, and- more often than not- some interaction among two or three of the preceding categories. Secondly, vulnerabilities are politicized through access and interpretation of information. In light of these established tenets of vulnerability production in the Valley of Mexico, some pointed suggestions can be articulated on how to glean more information and utilize existing information more effectively to break some of the feedback loops of politicized vulnerability production. More accurate fact-finding could occur at the local scale by leveraging citizen participation as well as encouraging increased collaboration and information sharing between government agencies. Citizen participation in local government decision-making can combat issues of mistrust on the part of all parties involved, as well as enhance the effectiveness of local government interventions. Lastly, compulsory or voluntary education for government practitioners regarding vulnerability production, citizen participation and information-sharing can create a lasting impact in changing institutionalized paradigms surrounding the issue. These and other suggestions could have lasting effects on mitigating conditions of vulnerability in the Valley of Mexico and elsewhere, and merit further study.

Exploring how interpretation and rhetoric can politicize conditions of vulnerability highlights the importance of more localized knowledge production and the importance of joint fact-finding in ensuring access to accurate and relevant information. In the Valley of Mexico and in similarly peri-urban regions, there is great potential value in increased citizen participation in fact-finding. Citizen participation can take many forms and should reflect unique local conditions and needs. Participatory Rural Appraisal (PRA) and Participatory Action Research (PAR) are two examples of frameworks that can be applied to leverage local resources and citizen participation in joint fact-finding endeavors, but no one framework is one-size-fits-all. In its essence, PRA has stemmed from a reaction to an idea that professionals used to hold, "that their knowledge was superior and that the knowledge of farmers and other local people was inferior; and that they could appraise and analyze but poor people could not." (Chambers 1994: 963) Participatory methodologies can be applied to leverage local knowledge and create a body of actionable, localized information that is triangulated and verified by local actors.

In addition to collaboration with community members, crucial in building a more robust bank of localized information will be increased collaboration and information sharing between government agencies. This collaboration must occur both within and between different scales of government in order to remain effective. Municipal governments have everything to gain from information-sharing with neighboring municipalities, as do regional and national government agencies from the richness of information gathered at the local scale. Increased collaboration amongst institutions can enhance the utility of existing information and help address some of the mistrust that

study participants identified amongst various government institutions regarding accuracy of information collected by one another.

Another facet of mistrust that must be addressed is the element of mistrust between government agencies and constituents. Here the potential value of greater citizen participation must be stressed once more. Study participants noted mistrust of government institutions by constituents as well as mistrust of citizenry on the part of government regulators, and participatory practices in government decision-making can introduce transparency that reduces mistrust on everyone's part. When citizens are empowered to take part in government decision-making, they can glean a clearer understanding of how decisions are made and how various stakeholder interests are taken into account. Furthermore, individual citizens who take part in decision-making processes are then held more accountable for personal declarations. In tandem, these aspects of citizen participation schemes can greatly reduce mistrust within local governance. Great care should be taken, however, to ensure that public involvement in decision-making is being incorporated in a meaningful way and not simply acting as a façade that can further mask opaque decision-making practices.

In addressing the politicization of vulnerability production, a central intervention needs to be more effective education of government land use regulators. Those practitioners who engage in decision-making regarding regulation of land use and/or shaping settlement patterns are the lynchpin for enabling change in that realm. But how can regulators be expected to address conditions of vulnerability if they are unfamiliar with how vulnerabilities are produced and interpreted in their jurisdictions? The first step must be some form of compulsory or voluntary education for government practitioners on the subject of vulnerability. Study participants who work outside of the realm of social

work were unfamiliar- and, in some cases, uncomfortable- speaking in the rhetoric of vulnerability. Further education about the process of vulnerability production and about the availability of local resources are a crucial first step toward enabling action on the part of local regulators to address conditions of vulnerability in the Valley of Mexico.

Lastly, further study is required to better understand vulnerability production and interpretation in the Valley of Mexico and conditions of poverty in peri-urban areas more generally. Utilizing a material-political vulnerabilities framework such as that posited by Simon and Dooling (2013), future studies can delve far further into the nuances of (re)interpretation and (re)production than have been explored here. The spatial data resources included in the appendices of this report will provide a solid starting point for anyone seeking to incorporate spatial data into vulnerability analysis in the Valley of Mexico. Additionally, the long term effects of any participatory engagement has yet to be studied in the Valley of Mexico, and the results of such a study could compliment existing literature on socio-economic, ecological and political vulnerability in the region.

6.2 Conclusion

Utilizing qualitative data from interviews with government regulators in three peri-urban municipalities in the Valley of Mexico, this report has examined how local land use regulators interpret the vulnerabilities facing communities and individuals in their jurisdictions. Conditions of vulnerability, as understood by these government practitioners, can be characterized within three distinct categories: socio-economic, ecological, and political. Vulnerabilities are further politicized through interpretation, translation, and rhetoric, as individuals assess and act upon the information available. This report begins to unpack that processes of politicization that produce and re-produce

the vulnerabilities facing individuals, communities and ecosystems in the peri-urban Valley of Mexico, which merit further study. While political vulnerabilities are not conventionally taken into account in most government decision-making processes, this report provides some concrete suggestions for policy-makers in the Valley of Mexico to act as a model for communities worldwide, incorporating holistic thinking about vulnerability into the political process. While current trends of settlement patterns on the urban fringe still present a host of threats to sociopolitical and biophysical sustainability in the region, Mexico City's expansive growth does not have to exacerbate the conditions of extreme personal hardship nor threaten the ecological health of environmentally sensitive areas.

Appendices

Appendix A: Interview Protocol in English

1. What are your thoughts on the word 'vulnerability?'
    a. How do you define vulnerability?
    b. Is this word (as you define it) useful to you in your work?
2. Do you use the CONAPO marginalization index in your work?
    a. If *no*, why not?
    b. If *yes*, how does the marginalization index inform your decision-making?
3. What do you feel are the strengths and weaknesses of measuring vulnerability based solely on socio-demographic measures?
4. What role (if any) do you feel that you play in your professional life in alleviating exposure to risk and other conditions of poverty?
5. What information do you wish you could access in your professional role in order to better address conditions of poverty in your jurisdiction?
6. What do you think are valuable uses in your work (if any) for a deeper understanding of vulnerability that includes exposure to risks?

Appendix B: Interview Protocol in Spanish

1. ¿Cuáles son sus opiniones sobre la palabra 'vulnerabilidad?'
    a. ¿Qué significa la palabra para usted?
    b. ¿La palabra (como la define) es útil para usted en su trabajo?
2. ¿Utiliza usted el índice de marginación del CONAPO en su trabajo?
    a. Si *no*, ¿Por qué no?
    b. Si *sí*, ¿En qué manera el índice de marginación del CONAPO informa su toma de decisiones?
3. En su opinión, ¿cuáles son las fuerzas y debilidades de medir la vulnerabilidad solamente en basa a datos sociodemográficos?
4. En su opinión, ¿qué papel tiene usted (si tiene uno) profesionalmente en aliviar la susceptibilidad de riesgo y otras condiciones de la pobreza?
5. ¿Qué información desearía accesar usted en su ámbito profesional para abordar mejor las condiciones de pobreza en su jurisdicción?
6. En su opinión, ¿cuáles serían los usos valiosos para su ámbito profesional (si existen) de un conocimiento más profundo de la vulnerabilidad que incluya la susceptibilidad de riesgos?

Appendix C: Spatial Analysis Resources

Geographic Information Systems Resources in the Valley of Mexico

The following information is meant as a resource for those wishing to conduct spatial analysis in the study area for this report or elsewhere in the Valley of Mexico. The primary public source for spatial and demographic data in Mexico is the federal institution Instituto Nacional de Estadística y Geografía, or National Institute of Statistics and Geography (INEGI). The national census as well as all federally funded spatial analyses has ties to INEGI, and all of the data used in this report is from that source. The Marginalization Index comes directly from the National Population Council (CONAPO), where it was developed using data from INEGI. While INEGI is a rich source for spatial data, it is notoriously disorganized and data can be very difficult to access. This document is meant to serve as a starting point for those who wish to conduct further spatial analysis.

Notes on Data Acquisition:

- INEGI shapefiles and tables are publicly accessible but difficult to acquire; most of the data used in this report was acquired through personal contacts
- INEGI typically provides census data on CD-ROM in the form of .exe program files which need to be run in order to access the data
- You can contact INEGI directly at their office for more assistance:
  Av. Héroe de Nacozari Sur 2301
  Fracc. Jardines del Parque C.P.
  Aguascalientes, Ags. 20276 México
  Tels. (449) 910 53 00 ext. 5648
  Horario de lunes a viernes de 9:00 a 16:00 hrs.
- Some of INEGI's census geography shapefiles are readily accessible through INEGI's website:
  http://www.inegi.org.mx/geo/contenidos/geoestadistica/m_geoestadistico.aspx
- Tables and metadata for the National Population Council (CONAPO)'s marginalization indices are accessible through CONAPO's website:
  http://www.conapo.mx/es/CONAPO/Indice_de_marginacion_urbana_2010

Spatial Data Sources

- "ageb_urb.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "carretera_de_terraceria.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "intermitente.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "manzanas.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "municipo.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "perenne.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "camino.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "loc_rur.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "servicios_l.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "servicios_p.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "servicios_a.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "carretera_estatal_libre.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "eje_vial.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "curvas_de_nivel_100M.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "loc_urb.shp" [computer file]. Aguascalientes, Ags. M.X.: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "cuerpo_de_agua_perenne.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "nacional.shp" [computer file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.

Demographic Data Sources

- "Base_IMU 2010_CONAPO_VF.xls" [Microsoft Excel file]. México, Distrito Federal: Consejo Nacional de Población, 2010. Last modified 2012. FTP available online: http://www.conapo.gob.mx/es/CONAPO/Indice_de_marginacion_urbana_2010
- "cpv2010_manzanas_caracteristicas_educativas.dbf" [dBASE file]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "cpv2010_manzanas_viviendas.dbf" [dBASE Table]. Aguascalientes, Mexico: Instituto Nacional de Estadística y Geografía , 2010. Accessed from a personal hard drive, 2013.
- "México en Cifras" [Microsoft Excel file]. Aguascalientes, Ags. M.X.: Instituto Nacional de Estadística y Geografía , 2010. FTP available online: http://www3.inegi.org.mx/sistemas/mexicocifras/default.aspx?e=15

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Vita

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